



Improving Sanitation Project Management for Unsewered Rural Communities in Morocco

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ABSTRACT

The hydraulic potential in Morocco is limited, droughts are more frequent, resulting of climate change, and increasing water demand relating to the population growth and socio-economic development. Morocco has invested in the urban sanitation sector through the establishment of the National Liquid Sanitation Program. In rural Area, the intervention in this sector remains limited due to various constraints. In order to support the efforts of establishment of the National Rural Assainissement Program (PNAR), we conducted a case study that recommended the treatment of wastewater by an innovative process used for the first time in Morocco. We realized, first, a pilot experiment at the douar (Unstructured Village) Talat Marghen within the rural Municipality of Aghouatim a few km from Marrakech. The innovative aspect of the project is managerial proposes covering the different technical aspects, management and institutional innovation, to meet the various constraints that characterize the rural areas.

Keywords: Morocco, sanitation, decision maker, statistical analysis.

1. INTRODUCTION

In the Middle East and North Africa, small communities have virtually no access to centralized wastewater collection and treatment systems. In the absence of such services, sewage disposal is often left to the discretion of homeowners. In many cases, untreated sewage is discharged into surface waters or the landscape, contaminating already dwindling surface water and groundwater resources. This practice will continue unabated unless

appropriate and affordable treatment systems are made available

The project will develop, test and promote low cost sustainable technologies for decentralized wastewater treatment through a partnership of local communities, research institutions, government and businesses.

After selecting the pilot technology to be installed in Morocco (Talat Marghen village), the design specifications for technology were identified, MSL: Multi-Soil-Layer-ing, in accordance with the assessment of wastewater quality and quantity.

The results of the technologies piloted and implemented in Morocco will be compared, according to socio-economic and technical criteria. The project asks for the best way to adapt the wastewater treatment systems for small communities in MENA region and some part in Africa.

The goal is to develop engineering tools based on a set of fundamentals principles to ensure the success of the project, improving population health and sustainability of sanitation services in the pilot village object of our study, it is:

- The participatory approach is a reliable tool integration of the social aspect. Indeed, it allows the population to be the primary author of development of its territory by articulating their problems, needs, obstacles and opportunities.
- The need to involve both the social aspect and technical aspect throughout the project cycle.

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- Well formalized project is the result of a well-studied pathway. This means that it is not at formalizing a project that is being built but it is the culmination of a thorough identification and a simple and rigorous planning conducted further upstream.

2. MATERIALS AND METHODS

Douar Talat Marghen is on the watershed of Wadi Ghighaya at 39 km from Marrakech and 4 km from the center of Tahanaout on Regional Road 203 south. Administratively, it is located in the rural commune of Aghouatim in Al Haouz province within the region of Marrakech Tensift Al Haouz in southern of Morocco, characterized by a semi-arid climate.

In order to plan the major guidelines of our project to the time scale on the one hand, and identify solutions that respond most effectively to different problems and needs identified and the actions and resources needed to achieve these results, on the other hand, a methodology was followed taking into account the involvement of the population, and to analyze and identify the main actors and their roles in the field of planning and management of the site sanitation subject to our project.

Interactive participation is the basis on which it was founded, to plan our project, with a view to promoting sustainable management of our wastewater system, where the population took part in the diagnosis of the current situation of the village, which leads to action plans, training and strengthening of interest groups. These groups take local decisions, and to the perpetuation of the sanitation department to implement.

The current approach involves a series of steps, including:

Step 1: Diagnosis and description of the inventory knowledge of the environment.

Step 2: Identification of problems and solutions.

Step 3: Education / awareness of population on the environmental challenges and opportunities to act on the environment.

Step 4: Organization management and programming of actions, by strengthening the capacity of non-governmental organizations (NGO) working in the field of the environment in general and in particular sanitation.

All these steps were carried out in three phases, with a multidisciplinary team of economists, sociologists and environmentalists, with the participation of the population, between the periods of January to May 2014, these three phases are:

The preparatory phase: consisted of outreach, coordination and awareness to optimize the acceptance of the whole

project and its progress, during which we introduced an awareness triggering accountability in order to generate voluntary process at the village level.

