

34th WEDC International Conference, Addis Ababa, Ethiopia, 2009

**WATER, SANITATION AND HYGIENE:
SUSTAINABLE DEVELOPMENT AND MULTISECTORAL APPROACHES**

**NETSSAF – a multidisciplinary collaboration towards more
sustainable sanitation in West Africa: main results**

P. A. Fall, L. Barreto, C. Zurbrügg & C. Werner, Germany

REFEREED PAPER 257

The MDG sanitation target is, at current progress, unlikely to be met in Sub-Saharan African countries. One of the most important reasons is the lack of capacities of the various stakeholders, active in the sanitation field. To contribute in bridging the gap and in enhancing North-South and South-South cooperation, NETSSAF, a project funded by the European Commission, with its consortium of 19 partners has set up objectives aiming at creating synergies from different sectors to support the large-scale implementation of sustainable sanitation systems in peri-urban and rural areas in West Africa. Several valuable results have been obtained, which aim is to propose feasible solutions for the achievement of MDGs. The consortium has worked hard and believes on the potentialities of the use of such results – Dissemination and capacity development materials, systematization and characterization of sanitation systems, Sanitation Yellow Pages, Participatory Planning Approach, - to boost progress in sanitation coverage in Africa. Therefore, current discussions are on how to continue working together in implementation and capacity building projects, as well as in the improvement of the materials developed in NETSSAF (translation to French and local languages) and their further dissemination, that will lead on the real implementation of the Sustainable Sanitation solutions.

Introduction

All countries in the world, including all those in Africa, have agreed to achieve the MDG sanitation target by 31 December 2015 – just over seven years from now. Despite numerous efforts and campaigns the reality is, that sanitation projects which were implemented often do not show the desired effect and have not been replicated in large-scale across the regions of need. The February 2008 publication A Snapshot of Sanitation in Africa (WHO & UNICEF, 2008a) shows that currently no country in Sub-Saharan Africa is ‘on track’ to meet the MDG sanitation target. “Without concerted effort and action, the international community is likely to miss the Millennium Development Goals relating to water and sanitation” (NETSSAF, 2008). So, what can be done? Is there any way we can begin to get more countries on-track?

In a multidisciplinary approach, the 19 partners of the Network for the Development of Sustainable Approaches for Large Scale Implementation of Sanitation in Africa (NETSSAF) have worked during 30 months to propose interesting answers to these questions.

Nature of the NETSSAF project

The Network for the Development of Sustainable Approaches for Large Scale Implementation of Sanitation in Africa (NETSSAF) is a Coordination Action (CA) 100% funded by the European Commission under the "Global Change and Ecosystems" thematic area of the 6th Framework Program. NETSSAF has brought together 19 institutions from 11 different Sub-Saharan Africa and European nations in the field of sustainable sanitation, and promoted international multidisciplinary collaboration between research organizations, associations, universities, municipalities (local authorities), and international development agencies (such as GTZ), focusing in particular in the West African countries. The general objective of NETSSAF has been to coordinate and integrate the current scientific research, technological innovations and execution activities, creating synergies to support large scale implementation of sustainable sanitation

systems in peri-urban and rural areas, in order to propose feasible solutions for the achievement of the sanitation Millennium Development Goals (MDGs) in Africa.

As a CA, NETSSAF does not include implementation of the solutions identified but aims to be the first step (creation of an enabling environment) for it in the near future. Therefore, the partners are currently discussing how to continue working together in implementation and capacity building projects, as well as in the improvement of the materials developed in NETSSAF (translation into French and local languages) and their further dissemination, that will lead on the real implementation of the Sustainable Sanitation solutions proposed.

NETSSAF has brought together a number of relevant stakeholders in the field of sustainable sanitation in Sub-Saharan Africa and Europe, and promoted international multidisciplinary cooperation between research organizations, associations, universities, municipalities (local authorities), and international development agencies (such as GTZ) in an European and Sub-Saharan African context, focusing in particular in the West African countries.

