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WASH Field Note FN/03/2018

Multiples Uses of Water in Madagascar: drinking water - agriculture - livestock

SUMMARY BOX

Multiple Uses Services (MUS) is an approach being supported by UNICEF and partners to help build drought resilience for the poorest communities in Southern Madagascar. The MUS approach aims to meet both households' domestic and livelihood needs whilst at the same time, ensuring the most efficient use of water resources. The programme operates on 3 basic principles: i) sustainability of groundwater resources needs to be ensured, ii) water services are to be paid for and iii) the quality of water for drinking purposes must be preserved. There is a major incentive to keep MUS functional (more so than single-use water systems) as livelihoods depend on it. Cost recovery and attention to maintenance are improving with time.

Introduction

Over the past two decades, Madagascar has experienced an increase in extreme weather events as a result of climate change. The main impacts of climate change have mostly been felt through water.

More specifically, this has led to:
(1) extended drought periods;
(2) increased unpredictability and variability of the rainfall regime;
(3) intensification of cyclones;
(4) increased flooding associated with cyclone disturbances.

Examples of impacts already observed include:

- Increased water stress (irregular rainfall patterns and drought in some areas);
- Decreasing yields and soil fertility loss;
- 30-60% of the population of Southern Madagascar suffering from food insecurity due to drought periods;

The general approach adopted in Madagascar to identify climate adaptation measures has been to concentrate on the sectors regarded as most vulnerable to climate change (for example Agriculture and Water).

Adaptation measures were highlighted by the *Politique Nationale de Lutte contre le Changement Climatique* developed in 2010. This national policy has, as first strategic target, to "strengthen adaptation to climate change, considering Madagascar's realistic needs".

Priority Actions established by the Government of Madagascar to be implemented by 2020 include:

- Establishment of a climate resilient Water, Sanitation and Hygiene strategy, and
- Development of agriculture model pilot programmes that combine watershed management, rehabilitation of hydro-agricultural infrastructures and use of drought-resilient crops.

Expected impacts from the implementation of these actions towards 2025 aim at reducing the incidence of hunger and food insecurity events associated with drought periods, particularly in southern Madagascar.

This Field Note focusses precisely on the southern region of Madagascar and documents an innovative collaboration and approach to support Multiple Uses of Water. It explains the rationale behind the approach, the technologies involved and the benefits and mangament of the systems.

KEY POINTS

- *A Multiple-Use Services (MUS) approach is broadly defined as meeting both people's domestic and livelihood needs in an integrated manner, whilst at the same time, ensuring the most efficient use of water resources.*
- *Through the implementation of MUS approach, the provision for safe drinking water, small scale irrigation and livestock simultaneously increases productivity and time-saving, which in turn improves livelihoods, health and food security.*
- *This program is implemented through multiple stakeholders who lead in the areas covered by MUS.*
- *Water services are to be paid for.*

Description of Intervention

1. Objectives of the strategy of multiple uses services (MUS)

People in rural and peri-urban areas predominantly require water for drinking, cooking, washing, sanitation, watering animals, growing food and generating income. Most water projects only meet some of these requirements – focusing solely on either domestic or productive needs. A multiple-use services (MUS) approach is broadly defined as meeting both people's domestic and livelihood needs in an integrated manner, whilst at the same time, ensuring the most efficient use of water resources (Van Koppen et al., 2009).

Since 2015, UNICEF, in partnership with the National Department of Water, Sanitation and Hygiene, has supported the construction or rehabilitation of more than 600 boreholes (fitted with handpumps) in the Androy and Anosy regions. Each of these water points provide drinking water to an average of 200-300 people per community. In addition, 17 new solar powered water systems have been built or are under construction in those regions. Given the state of recurring droughts in southern Madagascar the MUS approach aims to use these existing, functional water points to support the development of small-scale agricultural and livestock activities. The ultimate aim of this is to strengthen the resilience of communities to

the impacts of drought, to promote socio-economic development and improve food security in the region. Through the implementation of MUS approach, the provision for safe drinking water, small scale irrigation and livestock simultaneously increases productivity and time-saving, which in turn improves livelihoods, health and food security – something which also helps strengthen resilience. This approach also encourages the economic sustainability of water services as service providers and operators generate increased revenue as water consumption increases. At the same time MUS also increases demand as communities realize the benefits of multiple uses. These benefits needs to be balanced with a sustainable use of the constrained resources.

