

# SMART Symposium

Simple,  
Market based,  
Affordable,  
Repairable  
Technologies



Sharing 25 years of lessons learned in rural development by SMART Centres and SNV. Over 10 million people already benefit from the SMART approach:

- By local entrepreneurs
- Profit based sustainability for user and producer
- Clear ownership
- Creating Self-supply

The symposium covers key aspects of the SMART approach and provides the missing input for your next concept note.

Impact on SDG 1,2,6, and 8; income generation, food production, water & sanitation and employment.



November 2018. Mzuzu. Malawi  
More info: [info@smartcentremalawi.com](mailto:info@smartcentremalawi.com)

[www.smartcentregroup.com](http://www.smartcentregroup.com)



The  
**SMART**  
Centre  
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skat\_

SNV

Aqua for All

META



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## 1. Introduction

The SMART symposium was organized by the SMART Centre Group, Meta Meta, Aqua for All and SNV from 13<sup>th</sup> to 16<sup>th</sup> November 2018 in Mzuzu, Malawi. It gathered participants from different countries (Malawi, Zambia, Mozambique, Tanzania, Kenya, Ethiopia, the Netherlands, Spain and the United Kingdom) working on different fields related to water and sanitation. The goal of the symposium was to share ideas and knowledge on how to reach the Sustainable Development Goals (SDG) 1, 2, 3, 6 and 8 and to present the SMART Centre approach and other strategies. A summary of the discussed topics and activities during the symposium are presented in the following sections. The presentations can be requested through [info@smartcentremalawi.com](mailto:info@smartcentremalawi.com) and pictures can be found on [www.smartcentremalawi.com](http://www.smartcentremalawi.com).

## 2. The SMART Approach and other innovative approaches

Tuesday 13 July 2018

Ensuring universal access to safely managed drinking water for all, (SDG 6.1), does not seem possible according to the current trends. Unless we find innovative approaches and technologies and scale them up there will still be 225 million or more people in Africa without access to safely managed drinking water services in 2030. One way of getting closer to the goal is to improve water sources that families already have and stimulate **Self-supply**<sup>1</sup>. “Self-supply” means people providing and paying themselves, like having a well, a hand pump, a water filter or a rainwater harvesting system. Self-supply is used for domestic and/or productive use, is demand-driven, convenient and easily upgraded through the ‘water ladder’. Studies in Zambia indicate that families with a well share water with an average of 50 other people who do not have a well. So Family owned results in Community served. To accelerate Self-supply it is essential that there is a range of affordable technologies, a well-developed and local private sector, access to grants, microcredits, saving schemes and national policies. The lack of information about the existence of new low-cost technologies like new options to drill wells by hand, low cost hand pumps, options to avoid that shallow wells go dry etc is a main barrier to scale-up the Self-supply. Donors and government often prefer Communal supply system with large contracts with fast results. However incremental improvements and Self-supply are a way and probably essential to reach the SDG6.1.

### *The SMART approach*

‘SMART stands for Simple, Market-based, Affordable, Repairable Technologies. Examples are manual well drilling like SHIPO and Mzuzu drill, Rope and EMAS pumps, Tube groundwater recharge, Table top water filters, SaTopan latrines etc. The SMART approach focuses on these innovative and affordable technologies which are locally produced and therefore can be locally repaired, which increases the functionality. Scaling up Self-supply is one part of the **SMART approach**. Another focus is **productive use** e.g. agriculture, livestock, etc. The income from a well will increase functionality as well as stimulate rural

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<sup>1</sup> [https://en.wikipedia.org/wiki/Self-supply\\_of\\_water\\_and\\_sanitation](https://en.wikipedia.org/wiki/Self-supply_of_water_and_sanitation)

development. Promoting household water treatment at point of use is also key, since the water from the wells can be unsafe for drinking and the chances of the water being re-contaminated increase with transport and storage. Another focus of the SMART approach is **Market-based products, options** for which people are willing to pay. SMART Centres train the local private sector so that they provide these services and products with high quality. In this way, there will be a **profit-based sustainability**, meaning that companies generate income so continue after the project/SMART Centre stops. The result of the SMART approach is sustainable water supply but also positive effects on poverty reduction, food security and employment .