At this stage two strategic lines of communication on which it was based on:

- Axis of internal communication, whose main objective is the establishment of a partnership between NGO, municipalities and local authorities to involve and mobilize the support and success.
- Axis external communication whose purpose is the implementation of a process of empowerment and ownership of the sewerage system that will be implemented by the people of the village beneficiary of this project.
- Several actions are carried out for a comprehensive social communication including:
 - Information and coordination with local policy-makers and elected meetings.
 - Meetings on site with the target population (residents and community groups including women and children) to sensitize them about the importance of their implications and their membership in the project.
 - Participation in Fairs, Conferences, Seminars to inform professionals in the private sector, researchers, engineers on the project, achievements and opportunities.

Participatory diagnosis phase: during which we established the environmental and socio-economic profile, identifies the potential of the village, analyzed the problems and sought the most appropriate solutions, in preparation for field surveys based on Rapid Rural

The planning phase: where we validated in agreement with the village population of Talat Marghen, the different activities within the project, analyzed the social, technical, economic, financial and institutional feasibility of these actions. During this phase an institutional framework for sustainable management was approved.

2.1 Managerial aspect

The main challenge remaining for the management of sanitation, according to the results of the participatory diagnosis of Douar Talat Merghan, is the choice of who will be responsible for the task of implementing and monitoring the whole sanitation system.

The methodology included a comparison on the basis of key quantitative and qualitative criteria, between different modes of management options to implement. In our study case, we focus on management by local NGO and samll-entreprise (or micro-enterprise). The optimal choice will

provide low cost, project sustainability, socio-economic development of the population, and finally building a community of practice for sharing and dissemination of knowledge.

Given the importance of the objectives of the project, it is important to study the different ways of managing the most appropriate options for ensuring sustainability of the sanitation service. The area is characterized by a semi-dispersed settlement, small size douar, low income households. All of these factors make it difficult to match people's expectations with the proposed solutions. This is likely to affect the sustainability of the management system. An analysis based on a methodology adopted, as part of the development program and the rural drinking water supply and sanitation system, was complemented by statistical analysis. These steps were performed in order to determine which entity will provide better management of our wastewater system.

After collecting the necessary data by following the approach previously mentioned, we conducted an institutional assessment and an economic study, which were then verified through statistical analysis.

2.2 Institutional aspect

Under the regulatory and institutional assessment conducted by the PNAR, many different actors are involved in the sanitation sector, according to different purposes. It is of note, for example, that the local council where the primary responsibility of this sector is based, is one that meets the least.

Indeed, the real challenge is mainly how to respond to the amounts available for investment. In Talat Marghen pilot project, we propose two complementary schemes to manage the remediation project. This is an operational solution from an institutional and organizational perspective, and the application will be used for achieving sustainable development of the sanitation sector in rural areas.

3. RESULTS

Douar Talat Marghen, the main area of focus for this study, primarily faces the problem of sanitation. It is evident that there only a few pipes and spillways connected to surrounding homes that drain into troughs.

Faced with this situation, and in order to improve the quality of life in the douar, we opted for a sustainable development project which aims to develop a concept of community wastewater management, to build local capacity to adopt, and the operation and implementation of sanitation, according to the participatory diagnosis of douar Talat Merghan. Indeed, this is:

1. Develop a sustainable sanitation project.

2. Build the capacity of stakeholders and all partners.
3. Duplicate the pilot experiment.

As part of the bottom-up approach, the companion of awareness was crowned by the acceptance of the project by the villagers.

The result of planning of the technical, institutional, and managerial aspects phase for this project is built upon two fundamental principles. The first one is the direct involvement of stakeholders in the process to choose the appropriate alternatives. The second is the sustainability of sanitation service.

3.1 Conceptual model of factors affecting wastewater service management

Institutional diagnosis

This participatory approach served us not only in educating and involving the public and various local authorities in this project and in the choice of the most suitable management mode, but also in preparing them for their supportive future responsibilities.

At the institutional diagnosis made, we worked on different aspects:

- Analysis of the current situation of the village Talat Marghen it based on a set of techniques and tools used in the PRA. This analysis is essentially the historical profile of the social map, list of problems, the preferred matrix, the problem tree, the daily schedule, the chart system and the mobility card.
- Awareness of the importance of the project on health, socio-economic development of the area, the need for their involvement in the project succeeds, etc.
- Assess the capacity of each potential speaker to get involved in the management of the sanitation service.

The result of the analysis of the situation of douar Talat Marghen confirm the first priority issue for all categories of the population is the lack of sanitation seen the negative consequences that are currently spread of diseases particularly caused allergies, dissemination of odors, contamination of ground water, surface water pollution, insect outbreaks, and the damaged image of the douar. Other problems plaguing the douar reside in the poor quality and lack of drinking water, especially in summer period, unemployment, illiteracy, and poor infrastructure. Further, the dynamics observed during awareness among the population-- especially among women and their willingness to contribute the efforts to solve their problems

and organizational movement within local NGO can be seen as an opportunity.

