



The University
of the
South Pacific



INSTITUTE OF APPLIED SCIENCES
(IAS)

NEEDS ASSESSMENT FOR WASTEWATER TRAINING PROGRAMME FOR THE PACIFIC REGION

AS A CONTRIBUTION TO
THE GLOBAL PROGRAMME OF ACTION FOR THE PROTECTION OF THE MARINE ENVIRONMENT
FROM LAND-BASED ACTIVITIES

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LIST OF ACRONYMS

DOALOS	– United Nations Division of Ocean Affairs and the Law of the Sea
FSchM	– Fiji School of Medicine
GPA	– Global Programme of Action for the Protection of the Marine Environment from Land-based Activities
IAS	– Institute of Applied Sciences
IOI	– International Ocean Institute
IWP	– International Waters Programme
PACE-SD	– Pacific Centre for Environment and Sustainable Development
PCDF	– Partners in Community Development Fiji
PWA	– Pacific Water Association
SIDS	– Small Island Developing States
SOPAC	– Pacific Islands Applied Geoscience Commission
SPAS	– School of Pure and Applied Science
SPREP	– Secretariat for the Pacific Regional Environment Programme
UNEP	– United Nations Environment Programme
UNESCO – IHE	– United Nations Educational, Scientific and Cultural Organisation – Institute for Water Education
USP	– University of the South Pacific
WHO	– World Health Organisation
WIOMSA	– Western Indian Oceans Marine Science Association

INTRODUCTION

The Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) is a global strategy aimed at preventing the degradation of the marine environment from land-based activities. The United Nations Environment Programme (UNEP) was chosen as the Secretariat of the GPA initiative. Wastewater discharge has been identified by UNEP as the main source of land-based pollution and reconfirmed at the 2002 Millennium Summit on Sustainable Development. In 2003, UNEP/GPA with UNESCO-IHE developed and delivered a pilot course titled “Improving Municipal Wastewater Management in Coastal Cities” in Zanzibar, Tanzania. SOPAC along with the IAS arm of USP together with GPA is now working on adapting this course for use in the Pacific region.

The first step in this regional adaptation has been to carry out a needs assessment in consultation with stakeholders to assess the training needs for the Pacific region with the idea to identify the blend of material appropriate for the region as well as the most preferred learning modes and teaching approaches.

This report provides the findings of the training needs assessment that was carried out in July-August 2005.

TRAINING NEEDS ASSESSMENT

Method

The needs assessment included reviewing the available literature on wastewater management, as well as consultations with relevant institutions such as SPREP, IOI, WHO, UNESCO and USP (which includes IAS, SPAS and PACE-SD) through advisory committee meetings in the process of training material design and implementation. A list of members of the advisory committee is attached as Annex 1.

In addition, a questionnaire was designed for distribution to people working in the field of water/wastewater to consider factors such as experience, need for training, topics of interest and training timeframe (the sample questionnaire is attached as Annex 2). The questionnaire was sent out by email to approximately fifty individuals throughout the region. These individuals were also asked to disseminate the questionnaire as appropriate. The distribution list for the questionnaire was primarily drawn from the wastewater focal group that was formed through the

Regional Meeting on Wastewater Management in Majuro, in 2001. Copies of the questionnaire were also distributed to the Advisory Committee group members for further dissemination through their contact points.

Limitations

One of the major limitations in the needs assessment was the lack of response to the questionnaires. Only seven completed questionnaires were received for analysis and four of these seven were from Fiji. A two-week time frame was given for completing the questionnaire and two reminders were sent during this time however unfortunately this did not encourage greater participation.

However, the experience of the advisory group members and the literature available within the region coupled with the questionnaire responses are felt to be sufficient to provide a reasonable background to the status of wastewater management in the Pacific region and the needs for training in this area.