The activities within NETSSAF comprise, among other:

- Contributing to finding solutions of sanitation problems by using local resources while taking into account the cultural and socio-economic situation of the populations,
- Elaborating the participatory planning tool
- Reinforcing the capacities of stakeholders and institutions involved in the sanitation sector, and facilitating information flow on sanitation data of 11 countries of West Africa,
- Creating a regional data base (West Africa) that supplies practical information on: counselling companies, equipment supplies, training institutions and trainers, individuals and NGOs, private and public organizations intervening in the sanitation sector.

Main results of NETSSAF

The diverse activities within NETSSAF project were divided into nine Work Packages, each concentrating on a certain aspect related to the overall goal of NETSSAF. The specific outputs within each Work Package have been published as Deliverables (D), some of them freely available in the NETSSAF home-page (www.netssaf.net).

In order to be able to assess the situation in a number of countries with different technological, administrative, economical, political, cultural and social traditions and practices, evaluation criteria were work out in the early stages of NETSSAF (D02, D03, D04). Based on these commonly agreed criteria the sanitation situation in a number of settlements was assessed (D15). Many other Deliverables have been developed within the project (www.netssaf.net). In this paper, four of them are briefly described.

Systematizing sanitation

Numerous technological innovations have been developed in the last decade. With innovation comes also an increasing lack of consistency and increased communication difficulties. This is especially true in rural and peri-urban West-Africa, where there is a desperate need for feasible sanitation systems and technologies which in the site specific context can achieve the intended objectives of health hygiene and well-being.

A “good” sanitation system minimizes or removes health risks, is economically viable, and avoids negative impacts on the environment. A sanitation system - contrary to a sanitation technology - considers all components required for the adequate management of human wastes. Each system represents a configuration of different technologies that carry out different processes on specific products (wastes). The sequence of process-specific technologies through which a product passes is a flowstream. Each system therefore, is a combination of product- and process-specific technologies designed to address each flowstream from origin to disposal. Technology components exist at different spatial levels, each with specific management, operation and maintenance conditions. Starting at the household level with waste generation, a system can include storage and potentially also treatment and reuse of all products such as urine, excreta, as well as greywater, rainwater/stormwater or even solid waste. However, problems can often not be solved at the household level alone. The household “exports” waste to the neighbourhood, town, or downstream population. In such cases, it is crucial that the sanitation system boundary be extended to include these larger spatial sections; those that take into account technology components for storage, collection, transport, treatment, discharge or reuse at these levels.

Also, the suitability of various sanitation options was evaluated (D20, D21). NETSSAF (Network for the development of Sustainable Approaches for Large Scale Implementation of Sanitation in Africa) has developed a method for organizing and defining sanitation systems. Main goal is to assist in the decision making process to avoid fixed mind sets towards conventional solutions which to-date have not always shown to be the best choice in a site specific context. The systematization shall also help avoid that some waste components (e.g. greywater or faecal sludge from on-site technologies) are forgotten in the planning and master plan development. The methodology has started by defining the different elements, which have to be taken into consideration within the sanitation system:

