A CAPACITY NEEDS ASSESSMENT FOR WASTEWATER MANAGEMENT IN THE WESTERN INDIAN OCEAN REGION

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GLOSSARY

BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
EC	European commission
GPA	Global Program of Action for the Protection of the Marine Environment from Land Based Activities
IMS	Institute of Marine Sciences
TSC	Train-Sea-Coast Programme
DOALOS	United Nations Division of Ocean Affairs and the Law of the Sea
UNEP	United Nations Environment Programme
UNESCO-IHE	UNESCO Institute for Water Education
WHO	World Health Organisation
WIO	Western Indian Ocean Region
WSSCC	Water Supply and Sanitation Collaborative Council

EXECUTIVE SUMMARY

The Western Indian Ocean (WIO) region is facing serious pollution of its coastal waters especially that arising from domestic wastewater discharge. Two factors are recognized as having been responsible for this problem. These are the region's high population growth combined with inadequate wastewater management. The region's coastal population of 20 million is set to double by the year 2020 further aggravating the problem. In order to address the wastewater management issue in the region The Global Program of Action for the Protection of the Marine Environment from Land Based Activities (GPA) has identified, among others, the need for capacity building, including training, as an important component of action on sewage. The need for training was endorsed by the first Intergovernmental Review Meeting of the GPA held in 2001 as well as by the Regional Consultative meetings on municipal wastewater, convened by UNEP and held in the region in 2001. In response to this need, UNEP/GPA Coordination Office, with the assistance of UNESCO-IHE, is planning to deliver a training course for wastewater managers in Eastern Africa. Based on its first delivery, it is planned to further develop the course to comply with the standards of the Train-Sea-Coast Programme (TSC) of the United Nations Division on Ocean Affairs and the Law of the Sea (UN/DOALOS).

WIOMSA assessed the training needs in the region with the view to identify, among other things, the current wastewater management capacity in the region as well as the most preferred learning modes and teaching approaches. In addition to assessing the unique needs of individual wastewater manager, the needs assessment also evaluated the needs of the institutions responsible for wastewater management.

The assessment revealed that there are few trained wastewater managers in the region especially those qualified to adequately address the following issues with respect to wastewater management: (i) Innovative and appropriate technologies (ii) Funding mechanisms (iii) Private sector involvement (iv) Institutional arrangements and (v) Multi-stakeholder involvement. The assessment has concluded that a one-week training course held in each country as the course mode most acceptable to the target population.

INTRODUCTION

Pollution arising from land based sources and specifically from municipal wastewater has been a major source of concern in several parts of the world. In view of the seriousness of the problem, the world community has taken several actions with to address this issue. This includes the adoption, in 1995, of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) by 108 countries and the EC. The goal of the Global Programme of Action (GPA) is to prevent the degradation of the marine environment from land-based activities, "by facilitating the realisation by States of their duty to preserve and protect the marine environment".

In addition, several regional workshops of Government-designated experts held in the period 1996-1998 under the auspices of the United Nations Environment Programme/UNEP's Regional Seas Programme involving more than 60, mostly developing countries, recognised sewage as a major source of concern. Participants in these consultative regional workshops, which included representatives from governments, the private sector, intergovernmental and non-governmental organizations, among others, identified municipal wastewater discharges as one of the most significant threats to the health of coastal and marine environments worldwide.

In order to effectively combat the problem of pollution, GPA has identified, among other things, the need for capacity building, including training, as an important component of action on sewage. The need for training was endorsed by the first Intergovernmental Review Meeting of the GPA held in 2001. The need for training was also expressed by participants in the Regional Consultative meetings on municipal wastewater, convened by UNEP and held in Dar es Salaam in 2001. In order to address this request, UNEP/GPA Coordination Office is developing a course module for wastewater managers in Eastern Africa. IHE will assist in a first course delivery in Tanzania on municipal wastewater within the framework of the Train-Sea-Coast Programme (TSC) of the United Nations Division on Ocean Affairs and the Law of the Sea (UN/DOALOS).