### *The Jacana Approach*

An example of the SMART approach is the work of the **Jacana SMART Centre** in Zambia. The cost per person of the Machine drilled wells and imported hand pumps, (the conventional communal water supply) is very high in areas with a low population density. Also the functionality of the imported hand pumps is often low. To overcome this, the Jacana way is based on productive water. A condition to get a sponsored pump via Jacana is that the users, often a family, will make money with the pump. To drill the wells and



Figure 1: Some of the presenters during the Symposium (clockwise): (A) Dr. Rev. Levi Nyondo, the General Secretary of the CCAP Synod of Livingstonia during the official opening of the SMART Symposium, (B) Rik Haanen from Jacana SMART Centre, Zambia, on the Jacana Approach, (C) Vandana Thottoli, from SNV Kenya, explaining about the SMART Water for Agriculture Program and (D) Henk Holtslag from the SMART Centre Group giving an overview of the various SMARTechs.

to produce the pumps Jacana selects entrepreneurs with business skills and coach them for 1 to 2 years until they have a business in well drilling and Rope pumps. Effects of this method is that families with a pump share water so **“family owned becomes community served”** The pump functionality is high, over 95% since there is a clear ownership. Another impact is that the **sponsored pumps create a market for Self-supply** so an increasing number of (middle) income families buy their own wells and pumps. This results in a sustainable supply chain of products and services after the SMART centres stops projects.

### *Faith & Water*

Another approach to reach the small remote communities is the **Faith & Water** program as practised in Malawi. People trust their church leaders and churches are present in the smallest and most remote communities. It appears to be very effective to train the leaders and laymen in Low cost and local water and sanitation solutions so that they can inform and train their communities. The importance of water and sanitation is shown through Bible passages; in this way, the church leaders feel more responsible and committed to this field. The trainings include practical and visual examples of SMARTechs and the development of a 10-step plan for the congregation.

### *Farmer clubs*

A strategy for rural development is taking place in Mozambique via so called **“Farmer Clubs”**. A group of 20 to 50 farmers get a training on how to increase their productivity e.g. composting, crop rotation, and irrigate with a hand drilled well and Rope pump. After the training, some farmers go on themselves or in small groups. With the profit from irrigation in the future they managed to pay for an additional well to increase the size of their garden.

### *Well clubs*

An option to reduce the cost of wells to a maximum is the so called **“Well club”** This is applied in Bolivia. When 10 families are interested in getting a household well the form a club. Than one or two people from each family get together and are trained by an NGO in constructing 2 wells. After that, the group of trained people continue and make a well in each of the families. In this way families can have wells at the cost of Labour and materials and so make wells of 150 to 350 US\$ depending on well depth size of casing etc. In Bolivia the NGO **“Water for all International”** who has drilled over 4000 wells this way, pays for the materials supports with the drill sets and training and give long-term follow-up. Simple drill technologies like the Mzuzu drill seem fit for this approach and in Malawi over 70 wells have been drilled with this technology in wells up to 15 meter deep. A challenge with the action of the NGO like WFAI when they stops, drilling activities stop as well. So SMART centres are investigating how to make this approach a business model. For instance a local pump produced rents out drill sets, sells training days and sells the pump.

### *SMART Water for Agriculture (SWA)*

The use of multi-stakeholder collaborations and horizontal learning, especially engaging the private sector is another innovative approach that the **SMART Water for Agriculture** program from Kenya follows to improve on-farm water productivity. Key in the approach is ensuring supply chains are in place both for the technologies to extract and distribute the water as well as on the buying side of the produced crops.



As an example of a knowledge hub, Paul Kiriinya from the Kaguru ATC explained the set-up of their centre and how they have put the SWA approach into practice.

### *Water Harvesting/ groundwater recharge*

A key element for both Communal and Self-supply is water harvesting, especially in arid areas. In most areas there is enough rainwater to meet the human needs but the problem is that due to changing rain patterns, erosion etc (partly the impact of climate change) in many places 80% or more of the rainwater flows to rivers and sea and is not stored in the ground. SMART Centres promote the MetaMeta concept of 3R: Retain, Recharge (infiltration of rain and run-off water), and Reuse (consider drainage and wastewater a resource). The SMART centres promote the so called Tube recharge, a technology that is installed near wells and so can avoid that it dries up. Material cost of 10 US\$. Technologies to be used depend on the context and the needs.