- **Products:** Although there are nearly infinite combinations, we defined eight unique products which would be considered in the systems design: Urine; Faeces; Excreta; Blackwater; Faecal sludge; Beigewater; Greywater; and Stormwater. Each product differs in its characteristics due to mixing or separating different types of excreta and quantities and types of water. By carefully differentiating between products, and therefore the inherent characteristics, the feasible and subsequently most appropriate technologies and systems can be selected. The greatest benefits of product separation and targeted processing are the ability to minimize pathogen spread, concentrate nutrients and facilitate beneficial reuse (or at least benign disposal). These eight products are those that, separated or combined, are unique enough to necessitate or allow for product-specific technologies
- **Process:** A 'process' is a task; a process contains, transforms, or transports products to other process steps or a final point of use or disposal. In this document we refer to six different processes: User interface; On-site collection, storage and treatment; Transport; Off-site treatment; Reuse; and Disposal. Technologies which perform the same process are grouped together under the same heading
- **Technology:** A technology performs a product-specific process, i.e. they occur at the product-process intersect. A technology is a product-specific method or tool designed to collect, store, transform (change), move, or dissipate a product. A comprehensive list of common, alternative and experimental technologies were compiled, described and organized according to process and flowstream.
- **Flowstream:** It is the entire set of changes (chemical, physical, biological, spatial) that a product undergoes from the point of generation to the point of dissipation in the environment. So far, eleven different flowstreams were defined; the difference between the number of products and the number of flowstreams is due to the fact that some combinations of products require their own flowstream. These flowstreams vastly amplify the specificity of a waste's definition, in terms of volume, pathogenicity, nutrient load, and reuse potential. By clearly defining and understanding the actual flowstreams that are being created and in need of processing, a sanitation system can be more accurately assessed, improved and/or designed.

Sanitation system

Flowstream is the sequence and sum of the product-specific technologies and the sanitation system is the sum of the flowstreams. By considering a system, i.e. all of the products that are generated, the way they are separated and/or combined, the processes they pass through, the technologies that perform the processing task, and the products that are the result of the process, the boundaries and components of the system can be best understood.

A system however, is not a simple combination of products and technologies which can be chosen at will; technologies must be linked logically, products must be combined/ separated appropriately, and process steps ordered to reflect the latter.

The consensus of the consortium in NETSSAF was to focus the work on seven main sanitation systems (Table 1). Two main criteria for subdividing the systems are "Wet" and "Dry" as well as the various degrees of separating waste flowstreams. "Wet" and "Dry" indicate the presence of flushing water for the transport of excreta. This however only gives a certain indication of how wet or dry the collected waste materials will be. Although flushing water might not be used (and would not therefore qualify as a "Dry system") a system may nevertheless contain anal cleansing water (beigewater), urine flushing water, or even greywater. Also, Wet systems are characterized by the production of a parallel product: faecal sludge.

Table 1. Seven sanitation systems as characterized by the NETSSAF project	
System name	Flowstreams
A - Wet mixed blackwater and greywater system with offsite treatment	<ul style="list-style-type: none"> • blackwater mixed with greywater flowstream • faecal sludge flowstream
B - Wet mixed blackwater and greywater system with onsite treatment	<ul style="list-style-type: none"> • blackwater mixed with greywater flowstream • faecal sludge flowstream
C - Wet blackwater systems (blackwater separated from greywater)	<ul style="list-style-type: none"> • blackwater flowstream • faecal sludge flowstream • greywater flowstream
D - Wet urine-diversion system	<ul style="list-style-type: none"> • urine flowstream/ yellowwater • brownwater mixed with greywater flowstream • faecal sludge flowstream
E - Dry greywater-separate system	<ul style="list-style-type: none"> • excreta flowstream • greywater flowstream
F - Dry urine- and greywater-diversion system	<ul style="list-style-type: none"> • urine flowstream • faeces flowstream • greywater flowstream
G - Dry all mixed systems	<ul style="list-style-type: none"> • excreta mixed with greywater flowstream

Evaluation of technology components and of systems

Following the sanitation system descriptions, each technology was described briefly when possible with a reference. The technology components are grouped according to process (i.e. the function that they serve) and sub-divided according to flowstreams. Furthermore the technologies are then evaluated with respect to following specific criteria: Health issues, Impact to environment / nature, Technical Characteristics, Economical and financial issues, and Social, cultural and gender. The evaluation was meant to help to comparatively judge the various technology options possible whereby specific attributes can be weighed and prioritized by the stakeholders. It also can serve as guide in the choice of appropriate sanitation system.

To enable system evaluation and to support decision making, a Multi-Criteria Decision Support System (MCDSS) was used within the NETSSAF project. MCDSS are used when there is a need to identify trade-offs between of a variety of information, often including both quantitative and qualitative data, as is the case with sanitation. The advantages of using MCDSS in decision-making are that it can increase transparency, stakeholder participation, and optimisation by application of several criteria in the decision process. It is also easily adapted to consider the local conditions.