This GPA initiative aims at the establishment of national capabilities and institutional strengthening with the view to effectively manage pollution from land-based activities and to promote the implementation of the key principles and checklists from the UNEP/WHO/UN-HABITAT/WSSCC guidelines on municipal wastewater. Specifically, the training course aims at equipping wastewater managers with the tools to improve their performance in the identification, formulation and implementation of municipal wastewater management projects. The focus of the training will be on five principal issues which are (i) Innovative and appropriate technologies (ii) Funding mechanisms (iii) Private sector involvement (iv) Institutional arrangements and (v) Multi-stakeholder involvement.

The course programme will however be formulated according to the specific training needs in the region. This document gives the result of a training needs assessment carried out in the region during January 2003.

BACKGROUND

The Western Indian Ocean (WIO) Region comprises of the coastal States of Kenya, Mozambique, Somalia, South Africa, and Tanzania and the island States of Comoros, Madagascar, Mauritius, Reunion, and Seychelles. The WIO region has a coastal population of approximately 20 million (Olsen et al, 1999) which is projected to double as a result of the combined effects of birth and migration to peak at 40 million by 2020. The area has diverse array of coastal ecosystems and resources. These include coral reefs, lagoons, seagrass beds, mangroves and beaches all of which play a significant role in the social and economic developments of the communities of the region. The areas are rich in biodiversity, both flora and fauna. Coastal and marine resources of the region provide food, medicine, and livelihood to the local communities. The coastal resources also play a pivotal role in the development of such economic sectors as tourism, fisheries, and aquaculture.

However, given the high population growth, the area is under intense pressure from, among other things, pollution from untreated wastewater and nutrient runoff discharged into near-shore waters. The discharge into the coastal waters of untreated or poorly treated wastewater from domestic sources pose significant threats to sustainable coastal developments in the WIO region. This is widely attributed to the fact that discharge of such waste to marine and coastal waters could lead to health and environmental problems, including human health problems, pollution and ecosystems degradation. The impact of pollution from domestic wastewater discharge is evident in all the countries in the region. In almost all the countries of the region coastal and near-shore waters have registered high levels of pollutants including coliform bacteria, BOD, COD, heavy metals, suspended solids and inorganic nutrients. For example, in Mombasa municipal waste contributes about 4369 ton/year of BOD, 3964 ton/year of suspended solids, 622 ton/year of N and 94 ton/year of P (Mwaguni and Munga, 1997). This is in addition to coliform and *E. coli* levels of 1800+ per 100 ml and up to 550 per 100 ml respectively (Mwaguni and Munga, 1997).

In Seychelles, contamination of fresh water sources in the Beau Vallon area continues to raise concerns. Levels of up to 200 cells per 100 ml of total and faecal coliform have been recorded from the Rhodas and Le Niol rivers from which the municipality draws its freshwater (PUC, 1998). Furthermore, studies of faecal coliform around the Beau Vallon coast have shown that the water is 60% unsatisfactory for recreational use according to WHO standards (Payet, 1996).

In Tanzania, surveys have shown that coastal waters in all major coastal town and cites are polluted. Significant levels of pollution of coastal waters from untreated wastewater discharge have also been recorded in Dar es Salaam, Tanga and Zanzibar (van Bruggen, 1990; Machiwa, 1992; Ferletta, et. al., 1996; and Engdahl, et. al., 1998). In Dar es Salaam more than 118,822 tons of untreated wastewater are discharged to the ground each day, polluting ground-water sources within the built up area.

In Mozambique, 16927 Tn/y or about 71% of the total BOD produced in Maputo is of domestic origin. In addition, untreated waste contributes 8521 Tn/y of suspended solids, and

3246 Tn/y of nitrogen to the Maputo Bay. Similar levels of pollution are reported in other coastal cities and towns in the region.