One option developed by MetaMeta is **Roads for Water**. It is applied in Ethiopia, Bangladesh, Kenya, Uganda. Harvesting the water from the roads is a triple win: it reduces the water damage to roads, reduces damage from the roads to the environment (flooding, erosion, sedimentation) and the harvested water can be used for a productively. Considering the high investment in roads and the many plans on constructing new ones, this initiative is considered to have a lot of potential.

Another initiative is the **Sponge City** project in Kenya developed by MetaMeta, where the objective is to create a water buffer in an urban environment through various techniques like roof harvesting systems, gully plugging, kitchen gardening and road water harvesting.

It is very important to integrate and to support water harvesting initiatives in the SMARTechs. Not only to increase water access via wells, but it would also help in marketing and ensuring acceptance by the Government of Low cost technologies. If a family can say that the water they uses is Rain water collected from roof , garden etc and so there is less danger of depleting groundwater Options like Household wells be more accepted by governments.

### *Household Water Treatment*

In many sub-Saharan countries, only a small part of the faecal sludge is safely disposed of; the biggest part is not properly managed and ends up in the environment. This poses a risk to the wells and boreholes. Also Family wells in general use the shallow, top aquifer. Other problems are that even where there is safe water tap point water becomes re-contaminated in transport or storage. That is why The SMART approach has a strong focus on Point of use treatment with Household Water Treatment and Storage (HWTS) options. Of the options of boiling Chlorination and filters, studies indicate that filters are the most effective because their consistent use. Challenges are building up supply chains of affordable filters.

A new initiative started in Ethiopia, the so called “**Utility approach**”. As an intermediate solution Water Utilities who see that the cannot deliver safe water 24/7 sell filters that are paid through the water bills or other payment systems. The organisation Aqua for All is stimulating supporting this. Another HWTS initiative supported by Aqua for All is the Safe Water for all in Malawi (SWAM) program. Investigations are going on to use carbon credits to promote filters (avoiding CO<sub>2</sub> emissions). The dissemination will not

primarily take place via water utility companies like in Ethiopia. At this stage it is not financially interesting for businesses to invest in HWTS so support is needed to attract investors.

### 3. The SMARTechs

Wednesday 14 July

In the SMART approach, as explained before, the focus is on market-based and affordable products to ensure that people will buy products without the support, subsidy of NGOs. It is estimated that there are between 2 and 3 million hand dug wells in Sub-Saharan Africa. Options to improve them as well as making new wells with manual drilling methods were presented during the Symposium. A visit to the CCAP SMART Centre in Luwinda, Mzuzu, was an opportunity to see some 20 different technologies in real situations. Table 1 shows the different technologies presented.

Table 1: The SMARTechs presented during the symposium

Type of technology	SMARTech
Improvements hand dug wells	Small diameter hand dug wells Well ventilator for fresh air Well reducer rings (bricks or blocks) Prefabricated well cover Underlining (deepening from top down) Tube bailer (deepening from outside the well)
Manual drilling methods	SHIPO method Mzuzu method
Lifting devices	Windlass Rope pump (model 1, 2, 3, 4) EMAS pump Treadle pump / MoneyMaker Solar Rope pump and Wind Rope pump Future pump SP
Water storage	Wire-brick cement tanks
Rainwater Harvesting	Ghana gutter
Tube recharge	Tube recharge, (vertical and horizontal tube) Double pit Well recharge from roof or ground run of
Irrigation	Drip irrigation with microtubes Irrigation sprinklers
Household water treatment	Chlorine Household water Filters
Water testing	Hach pillow pack 3M Petri Film
Sanitation	Corbelled latrines SaTopan seat Dome slabs and SanPlat



Figure 2: An impression of the visit to the SMART Centre (clockwise) (A) Jetting drilling in action, (B) Demonstration of the Money Maker hip-pump, (C) Isaac Mkandawire explaining the composition of a drill set and (D) A visit inside the SMART Centre Workshop

An evaluation study on the Rope pumps in Northern Malawi showed that functionality of the pumps is higher for private pumps than for communal ones. In addition, the water quality test showed that the deeper the borehole is, the fewer the chance for contamination with E. Coli. In this way, it was pointed out that although the different pump models are often related to different water quality levels, the pump does not necessarily have an effect on the quality, but it is the depth of the borehole and the finishing of the borehole, the hygienic seal, that matters most.