WASTEWATER MANAGEMENT IN THE PACIFIC REGION

There are over 30,000 small islands in the Pacific (Falkland 1992) and they vary greatly in their physical characteristics including high volcanic islands, low-lying atoll islands and uplifted limestone islands. The high islands are large, consisting mainly of volcanic rock and are generally forested with fertile soil and usually an ample availability of freshwater (Scott *et al.* 2003). The low islands are usually small with limited freshwater resources and poor soil. Although many of the islands in the Pacific are small in area, the population densities can be very high which place a lot of stress on the naturally occurring water resources. Population density varies from as low as 8 people per km² in Vanuatu to 430 per km² on Nauru (Scott *et al.* 2003).

While there could be several definitions for the term wastewater, the Pacific Wastewater Framework for Action defines it as 'any combination of discharge (liquor/effluent, sludge/biosolids) into the environment, with or without treatment. It is defined as: human excrement (including zero waste discharge systems), effluent, flushing water, industrial water and stormwater (run-off caused by rain). Wastewater discharges are the main contaminants to freshwater and coastal marine resources throughout Small Island Developing States (SIDS). In the Pacific urban areas, currently served by a centralised system, the treatment level is usually limited to primary and secondary stages, and the discharge method is ocean outfall. Many existing wastewater

treatment systems do not work properly and are not operated or maintained due to lack of trained personnel and adequate finance (Burke 1999; Pacific Wastewater SAP 2001).

To improve the sustainability of water resources management in small island countries it is important to get support from bilateral, regional and international donor agencies, and others including NGOs and consultants. The capacities of national water agencies require strengthening in many areas including water resources assessment and monitoring capabilities, water planning, and appropriate technology in water, sanitation and wastewater (Falkland 2002). Specifically, there is a need for improved sanitation systems on small coral islands where the current systems continue to seriously contaminate the groundwater leading to environmental and human health problems. There are several reports available on sanitation issues in the Pacific (Bower *et al.* 2005; Crennan 2001; Crennan and Berry 2003; Crennan and Burness 2005; Depledge 1997; and Dillon 1997).

There are three common wastewater disposal systems used in the Pacific. These could be categorised as individual on-site waste disposal systems, centralised and decentralised wastewater treatment systems. There are many pollution sources that degrade the surface and groundwater quality in many small islands. One of the major pollution sources is discharge of untreated or partially-treated wastewater (from sanitation and greywater systems) with associated pathogens in streams and rivers. Increasing water pollution and associated water borne diseases have been reported by many studies in the past; (Detay *et al.* 1989; Miller *et al.* 1991; UNESCO 1991) as well as recently (ADB 1999; Crennan and Berry 2002; Falkland 2002).

Of the total population in the Pacific (6.1 million people) approximately 694,200 (or 11%) are serviced by a reticulated wastewater system. If PNG was excluded from the calculation then approximately 546,000 people out of 2.4 million (or 23%) have access to reticulated wastewater systems. Note that of those people serviced by collection systems (694,200), wastewater from over 100,000 people is discharged directly into the coastal environment without treatment (Burke 1999). A number of countries have reticulated systems (Kiribati, Republic of Marshall Islands, Solomon Islands, Pohnpei and Chuuk in the Federated States of Micronesia and Nauru) but no treatment. In areas with adequate wastewater treatment and disposal systems, water quality may still be poor due to the large number of individual systems that still exist in the area. Also many of the existing treatment plants do not perform as designed. The balance (or majority) of the people dispose of their waste through septic tanks, various types of latrines and over-water latrines. In some SIDS, composting toilets have been introduced as an alternative method of disposal. The bush and beach are still used for defecation, especially by children, in many countries. Domestic wastewater or sewerage is managed in several ways ranging from non-existing physical facilities

in rural and undeveloped urban areas to advanced secondary treatment plants in some of the large municipalities (Convard *et al.* 1997).

Many Pacific Island Countries lack data on coastal water quality, which is a concern. A regional water quality survey found that countries lacked the initiatives from the governments to support water quality monitoring programmes (Naidu *et al.* 1991). In Fiji, high levels of nutrients have been found along the 'Coral Coast' of Sigatoka, which could have detrimental effects on the coral reefs ecosystem (Mosley and Aalbersberg 2003).