Pollution on coastal and marine environment from wastewater has had severe impact on ecosystem health in the region. Excessive loading of nutrients on coastal waters has affected coral reefs by decreasing coralline algal cover, increased community metabolism and gross production, infestation of boring sponges (clionids), reduced calcification rates, (Bjork, et. al., 1995; Cuet, 1994; Montaggioni et al., 1994; and Naim, 1994). General stress on corals reported in different countries in the region has also been blamed on eutrophication.

Contamination of recreational areas and freshwater sources has been reported in Mombasa, Kenya (Mwaguni and Munga, 1997), Maputo, Mozambique (Fernandes and Hauengue, 1997) and Zanzibar (van Bruggen, 1990). Another concern is the frequent outbreak of waterborne diseases such as cholera, dysentery, gastro enteritis and diarrhea in some coastal cities and towns in the region. Such diseases and those associated with consumption of contaminated seafood have been prevalent in Zanzibar, Dar es Salaam, Mombasa and Maputo.

ASSESSING THE TRAINING NEEDS IN THE WIO REGION

In carrying out the needs assessment, two types of surveys were carried out. The first one is the Job Analysis. This exercise was essentially an individual survey that assessed existing individual capacity among the target population. In the Job Analysis, skills knowledge and attitudes already acquired by the target populations were assessed and compared with those required for the intended tasks. The second assessment was the Population Analysis, which looked at the general background information of the target population including categories of employees, their main tasks, level of skill and knowledge and training requirements. The information revealed by these assessments would help fashion a course that would meet the actual needs of the target population.

Methodology

In the context of this needs assessment, the required "needs' are knowledge, skills, ability and competency needed to undertake the following tasks with respect to wastewater management: identifying innovative and appropriate technologies, funding mechanisms, private sector involvement, institutional arrangements and multi-sector involvement. Such skills are essential for effective wastewater management. The approach used to conduct this survey involved questionnaire surveys, site visits and a review of the relevant literature relating to wastewater management. In the questionnaire survey, Job Analysis forms were distributed to individuals in the Zanzibar Municipal Council (Zanzibar), Kinondoni Municipal council (Dar es Salaam, Tanzania), Mombasa City Council (Kenya), Mozambique, and Mauritius. On the other hand, the Population Analysis forms were distributed to heads of the respective institutions mentioned above.

The literature review focused mainly on governance arrangements, the presence or otherwise of human capacity building initiatives and existing funding mechanisms in wastewater management. Site visits were made and interviews conducted at the Zanzibar Municipal Council, the Department of Environment and the Department of National Resources in Zanzibar. Further, interviews were conducted at the Kinondoni Municipal Council in Dar es Salaam. The survey revealed that there are few, if any, capacity building initiatives on wastewater management that have been carried out in the region and the region is in dire need of the same.

Limitation of the survey/study

The obvious limitation of this survey is that the sample size might not have been adequate and that complete assessment was only done in one country i.e. Tanzania. While some inputs were available from some other countries in the region, namely, Kenya, Mozambique and Mauritius the results might not be fully representative of the whole region. However, the result of this assessment gives a good indication of the needs of the region with regards to wastewater management.

FINDINGS OF THE NEEDS ASSESSMENT

Existing capacity

In Tanzania, where the detailed needs assessment was carried out, the survey was conducted in Unguja and Pemba (Zanzibar) and in Dar es Salaam on the mainland. In this case the respondents are one homogenous population with more or less similar culture and attitudes. The type of training acquired by the respondents as indicated by both the Population Analysis and the individual surveys range from certificate and diploma to degree levels. The vast majority, however, have had only basic secondary education. For example in the Department of Labour, Construction and Engineering of the Zanzibar Municipal Council, less than 2% have certificate level of education and a similar number have first degrees. More than 90% have acquired just basic level of training. The education levels in other departments are similarly skewed. Those who have attained higher level of education have indicated that their educational background is in natural resource management, biological sciences, civil, public health and environmental engineering. Few have any training in wastewater management. Three respondents mentioned that they had training in the identification, design and implementation of municipal wastewater through seminars and on the job training.
In terms of job experience the survey indicated that the average number of years of experience in the wastewater management sector is 2-10 years. However, only few are directly involved in the identification, design and implementation of municipal wastewater projects while the majority said that they had no opportunity or they are not trained for such tasks. Of those involved in project identification, 14.3% consider the job very difficult, 28.6 % consider it difficult and the majority (37.2 %) not difficult. In project design, 33.3 % rate the job very difficult, 50% difficult and 8.3% not difficult. In Project implementation, 60% consider it very difficult, 10 % difficult and 30% think of it not difficult.