#### 4. Business development, Marketing, Strategy to scale

Thursday 14 July

To have impact it is essential to scale-up SMARTechs so that more and more people can benefit, including the poorest, the people in remote areas. But, how to do it? This was a very much discussed point during the symposium. Establishing key partnerships is crucial for this: national and local governments, NGO-s, private sector and financial institutions need to work together.



It is essential that Governments are aware of the existence and potential of these technologies and accept them as one options to increase sustainable access. Presenting and examples of supported “Self-supply”, additional to communal supply would help Policy makers to recognize them. Inviting government members to the trainings like Jacana SMART Centre did, or attending government meetings can help starting new relationships. Roads for Water, for instance, is already working in Kenya with County Governments and Road Authorities to integrate their approach in their projects and guidelines.

It is also important to make donors and Governments understand that time and long term training is needed to achieve sustainable results. Collection and analysis of the existent data on existent technologies, trained private sector, beneficiaries, activities, etc. is very essential for marketing and when looking for funding. The use of webpages and social media to publish them has a lot of potential and can attract new donors.

Regarding the training of entrepreneurs, it is important to select promising and motivated entrepreneurs and to monitor and guide them at least for two years and very frequently at the beginning. To guarantee quality companies can be certified and names of qualified companies can be published on website of SMART Centres like Malawi is now doing. To keep enough market not too many people should be trained in the same district because there would be too little work for each of them..

The “Try & Buy” system for table Top Filters in Malawi is an example on how to create a demand in an area. After contacting the village leaders, a training was provided to interested people on hygiene and filters. At the end of the training, people can take a filter to try it during 2 months and after that trial period, they decide whether to buy it or not. 98% of the households bought a filter and after 6 months more than 80% were still using it 24/7.

## **5. Becoming a member of the SMART Centre Group (SCG)**

Thursday 14 July

Some of the participants of the SMART Symposium were interested in establishing a SMART Centre in their country and some guidelines were provided for that.

The SMART Centre Group is coordinated by the Dutch organization MetaMeta (MM). Although the SMARTechs and the SMART Centres can vary from one to the other, they share the same vision: water and sanitation for all; safe water for drinking and water for productive use; and focus on rural and peri-urban areas and to reach the poorest. This is achieved through developing a local private sector. Each SMART Centre belongs to an already existing local organization or institute in the country and is legally registered in the country of operation. Each Centre is responsible for its own funds and tries to become financially self-sustaining. The technologies and the manuals production and installation need to be approved by MM. Monitoring and evaluation is done with mWater monitoring tool and the SMART Centre Group logo needs to be used. Apart from SMARTechs, it is also possible to train in “conventional” technologies. In the future, the SMART Centres want to expand to other sectors like agriculture, environment, energy, employment.

The participants interested in establishing a new SMART Centre had a group discussion where they looked at particular cases and started setting up ideas. The rest of the participants had a meeting to tackle how their organizations could benefit from the SMARTechs, using the outcomes of the SWOT evaluation of their own WASH programs.

## **6. Successful examples: Entrepreneurs and Beneficiaries**

Thursday 15 July

During one of the sessions of the symposium, six entrepreneurs trained by the CCAP SMART Centre presented their stories about how they got in touch with SMART Centre, how they started their business, their challenges and their successes (Figure 3).



Figure 3: Session with six entrepreneurs trained by the CCAP SMART Centre

On the last day of the symposium, field visits were arranged to the workshops or houses of some entrepreneurs as well as to the plot of a user of the SMARTechs. The entrepreneurs involved Mr. Kennedy Gondwe, working in sanitation issues: builds and sells toilet slabs and harvests human manure and urine for growing his crops (Figure 4a). The driller Mr. Elias Mzumala showed the house he is about to finish building and which is already rented to university students. He also explained the role of the gravel pack and the casing through some practical examples (Figure 4b). In the workshop of the Mr. Alex Chakwanira and Mr Essau Mweso we could learn about the different tools needed to drill both in SHIPO and Mzuzu method, the jigs for the Rope pump production and different and innovative Rope pumps in use (Figure 4c and d).



Figure 4: Visit to the entrepreneurs working in sanitation, drilling and welding.