The assessment of the potential capacity of each villager is made by conducting a tour of local Associations and small private companies at the area surrounding the douar Talat Marghen, and the local authority to measure the following for each actor visited:

- Technical capacity of human resources, equipment and experience.
- Ability of business management: managing subscribers, etc.
- Ability of social management: managing user outreach.
- Willingness to get involved: the operator must have the ability and willingness of the management of the sanitation service).
- Acceptance of the douar: so that the douar population manages the AEP system and experiments with certain organizations or operators. This aspect should be also measured.
- Facility of involvement: some operators may have the potential to be involved without harming their mission or strategy.

Economic diagnosis

The economic evaluation of the management of sanitation services in douar Talat Marghen is based on an analysis and estimate of income and expenses, as the management method.

Management fees, taxation, are the main parameters that increase the cost of management in the case of setting up a microenterprise, where we may conclude that the establishment of a local Association of Villagers is less expensive.

The processing of data obtained from the institutional and economic diagnosis is made by a statistical analysis to evaluate the different information obtained during the said diagnosis, taking into account other parallel legal, socio-economic, financial, technical and environmental, aspects and impacts that could result from each management mode on the different elements.

Statistical analysis

The qualitative statistical analysis performed is based on mathematical modeling, performed using SPSS 17.01 software (Statistical Package for the Social Sciences 17.01: software used to conduct statistical analyzes of the data and produce tables and graphs that summarize the results).

Each mode of management has its own characteristics, constraints and strengths. An approach of choice is to

assess for the project area, how the characteristics of a management are consistent with the configuration and constraints of the area. This is ultimately to determine whether a management is feasible or not in a given area.

There are no criteria alone to choose a management; thirty were reviewed by a team from a set of entities, they are of order: Legal, technology, environmental, Finance and Socio-economic.

Multi-criteria analysis has allowed us to provide relevant answers, helping us make a decision in evaluating several options given situations where no opportunity is perfect.

The results of the statistical analysis (Principal Component Analysis (PCA)) showed the benefits of setting up a Local Association of villagers for the operations and management of the sanitation service.

The result of the analysis is shown the block N° 2 or Local Association of Villagers (local NGO) is the nearest to empty block supposed as reference for comparison. (Table No. 1).

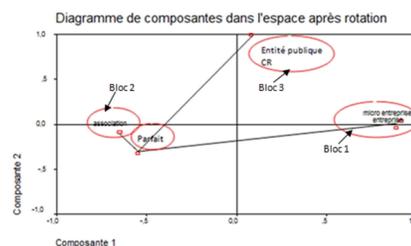


Fig. 1. Diagram components in space after rotation

Table 1 : classification of the management Distances

	<i>Block 1: Small private company or Micro-Enterprise</i>	<i>Block 2: Local NGO or Local Association of villagers</i>	<i>Block 3: Rural Municipality</i>
Type Mode	7.55	2.24	5.66

3.2 Institutional design adopted for the management of the pilot project in rural areas

The first proposed institutional framework will be divided on the three levels of government: central, regional and local, in accordance with the foundation of the policy of the advanced regionalization. The institutional and organizational scheme aims at further administrative organization by assigning an important role in the region this approach adapts the process of regionalization advanced decentralization underway in Morocco.

The institutional framework is as follows:

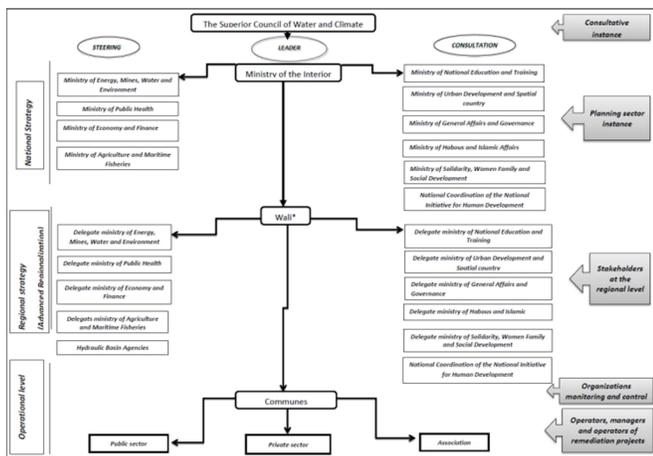
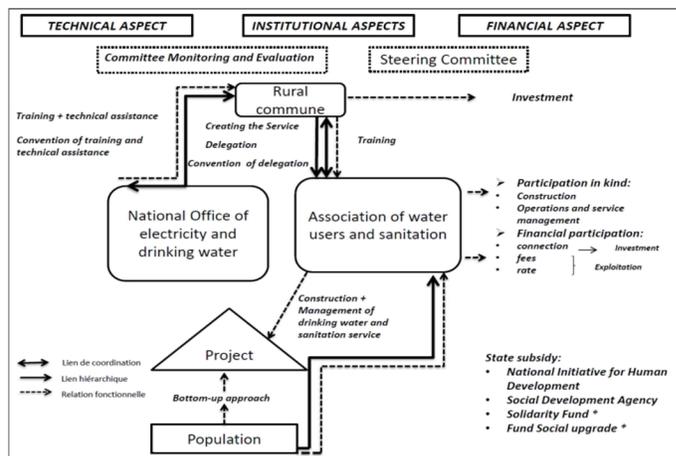


Fig. 2. First institutional scheme

The first skill for sanitation based on the Commons. Indeed, according to Article 39 of the Charter of Commons, the City Council decided to create and manage municipal utilities, including sanitation. It decides the type of management (direct control, self-governance, concession, and other form of delegated management). The involvement of rural operators in sanitation is limited. Other actors, such as water user associations (AUE), play an important role in some parts of Morocco's drinking water. It is also possible for these actors to extend their intervention to sanitation via collective or semi-collective. The results of the multi-criteria analysis show that the use of the association in this case is more interesting in order to ensure sustainability of the sanitation service. Indeed, in the case of rural sanitation, be it public or semi-collective, we can consider the establishment of an association for the management of the sanitation service. The second complementary institutional framework proposed in the case of using the association describes the tri-fold circuit for management: institutional, technical, and financial.



* Two main funds are being created

Fig. 3. Second institutional scheme

4. DISCUSSIONS

The comparative study between an association and micro-business, has allowed us to understand the similarities and differences between these two entities. Indeed, from the comparison between the two entities, we note that it is in our interest to establish an association for facility construction and management of the purifying system. A set of strengths justifies this choice:

1. An association is already in place, it is sufficient to provide training in the field of sanitation. Further, the micro-enterprise is subject to the conditions of a rather strict constitution, the amount and date of release for regulated inputs, the obligation to publish creation of micro-enterprises in a legal gazette, need to register with the Commerce and microenterprises authority, etc.
2. An association, or in this case what can be called the casual employee staff (construction phase of the purifying system), consists of two to three permanent employees (management phase), while for micro-enterprise staff must be comprised of

qualified permanent staff responsible for the management and operation of the system, while another set of staff is responsible for the execution. It should be noted that training is required by the ONEE in both cases. We conclude that the establishment of a micro-enterprise is more expensive.

3. An association is in principle not subject to taxes, while this is the case for a small business.
4. An association works in a nonprofit; and thus its interests are conjoined with the interest of the population first and foremost.
5. An association is more oriented towards sectors whose activities are "deficit" in the financial sense: social, humanitarian, etc. It is also present in niche where there is a "lack of private initiative".
6. An association has the opportunity to make a profit to continue its operations and to grow; it cannot be distributed among its members.
7. The establishment of a micro enterprise requires monitoring and control thereof. The identification of the entity responsible for this control is an obstacle to the adoption of this solution.
8. By setting up a micro enterprise, the call for qualified profiles generates a high cost.
9. The experience of ONEE showed a set of deficiencies that were identified in the management of facilities entrusted to micro-enterprises.
10. The primary interest of the micro-business is one of making profits.

Based on the comparison between the two entities, we note that the use of the establishment of an association contributed to providing good quality service in a sustainable development approach.

User associations are an important and indispensable operator in the management of drinking water station in rural areas (management water service in 6270 locations, or 41% of localities with 42% of the population served and about 4 /10 of the Access to end of 2004 rates). These results show that it is interesting to also involve these institutions (despite the smallness of their size) to the management of sanitation services in rural areas. The number of such associations is currently estimated between 5500 and 6000.

The user associations are varying in nature and it is important to keep in mind that they do not all have the same purpose, commitment to service water, and therefore the same potential for professionalization. Mostly young, two types of associations can be distinguished:

- AUE, which were created before PAGER (The supply program of drinking water for rural communities), which are more or less formal. They were often considered associative basis upon introduction of an AEP project.
- AUE, which were created during the PAGER and formalized to deal with facilities management realized.