Participatory planning for sustainable sanitation

Another major outcome of NETSSAF was the development of the “NETSSAF Participatory Planning Approach – A tutorial and complementary guideline for sustainable sanitation planning” which targets decision makers and individuals involved in setting up municipal wastewater systems and concepts for management of excreta in communities in West Africa. This valuable guide, offered as CD-Rom and paper based, illustrates a participatory approach to sanitation planning, dealing with the complex stakeholders concerns when deciding and implementing a sanitation system. It takes the user through a seven-steps-approach for participatory planning of sanitation, each of them with preselected questions and answers, case studies, links for further information and tools to facilitate the adoption of participatory sanitation planning in localities in West Africa. These tools should be adapted wherever possible to the specific needs of sustainable sanitation programmes enabling them to address the philosophy of a closed loop approach to sanitation.

To be able to attain a high sanitation condition in a community, it is essential to select the most suitable sanitation option by involving the end users of the systems in all steps of the planning process. Participation of users is now thought to be a prerequisite for sustainable development. Working with a participatory planning approach improves motivation, learning and self-realisation, feelings of ownership and self-esteem, and the possibility that the identified problems and solutions will truly reflect the felt needs of the

stakeholders. User involvement raises awareness and is particularly important to enable an “informed choice”, and for the proper operation of on-site systems.

The tutorial

The following screen gives the user clear instructions of how to use the program, indicating as well short descriptions of the different steps (see Figure 1). The 7 steps that make up the process of planning sustainable sanitation are shown in different screens. The user will be able to click in each of the steps to review them separately, or he/she could go in order by clicking in the next slide. Each step is comprised of the following elements: introduction, timing, sub-steps, expected outcomes and results. In order to support the implementation of each step, a set of tools and methodologies is available to facilitate the actual carrying out of the proposed activities. All these documents are found throughout the sub-steps, and can also be accessed at the end of each step in the section “Files to download”.

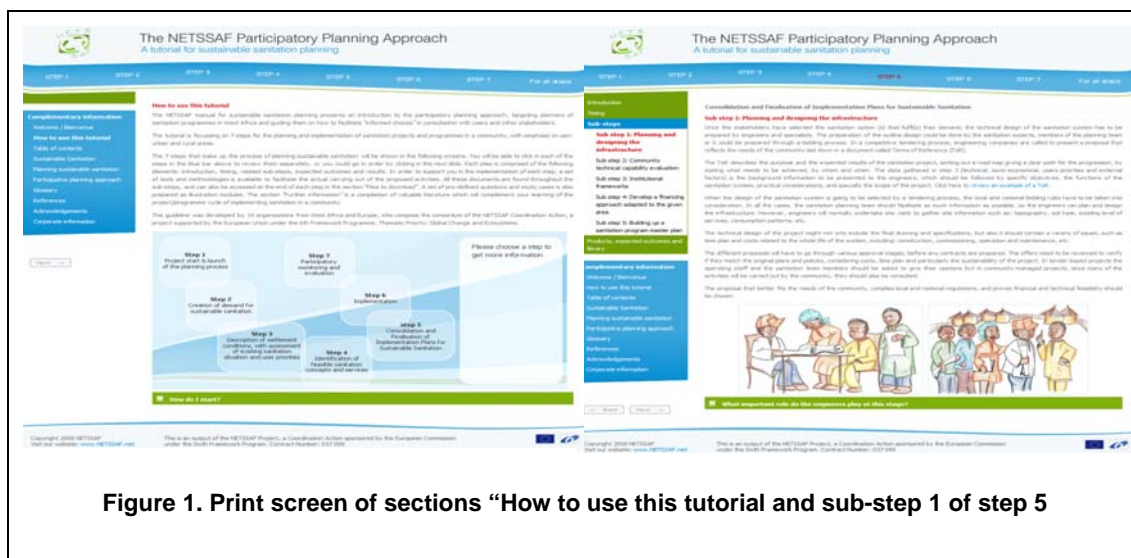


Figure 1. Print screen of sections “How to use this tutorial and sub-step 1 of step 5

A set of pre-defined questions and study cases is also prepared as illustration modules. The section “Further information” is a compilation of valuable literature which will complement the user’s learning of the project/programme cycle of implementing sanitation in a community.