Table 1. Single use system vs. multiple use system

Single use system	Multiple use system
System is designed for single use	System is designed for multiple uses
Water demand is projected for single need	Water demand is projected for multiple needs
Potential conflict around the use and allocation of water for competing demands	No or reduced conflict as water demand is already incorporated while designing the system
No or limited focus on livelihood improvement of vulnerable communities	Fully focused on livelihood improvement of vulnerable communities
Less supportive of integrated management of water resources	A tool for integrated water resources management
Focus on using available water only for single purpose with conventional practices	Designed to use available water resources optimally, with inclusion of effective and efficient water technologies

2. Multi-stakeholder coordination and general principles

This program is implemented through multiple stakeholders who lead in the areas covered by MUS as follows:

- **Drinking water supply:** Ministry of Water, Energy and Hydrocarbons (MEEH)[1] and UNICEF
- **Agriculture development:** Ministry of Agriculture and Livestock; and the United Nations specialized agencies International Fund for Agricultural Development (IFAD), and Food and Agriculture Organization (FAO)
- **Livestock production:** Ministry of Agriculture and Livestock

Other key actors involved in the pogramme are:

- The National Office of Nutrition (ONN) in charge of the follow-up of the implementation of the National Nutrition Policy in collaboration with the ministerial structures and the Institutions of the United Nations. The ONN is also in charge of multisectoral and multi-actor coordination in nutrition and food security. The ONN and UNICEF support important elements of MUS such as household awareness, and lead discussions with water and nutrition associations.
- AROPA, a project of the Ministry of Agriculture, Livestock and Fisheries co-financed by the International Fund for Agricultural Development (IFAD). AROPA works to strengthen agricultural organizations, helping them improve income generating activities and reduce the vulnerability of small-scale producers (especially the poorest) by facilitating access to a range of services and equipment adapted to their needs.

[1] Ministère de l'eau, de l'énergie et des hydrocarbures

The partners supporting the implementation of MUS use their own human and financial resources to implement their respective activities according to their mandates, whilst also ensuring close coordination. They work towards the common goal of enhancing community development and strengthening the the resilience of vulnerable populations. This collaboration does not include any financial transfers between partners, except in special cases. The partnership respects three basic operational principles:

1. **Sustainability of groundwater resources needs to be ensured**. The development of new uses of water must be compatible and ensure the sustainability of the available water resources, avoiding at all times, overexploitation or compromising the use of water for drinking.

2. **Water services are to be paid for.** A payment system exists for drinking water; therefore a mechanism needs to be in place to ensure effective payment for agriculture and livestock use of water.

3. **The quality of water for drinking purposes needs to be preserved.** Activities related to agriculture and livestock development need to occur in a manner that does not compromise the cleanliness and safety of water points, especially those where water is being collected for drinking purposes.

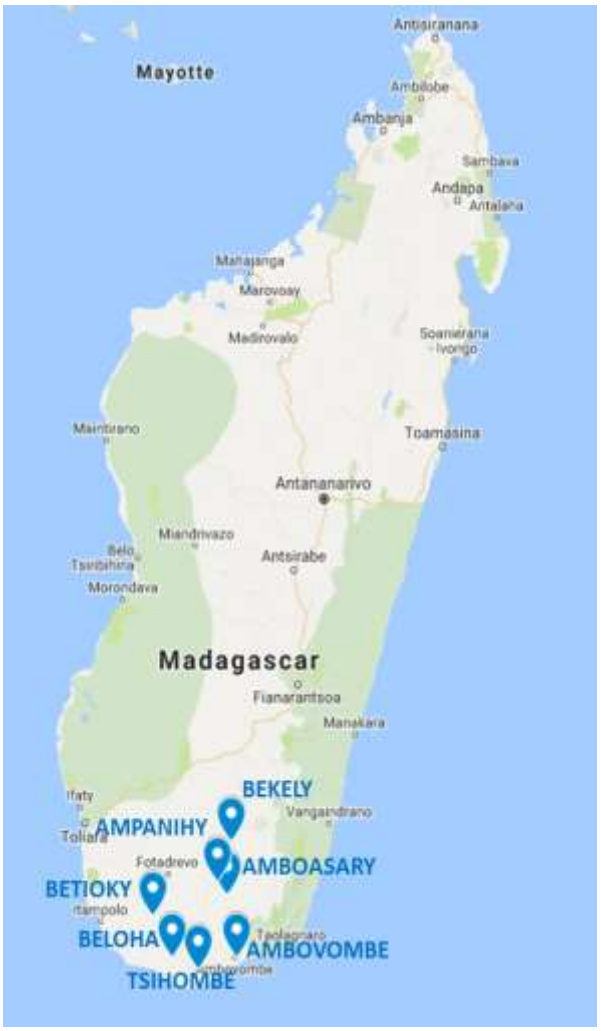
3. Geographic targeting and scale

The South Regions of Androy and Anosy, and more specifically the districts affected by droughts are the ones targeted and currently benefiting from the MUS programme. The selection of those regions was also done based on the convergence of the programmes of the partners involved. The baseline was established considering the list of water points constructed or rehabilitated by MINEAH-UNICEF and taking into account the priorities established by all the partners.