Fifty nine percent of the respondents said that they are involved in multi-stakeholder involvement, 18% in institutional arrangements and about 24% are involved in funding mechanisms. The Overwhelming majority of the respondent is regularly required to perform other duties in addition to those assigned to them. Such duties include reviewing environmental profiles, community awareness activities, and sanitation activities' in communities.

With regard to job performance, most of the workers (71.4%) said that they infrequently carryout their tasks successfully while 28% do so frequently. Lack of training is the principal cause given by the correspondents for the vast differences shown in their abilities in performing tasks as well as in the tasks they are required to perform. This is corroborated by the equally large difference in education level. Differences in education levels and skills have also contributed to significant differences in productivity between members of different organizations surveyed. The Population Analysis survey showed, however, that there are very minor differences in attitudes with respect to duties among the respondents despite the fact that the majority views their jobs (in terms of salary offered, working environment, career possibilities, job security) as poor.

Competencies

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The Population Analysis has shown that only about 2.2% of the target population can be classified as skilled, 9.2% semiskilled and the majority i.e. 87% unskilled. This is based on the assessment of their educational levels and years of on the job. The vast difference in the levels of skills among the workers corresponds with the equally large difference in the education levels. Of the 2.2% who were rated as skilled few can be rated as experts in the areas of wastewater management and even fewer in the specialized areas of institutional arrangements, multi-sector involvement, private sector involvement and funding mechanisms. The assessment also shows that only a small minority in the target population already has basic knowledge in these four areas of competencies.

Attitudes towards training

The assessment has shown that overwhelming majority of the workforce in the wastewater management sector is willing to learn new approaches and to accept changes in the working environment. Since these factors are related, the workforce is obviously of the opinion that through training they can increase their knowledge base and consequently their working conditions. Most respondents said that their preferred learning approach is on the job training through seminars and short courses while a minority preferred formal lectures followed by certification.

PRIORITY TRAINING AREAS

The most frequently indicated skills during the assessment that need strengthening are communication skills, project write up and review, information technology and data handling. Another area mentioned was “trouble shooting”. This can be translated to mean knowledge in program planning and review, since with such knowledge it is possible to make a pre-assessment and hence be able to structure the implementation strategy of a potential project.

The assessment has shown that there are crosscutting training needs in the region. This is especially true in the case in the areas covered in this assessment i.e. institutional arrangements, multi-sector involvement, private sector involvement and funding mechanisms. The study has shown that few, if any, of the respondents have received training covering such issues. No such courses have ever been conducted in the region.

Institutional arrangements

Effective legal and institutional frameworks are key to the successful implementation of wastewater management options. Despite having adopted a range of institutional and legal options aimed at the proper management of wastewater, there seems to be little success in that endeavor as demonstrated by the widespread pollution of the coastal and marine environments in the region. Such measures include setting up of environmental quality standards, monitoring, surveillance and inspection measures, penalties and pollutant discharge fee

(GPA/IMS, 2002). The effectiveness of such measures has been weakened by, among other things, limited understanding among government agencies of their applicability and limitation. In most cases there is no assessment and monitoring of those measures to assess their effectiveness.

Multi-sector involvement

A synthesis of information acquired by this assessment revealed that wastewater management in most of the countries in the region is fragmented, involving multiple agencies. However, lack of co-operation among the various sectors hinder proper coordination of wastewater management thus weakening efforts to reduce the pollution problem. Moreover, there appears to be poor dialogue between the stakeholders including dialogue between those polluting the environment and those trying to prevent it. There is therefore a strong need to train practitioners on how best to involve different sectors in wastewater management.