Finally, the system also includes a full menu with complementary information related to sustainable sanitation, planning sustainable sanitation and participatory planning approach, as well as a glossary, references, acknowledgements and corporate information.

The complementary manual

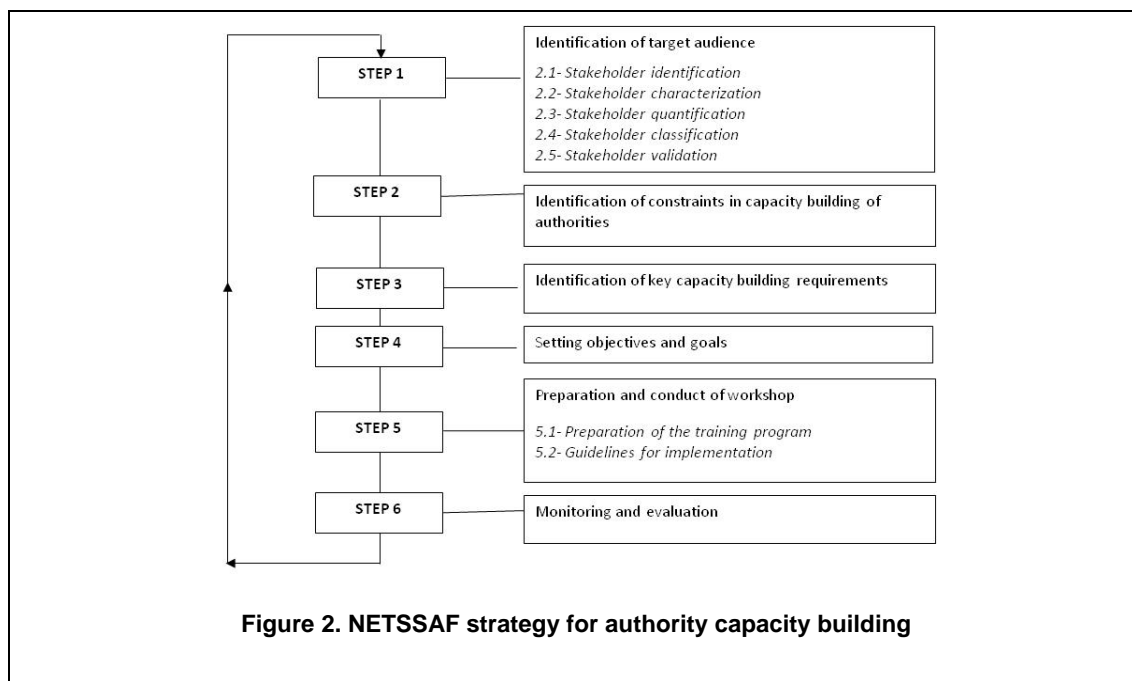
In order to offer the users an easy reference guide for navigating through the planning steps, available even when there are not computers or electricity, a condensed version of the NETSSAF participatory planning approach is presented in a guideline. This manual, which is presented as a fact sheet, is aimed at planners, engineers, decision-makers (e.g. municipal officials) and medical practitioners concerned with sanitation. The objective is not only to provide them with guidelines on how to carry out sanitation planning but to convince them of the benefits of adopting a participatory approach in the planning process.

Authority capacity building: strategy and lessons learnt

This NETSSAF guide is containing methods, tools, and planning elements for capacity building of authorities at all levels (local, national or regional), to be used by NETSSAF partners in West African countries. The sequential steps of the strategy are clearly presented below. One of the specific objectives of capacity building of authorities is to formulate strategies for educating and training local authorities in the field of sustainable sanitation.