The collaboration started in 2016 and tested with 20 pilot schemes in the district of Bekily. Right now the approach is being scaled up to 72 schemes (52 in Androy and 20 in Anosy). Depending on the successful implementation in those regions the programme could then potentially be extended to the Atsimo Andrefana region.

Table 2. Geographic targeting

Region	District
Anosy	Amboasary
Androy	Bekily, Tsihombe, Beloha, Ambovombe
Atsimo Andrefana	Ampanihy and Betioky



4. The technology

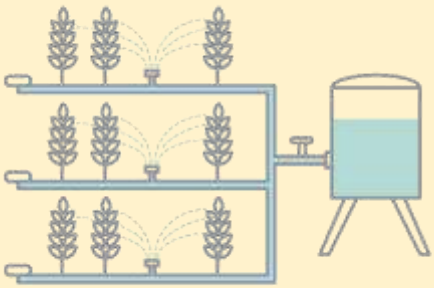
The technologies involved in a MUS approach are already well known within the water sector and are not ”MUS specific”. Nor is there a specific preferred technology for MUS. Most of the proven water technologies can be used for MUS, but attention must be paid to the local context along with sustainability issues.

When it comes to MUS, the main issue is ensuring smart combinations of technologies. The quality of technology and construction needs to be ensured so that investments are cost-effective and durable in the longterm. Community members need to be trained so that they can carry out small repairs, operation and maintenance using locally available resources as required. In the case of MUS in Madagascar the following specific technologies are being used:

Water point

Schematic	Technologies/infrastructure
	• Boreholes mechanically or manually drilled (average depth 10-40 meters) • Lifting device: 1. Handpumps: a) Hydro-India 60 (VLOM). Flow between 0.6 m3/h to 1.8 m3/h approximately for depth 30 to 60 meter and 1.8m3/h to 2.4 m3/h for depth 10 – 30 meter. Capacity to lift at 10 meter to fill the tank b) Vergnet 2. Submersible solar pumps (for mid-scale water systems) • Connexion to irrigation system • Fencing

Small scale irrigation system

Schematic	Technologies/infrastructure
	• Water fed directly from borehole to a storage tank • Small storage tank (200/400 liters) • Platform/stand (1-2 meters above ground) • Set of valves and micro irrigation tubes servicing an area of 100-400 m2

Watering livestock system

Schematic	Technologies/infrastructure
	• Water transported manually or fed directly from borehole to a concrete water trough • Concrete water trough built at a minimum distance of 200 m from the borehole

5. The beneficiaries

The first component of the MUS approach in Madagascar begins with a campaign to mobilise communities. Speicifc information given to households includes:

- An explanation of MUS and how it differs to existing systems
- How MUS is set to benefit the communitiy
- Defining the roles and responsibilities of, different stakeholders and service levels, particularly in terms of sustainability and day-to-day management
- The importance of MUS in the context of climate change, in particular droughts and links to nutrition and food security.

Based on the orientation and willingness of the community, there is a self-managed process, with support from the Ministry of Agriculture, to select the families and households benefiting from MUS. A users' group with an executive body (i.e. President, Vice-President etc) is established. Both processes to select families and households benefiting from MUS and the selection of the executive body are inclusive in nature ant take into account the needs of disadvantaged families in the community.

The approach has responded to critical but distinct needs: firstly, to secure water for drinking but also those of poor families to create a new means of income and livelihood. The beneficiaries of the small-scale irrigation systems, mostly poor women growing vegetables, have been able to increase their revenues, partly because of the time gain generated by the use of MUS.

Communities can now can plant vegetables year-round in cycles of just 3 to 4 months. Vegetables grown include garlic, onion, breeds, tomatoes, carrot and pumpkins. The micro-irrigation groups have experienced significant improvements in their cash income flow, household nutrition and food security as a result of the program.

SMALL SCALE IRRIGATION USER COMMITTEE IN AMBOMDROMBE

Ambomdrombe is a small village with 284 inhabitants, located in the southern Androy region of Madagascar. There are two boreholes fitted with handmpumps, one provides drinking water to the community and the other one is located within school premises to provide water to the school.

Since 2016, the MUS approach has begun utilizing the school's water point to provide water for a small-scale irrigation scheme. An association of 20 women manage the system, which includes the preparation of the terrain, filling the water tank twice a day and cultivating the land.

All households in the community pay 13,000 Ariary ($4.50 USD) per family per year for immediate household consumption needs (drinking etc). This revenue also covers the operation and maintenance of the irrigation scheme.