Private sector involvement

There is very limited public – private partnership (PPP) in wastewater management in the region. In most cases institutions responsible for wastewater management are state owned or affiliates. There is a need to create awareness among practitioners of the need to involve the private sector in wastewater management. This can also be achieved through capacity building by building up core management teams equipped with the appropriate knowledge of how best to involve the private sector.

Funding mechanisms

Two main approaches are employed the region in cost recovery in sewerage services in the region. These are, use of state institutions such as State Corporations or through delegated management. In some cases such as that of Dar es Salaam (Tanzania) state corporations, assume the role of both provider of fresh water and disposal of wastewater. This approach has proved to be very cost intensive, associated with negative returns and to have persistently generated losses to these agencies (Temu, 2001).

The second approach of delegated management involves contracting professional private sector operator, in most cases to deliver both water supply and sewerage services (Temu, 2001). However, wastewater services in the region are characterized by having large operating deficits due to, among other factors, inadequate collection of bills, poor sewerage services, and poor reporting systems thus depriving municipalities badly needed operational funds (GPA/IMS, 2002).

In order to improve services as well as to provide adequate financing for wastewater management, managers should be trained in developing other innovative financing options

such as those offered by public-private partnership, or through linking pollution management program to public investment plans or through the application of the polluter pays principle.

OPTIONS FOR DELIVERING TRAINING

During the assessment the respondents were asked to name their favored mode of training. Their choices range from formal training to workshops. However, short courses appear to be favoured by the majority. Two options, with their advantages and disadvantages, are discussed here.

A short (one week) training course in each country

The advantage of this training option is that the course can involve a large number of participants who will be able to compare and learn from more, albeit, local situations. Another advantage is that coming from the same country participants will have little or no language barrier and therefore course delivery and post-training follow-up will be easy. In this option course costs can be kept to a minimum, as travel costs for participants should be very small.

The disadvantages of this approach include the fact that conducting the course in separate countries does not allow networking and sharing of experiences between wastewater managers from the region. Moreover, a one-week training course could be too short to allow complete coverage of course material. In addition trainers and resource persons will have to travel to a number of countries in the region to deliver the course thus putting a lot of pressure on them in terms of time invested in course preparation and delivery.

A longer (two to three weeks) course in a single host country

A longer course held in one host country has the advantage of providing a platform for sharing of experiences and networking. Such a course, having attracted participants from different countries and with different wastewater management structures and background will be an ideal venue to help foster cooperation and exchange of management experiences. The course can also be more comprehensive and participants will have more time to cover as well as digest the course content.

The main disadvantages of this course option are related to the high cost of transportation and accommodation for participants from outside the host country. Moreover a longer course could be taxing to trainers due to heavy workload of course preparation and delivery.

RECOMMENDED TRAINING APPROACH

This survey has shown that there is a strong need for capacity building wastewater management in the region. Given the context and findings of this assessment this report also concludes that one of the principal factors that contribute to weak wastewater management

regimes in the region is the shortage of trained wastewater management personnel especially in the area identified as cross-cutting.

Course participants

In Zanzibar, where the first course is to be delivered, it is recommended that the bulk of the participant should come from the Zanzibar Municipal Council since they are the main players in wastewater management on the island. Other participants could come from the Department of Environment, being a secondary player as the most often-consulted partners. One or two participants could come from the neighbouring countries.

Course duration
It is recommended that the course duration should be one week as this will remove the problem of trainer fatigue but should be structured in such a way as to cover all the crosscutting issues.

Course content
The assessment revealed that the bulk of the respondents fail to fully appreciate the seriousness of the pollution caused by the discharge of wastewater into the environment. Many seem to lack basic knowledge in wastewater management. It is therefore recommended that in addition to the issues proposed for training, the course should be expanded to include the basics in general wastewater management

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