The strategy

The consortium has developed a strategy with 6 sequential steps (see below). Implementing this strategy should be flexible, recognising that different countries have different needs. Capacity building approach for sustainable sanitation promotion for authorities in West African countries, can respect the steps below (Figure 2).



Beside the elaboration of this strategy, a workshop outline and an evaluation questionnaire have been developed and used locally.

An intensive dissemination campaign has been carried out within NETSSAF. Amongst other activities, a large number of *workshops* have been held in West African countries. As a first step, **14 capacity building workshops for the authorities** have been carried to capacitate local governments in sustainable sanitation and introduce the necessity of sanitation system choice. In a next step, several **local workshops** for rural communities and end-users are to be held in targeted regions across Africa.

Lessons learnt

One of the best lessons learnt from organizing a workshop (WS) for Capacity Building of Authorities (CBA) is that, it should be done in a giving and receiving (exchange) approach. Organizers should avoid thinking at the initial stage that these stakeholders (authorities) know nothing on sanitation approach, and that they are coming to teach them. The WS shall normally be participative and launch solids basic of future partnership between organizers and authorities. Following lessons were also learnt:

- Authority's knowledge on sustainable sanitation are varied but "limited"
- Tools and methodologies applied have helped them to be comfortable, and to express their ability to learn and therefore to react positively
- Audiovisual material (short film) has greatly helped in understanding the general theme of the workshops
- Social marketing and the gender dimension are important issues because of their direct impact on the success of the implementation phase
- Work groups have helped to highlight their ability to analyze the situation of their community and identify actions for a better life
- The evaluation by the participants is a useful tool in a process of improving the quality of these workshops
- After the workshops, the authorities have stressed the need to regularly renew such capacity building activities and expressed their willingness to act as a bridge to local populations.

The Sanitation yellow pages

A vital requirement for real large scale implementation of sanitation is to know who the key actors in the field are. Therefore, an entire work package of NETSSAF was focussed on the identification and mapping of possible regional suppliers of technological requirements (local producers, sanitation materials traders, constructor companies and operation and maintenance suppliers, etc.) and the identification of key actors in the field of sustainable sanitation, such as capacity building associations, technology transfer institutions, universities, donors, foundations, financial institutions, NGOs, FGOs and CBOs. This process made possible to create a data base of stakeholders in Africa, providing the necessary information to facilitate the implementation of large-scale sanitation programs in Africa by using local and foreign infrastructure and support. This online database, called Sanitation Yellow Pages, contains service data and contact information of local providers of complete sanitation systems or individual components for the collection, transportation, treatment and reuse of waste, as well as companies and organizations working in the designing, planning and general consulting on both the technical and non technical aspects of sanitation. Figure 4 shows an excerpt from the online sanitation database (yellow pages: www.yellowpagesofsanitation.com).

The online database (Figure 3) has been designed to act as the “yellow pages” of sanitation and offers the user two options:

- To register as a company/organisation/expert.
- To search for companies and organisations involved in sanitation related activities in all countries located in Africa.

When registering, the companies have the opportunity to select the type of service that they offer, which includes:

1. Services, such as economical aspects of sanitation projects, policy issues, social issues of sanitation programs, health and hygiene, awareness raising and technical assistance;
2. Complete sanitation systems, including design, planning & consulting, implementation of projects, monitoring and evaluation, operation and maintenance, quality control & stabilisation and upgrade of existing systems.
3. Individual components of sanitation systems, related to user interface (toilets/urinals), on-site collection, transport and off-site treatment. reuse or disposal.