In the afternoon session, participants had the chance to visit Mr. Israel's plot in Mzuzu city, where he is making use of different SMARTechs to grow maize, cabbage, tomatoes as well as rearing livestock. Some of the produce is sold through his own shop at the side of the road. Although at the beginning using the drip irrigation kit was a challenge, now he says it finds more advantages than disadvantages. Before using it, he needs to make sure that the microtubes are in the correct place and adjust them because they often move slightly as a result of expanding and shrinking due to changes in temperature. However, he has realized that the use of the kit saves him time, effort and water: he manages to do other things while the drip is working and the water is directed to the plant. Apart from the crops, he uses the water from the boreholes for domestic purposes and to grow rabbits and pigs. He has four boreholes at his plot: one with the rope pump model 1, other with the rope pump model 3 connected to the water tank and the third one connected to a submersible solar pump. The fourth well has not yet



been equipped with a pump. All wells were constructed by Mr. Israel himself using hand digging in one case and Mzuzu Drilling in three other cases.



Figure 5: (left) The Rope pump model 3 at the garden of Mr. Israel and (right) the low-pressure drip system installed and currently in use to irrigate a crop of maize.

## 7. Conclusions and way forward

- In general the SMART approach has huge but yet untapped potential to help in reaching the SDG6.1 but also have positive impact on SDG 1, 2, 5 and 8
- Self-supply, family-owned wells for productive use increases the functionality of the pumps serves water to small communities and create rural development in general
- To scale Self-supply it is important to have a range of options for people to choose from
- With the climate change the several options for water harvesting, groundwater recharge should be promoted much more
- To scale SMARTechs it is important that they are accepted by Governments
- To scale knowledge on SMARTechs it is essential to get knowledge into vocational education systems of each country.
- To scale the SMART approach participants can promote it in their country and look for funding options to expand existing or start new SMART centres.

A summary of the Symposium can be accessed through a blog of Vandana Thottoli of SNV Kenya.

<https://rsr.akvo.org/en/project/4296/update/24199/>

## **ANNEX A    SMART Symposium Program**

### **Day 1 – Tue 13 Nov 2018 – Theme: The SMART Approach and other innovative approaches**

1. The SMART approach (Henk Holtslag)
2. Potential and experiences of introducing Self-supply acceleration/support (Sally Sutton)
3. From community to private ownership (Rik Haanen)
4. Faith & Water (Rianne Veldman)
5. Farmers Club and Well Clubs (Henk Holtslag)
6. Water harvesting + Recharge: roads for water & sponge cities (Luwieke Bosma)
7. SMART water for agriculture program (Vandana Thottoli and Paul Kiriinya)
8. SWAM model / SAFI water (Joe DeGabriele)

### **Day 2 – Wed 14 Nov 2018 – Theme: Innovative technologies. SMARTechs for water supply, agriculture/ productive use, sanitation, Household Water Treatment**

1. Overview of SMARTechs (Henk Holtslag)
2. Evaluation of Rope pumps (Andrew Kamanga and James Mhango)
3. Evaluation Try and Buy approach in Usisya with Water filters (Rianne Veldman)
4. Regulations and Scaling-up (Reinier Veldman and Rik Haanen)
5. Promotion and Track Record (Rik Haanen)
6. Visit to demonstration field ( CCAP SMART Centre)

### **Day 3 Thu 15 Nov 2018 – Theme: Business development, marketing support, coaching, future joint activities**

1. Business Development and Selection of entrepreneurs (Rik Haanen)
2. Examples of established Malawian Businesses (Elias Mzumala, Alex Chamwanira, Essau Mweso, Brighton Kaniki, Isaac Mkandawire and Kennedy Gondwe)
3. Starting a SMART Centre (Henk Holtslag)
4. Cooperation (Reinier Veldman)
5. Evaluation (Reinier Veldman)

### **Day 4 – Fri 16 Nov 2018 – Optional day, Field visit + network building**

1. Field visits to entrepreneurs:
  - a. Pump producer Essau Mweso
  - b. Pump producer Alex Chakwanira
  - c. Sanitation Entrepreneur Kennedy Gondwe
  - d. Driller Elias Mzumala
2. Field visit to users of SMARTechs
  - a. Mr. Israel