The scheme has 26 lines that can be cultivated in cycles of 3 months, allowing for up to 4 crop growth cycles per year. The pre-analysis conducted by FAO indicates that one line can produce a revenue of 200,000 Ariary ($68 USD) per cycle. Extrapolating that to the full irrigation system means a potential revenue of 20,800,000 Airiari ($7,070 USD) per year. The community however intends to keep keep 20% of the production for their own consumption.

The next steps are for UNICEF and the partners to upgrade the system so that a new pump will be able to feed the water tank directly making the operation of the system much easier and efficient and ease the burden for the women.

6. Management and community organization

In Madagascar, water points fitted with handmpumps are usually the starting point for the MUS approach. They are usually managed by water committees which comprise of community members. Normally, one water committee exists per water system. The Regional Directorates of Water, Sanitation and Hygiene in Androy and Anosy also oversee the systems to ensure that handpumps are functional.

An association called FIFARAFIA and based in Ambovombe currently has a contract with the Regional Directorates and is responsible for the operation and maintenance of water points.

Households pay around 12 000 Ariary ($4 USD) per household and per year, for the water used for drinking and at household level. Payment of this fee usually happens after harvest.

Followng the introduction of MUS approach, partners have discussed and agreed upon a set of operational guidelines including the provision of repair and maintenance funds. This is based on the principle that water use, beyond water for drinking, should also be paid for.

Table 3. Water consumption figures

Water drinking consumption per waterpoint: serving an average of 250 people with 20liter/day/person = 5,000 liter/ day
Micro irrigation consumption: 2 tanks of 200 liter = 400 l / day
% of consumption for micro irrigation is around 7.5% (Low impact on water resources)

The Executive Committee of the water committee are responsible for overseeing the small irrigation schemes and are trained to coordinate the daily operation of the system. In most cases, they are also responsible for the collection of water fees as decided by the users' committee.

The programme is still very much in it's initial stages as some communities are still transitioning from a culture based on not paying user fees for irrigation. At this point, it should also be noted that some of the agreements are purely verbal and partners have agreed to follow up on this to make sure that water tariffs for the different uses are clearly established from the onset of the MUS programme.

In each community, caretakers are trained to ensure smooth functioning and consistent operation of the MUS. These trainings, provided by the Ministry of Agriculture, include operation and maintenance, financial management, record keeping, source protection, micro-watershed management, use of micro-irrigation technologies, crop production, and market linkages.

To ensuere the sustainability of the water resources, the monitoring of water table levels will also take place to avoid overexploitation and water scarcity.

OUTCOMES

The MUS prgoramme is bringing multiple positive benefits to several districts in southern Madagascar which are being affected by intense drought:

1. MUS is having an impact on the multiple dimensions of poverty by taking a livelihood perspective and supporting services which provide explicitly for actual water demands, both domestic and productive. By strengthening and diversifying water supply options within the community, the approach also contributes to improving climate change resilience.

2. MUS is also improving the sustainability of water systems at the community level because of the greater level of economic integration of systems within communities. Cost recovery and attention to maintenance are improving with time, more so than is the case for single-use systems. The benefits of this go beyond climate change and are an example of effective and sustainable programming in the long-term.

3. The new crops are contributing to the diversification, promoting better nutrition and sustainable harvests, further increasing households' food security, economic stability and children's nutrition. This helps improve resilience to drought.

4. Women's earning potential has increased as a result of the small-scale irrigation schemes which allow new users, mostly women, to cultivate crops and to improve their economic resilience to drought and climate change. The benefits of this go beyond climate change resilience, they have also been instrumental in ensuring economic sustainability and the empowerment of women.

LESSONS LEARNED

In the case of limited availability of water resources, it is essential that implementers and policy makers understand the multiple demands of communities and commit themselves to meeting these demands by providing multiple use water services, in a sustainable and equitable way. Building a stronger evidence base, which goes beyond anecdotal evidence, would be one way of doing this. For example, carrying out a thorough cost-benefit analysis would help provide a strong advocacy tool, particularly if it includes data on the increased financial sustainability and increased willingness to pay for such systems. The economic benefits for women and their families could also be included, along with the increased financial benefits of improved health and nutrition.

Integrated planning and management, taking into account the comparative advantage of the implementing partner but more importantly, taking into account water demands for different uses, and how these may develop over time, is key in providing sustainable multiple use services.

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CREDITS

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ABOUT THE AUTHORS

- Silvia Gaya – UNICEF WASH Chief Madagascar
- Luc Herrouin – UNICEF WASH Program Manager;
- Naina Rakotoniaina – UNICEF WASH Specialist Madagascar
- Jose Gesti – UNICEF Water and Climate Specialist Headquarters
- Emily Bamford – UNICEF Wash and Climate Specialist Headquarters

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United Nations Children's Fund
3 United Nations Plaza, New York, NY 10017, USA

For more information, please contact: WASH@unicef.org

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