Figure 3. Shot screen of the Yellow pages of Sanitation

Conclusion

NETSSAF has been conceived as a means to contribute to the improvement of the sanitation situation in West Africa, and to strive to decrease the risk of missing the sanitation MDG target. Facilitating the process through the production, validation, distribution and dissemination of local adapted key tools, such the NETSSAF Participatory Planning Approach, is the answer of the consortium to the need of West Africa. However, it is important to stress that the tutorial and manual are not a blueprint for sanitation planning in West Africa, but it is rather a guideline, which should be adapted based on prevailing local situations.

There is no doubt that innumerable efforts are still needed to provide access to sanitation in rural and urban areas in Africa, however it has been demonstrated based on the NETSSAF experience, the great potential to strengthen the implementation efforts through the international cooperation of key actors in a multidisciplinary approach.

Step forward: More cooperation

Without the frame of a functioning network, the knowledge generated from the NETSSAF project risks being isolated from the daily activities of individual partners, and either forgotten or applied in a haphazard and incomplete fashion.

NETSSAF project has developed methodologies and procedures on how to implement sustainable sanitation solutions in western Africa. These tools should be taken into use. NETSSAF partners know well these tools and they are best positioned to promote their utilisation. The best way to show the usefulness of these tools would be to start specific implementation projects. Capacity building activities should be carried out at various levels: regional and local level administration, community leaders, religious leaders, local entrepreneurs, NGOs and community groups etc. This approach would require some new local partners to be included in the regions concerned, but certainly the experience and knowledge of present western African partners would be valuable. In the first stage a number of demonstration units would be constructed in several countries and sites. To get towards 'large scale implementation of sustainable sanitation' as is the initial target of NETSSAF, it would also be necessary to link with other organisations and initiatives such as Sustainable Sanitation Alliance (SuSanA) or The African Sanitation Knowledge Network (ASKNet). It would be valuable to get in cooperation or link with national policy processes, sector decision makers, local level administration, policy makers, politicians and decision makers.

Acknowledgements

The work that lies behind this paper is the joint effort of several persons who are to be acknowledged. These persons are from: ttz Bremerhaven; Germany, Technische Universität Hamburg-Harburg; Germany, Centre Régional pour l'approvisionnement en eau potable et l'assainissement à faible coût; Burkina Faso, BioAzul; Spain, Bureau Ouest-Africain d'Appui Organisationnel et de Technologies Appropriées; Mali, International Ecological Engineering Society; Switzerland, International Water Association; United Kingdom, Université Abobo-Adjamé; Côte d'Ivoire, Sveriges Lantbruksuniversitet; Sweden, Commune de Matam; Sénégal, Swiss Federal Institute of Aquatic Science and Technology; Switzerland, Commune de Bobo-Dioulasso (Ville de SYA); Burkina Faso, EcoSan Club Austria; Austria, Kwame Nkrumah University of Science and Technology; Ghana, Leeds University); United Kingdom, Stockholm Environment Institute; Sweden, Deutsche Gesellschaft für Technische Zusammenarbeit; Germany and Tampere University of Technology; Finland.

We also would like to extend thanks to Elisabeth von Münch from the gtz ecosan Program for her valuable contribution.

References

The article is essentially based on documents or electronic material such as the Deliverables (e.g. D20), compiled during NETSSAF Project. These are accessible at NETSSAF homepage: www.netssaf.net WHO / UNICEF (2008). *A Snapshot of Sanitation in Africa*. Geneva: World Health Organization.

Keywords

NETSSAF, Collaboration, Sustainable sanitation, Africa.

Contact details

Papa Abdoulaye Fall,
Consultant at GTZ ecosan Program
Po Box 5180, 65726 Eschborn, Germany
Tel: +336 65 70 20 65 / +49 176 66 11 43 21
Fax: +496196797458
Email: vieuxfall@yahoo.com
www: <http://www.gtz.de/ecosan>

Leonellha Barreto
ttz - Water, Energy and Landscape Management,
An der Karlstadt 6, 27568 Bremerhaven, Germany
Tel: +49-(0) 471/4832-180
Fax: +49-(0) 471/4832-129
Email: barreto@ttz-bremerhaven.de
www: www.ttz-bremerhaven.de