Available data on a sample of 370 AUE, to assess the relative importance of these two types of associations. Indeed, the first type represents about 12% of the total number of AUE; 88% were created after the advent of the PAGER program.

Despite their youth, the two thirds of these AUE have more than 50 members, which explain their ability to mobilize and unite citizens around rural development projects, such as water supply and sanitation.

To strengthen the capacity of the organization (NGO) to be an important element in the development of the environmental sector and in particular sanitation, two key points need to be developed:

- Institutional and regulatory level: by governing NGO interventions by laws and regulations.
- At the level of training: establishing training programs for NGOs, so that they are an integral part in the various stages of the project.

Regarding the institutional aspect, two complementary institutional arrangements covering the different technical, financial, managerial and innovative to meet different constraints that characterize the rural areas, to manage a project of rural sanitation.

For the institutional arrangements and relationships between the different actors may be involved in the field of rural sanitation, diagrammed above (see Figures 2-3), the recommended option is to build on existing structures and the strengthen, to first, to ensure ownership of the program by the state services as part of their missions, and secondly, to affirm the roles of Local authorities, operators public, and in particular, ONEE, private sector and civil society.

The institutional framework will enable the integration of the following core functions related to the implementation of rural sanitation program:

1. Planning the needs of rural sanitation.
2. Strengthening coordination and cooperation.
3. Fundraising and financial management.
4. Development and capacity building of all stakeholders.
5. Infrastructure development.
6. Monitoring - evaluation and reporting.
7. The promotion of study and research.

8. Defining and improving procedures and tools for implementation.
9. Coordination and harmonization of all activities contributing to the achievement of rural sanitation.
10. Communication and awareness.

In this regard, the institutional framework and the relationships between different actors may be involved in the field of rural sanitation, recommended consist of the following agencies and entities:

- Technical and administrative supervision of the program will be provided by the Ministry of the Interior in coordination with the Department of Water and Environment.
- Steering and national coordination.

The sewerage system is linked to AEP power mode. In general we can choose how to handle depending on the specifics of each town (see previously proposed conceptual model).

Given the very limited resources of rural communities on the one hand, and the desire to combine the management of the service water supply and sewerage, due to the many synergies and economies of scale, the solution most recommended management of sanitation facilities is entrusted to AUE; public operators provide guidance and technical assistance from the SEA and the monitoring of the quality of discharges.

However, and given the importance of future rural sanitation and limited means programs, direct management permit to partially satisfy the needs. Therefore, the state must opt for the involvement of local operators, such as rural communities, user groups or private, for the management of sanitation facilities. Similarly, it will bring the proper guidance and technical assistance.

The creation of a new type of specialized in drinking water and sanitation Association - Associations of Water Users Drinking is Sanitation (AUEPA) - for the management of drinking water supply and sanitation through the development of a special law based on the general law of association, to create a sharp entity in this sector providing management more efficient service in a manner that meets the different expectations. The Association of Drinking Water Users and Sanitation runs through deliberation of the rural district, approved by the authority of guardianship.

It is recommended, first, to require this type of association to keep records, so that it is structured, feasible to control, and to ensure sustainability of drinking water supply and sanitation.

The income of the Association shall not be dedicated to activities other than the drinking water supply and sanitation. Indeed, if there is an excess of income is that

the tariffs are not well estimated, if the maintenance is not carried out.

5. CONCLUSION

The results emerging from this pilot case can be extrapolated for national use. According to our results, the implementation of rural sanitation projects should be based on a participatory approach, organized in an integrated manner so as to involve decision makers and users. The basic principles of this approach are:

1. Participation: projects should be undertaken by an adapted water and sanitation sector and participatory approach to the Moroccan context. This approach should seek to stimulate and organize active and responsible participation of all partners since the beginning of the projects to the execution of works and monitoring the use of water. The co-financing of projects by municipalities and users is an aspect which demonstrated the priority level of this service among users and elected officials.
2. Integration: This is to complete projects including the AEP, the sewage systems, health education and strengthening the institutional capacity of local communities.
3. The organization of population: The organization of the population is fundamental to the sustainability of projects, but also to increase its participation, facilitate partnerships and initiate care management.
4. The partnership and contractual relationships: it is necessary contracts and agreements must be established throughout the cycle of project implementation, to clarify and sit on a solid basis, the partnership relations.

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