To address the problem of pollution, GPA, has identified amongst 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 GPA held in 2001. The need for training was also one of the outcomes of the Regional Wastewater Consultation held in Majuro 2001, which was facilitated by GPA, PWA, SPREP and SOPAC. This consultation led to the Pacific Wastewater Policy Statement and the Pacific Wastewater Framework for Action.

RESULTS FROM THE QUESTIONNAIRE

The questionnaire (Annex 2) consisted of 2 main parts to glean information on both existing capacity and training needs. The results are summarised below with more detailed information provided in Annex 3.

Existing Capacity

All respondents to the questionnaire were tertiary educated. Qualifications were engineering or science-based and several respondents possessed post-graduate degrees. The respondents to the survey occupy senior positions in their respective organisations and all are responsible for project planning and development with the majority following projects through to implementation stage, including monitoring and evaluation. Most held supervisory positions and were responsible for staff selection and hiring. All respondents are required to represent their organisations at outside meetings and most are active members of external task forces and committees. The job function of most respondents also included community education and awareness as well as training others.

Experience in the survey group varied, 3 respondents had 1-5 years experience, 3 had 6-10 years experience and one respondent had no direct experience in the wastewater field.

The organisations where respondents work have limited human resources invested in wastewater projects. The majority of respondents indicated that they were the only staff members performing their type of tasks, 2 respondents indicated 1-2 people performing similar tasks and 2 respondents indicated 4 people were carrying out similar work. In addition most respondents indicated they did not supervise anyone working in the field of wastewater, with one respondent supervising 1 person and another supervising 7.

The wide range of tasks and responsibilities is reflected in the fact that most respondents work is a combination of both field and office work and they are using a range of materials to complete daily tasks including primarily design manuals, computers and some technical equipment. Most respondents indicated that on average they spend approximately 4-5 hours per day on wastewater tasks.

Most respondents work with a number of different organisations on wastewater issues, most often government departments but also NGOs, community organisations and donor organisations.

Training Needs

Although many respondents indicated high responsibilities regarding wastewater, none had received any training specific to wastewater management.

Almost all respondents felt that they needed further training on wastewater issues. Common topics of interest included:

- options and innovative technologies for wastewater management in rural areas including composting toilets and artificial wetlands;
- management of wastewater in low-lying areas and coral islands; and
- water quality issues including effects of septic tanks on the environment and water quality testing in marine and freshwater environments.

Additional topics specified by individual respondents were:

- involving stakeholders in wastewater management;
- funding options for wastewater management;
- national and regional policies;
- animal waste and methane production; and
- innovative technologies for urban wastewater management.

Almost all respondents agreed that the proposed course is relevant to the region and were interested in participating. Generally, it was felt that a full-time face-to-face mode of delivery was the most appropriate option for teaching; 42% felt that a one-week time frame was sufficient for the proposed material to be covered effectively but 29% felt this would be insufficient while 29% were unsure.

The outline of the course was considered to be appropriate by most respondents, however some would like to see more Pacific case studies and information on technologies applied in the region as well as one respondent who would like to have more information on ground profile in atolls and the assimilative capacity of different soils and environments. All respondents considered all parts of the proposed outline as useful.

The final survey question asked for general comments on any issues relating to wastewater that they would like to see being addressed. The following issues were raised:

- There is a need for integrated management involving all stakeholders such as government departments and communities.
- The course needs to be relevant to the Pacific region and technologies discussed need to be acceptable and affordable by PICs.
- The development of some kind of work plan or strategy that can guide workshop participants apply or implement what they learn from the course when they go back to work would be useful.

CONCLUSION

It is evident from the needs analysis that there have been few opportunities for training in wastewater management in the Pacific region and those working in the field who responded to the needs assessment questionnaire all indicated that wastewater training would be of benefit. The outline of the proposed course including the timeframe was felt by the majority to be suitable. Particular emphasis on wastewater management in rural areas and low-lying islands was felt to be a necessary part of the course.

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ANNEX 1

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ANNEX 2

NEEDS ASSESSMENT QUESTIONNAIRE

Wastewater Training in Pacific Island Countries

SOPAC/IAS/GPA/UNEP/UNESCO-IHE/UN/DOALOS

The purpose of this questionnaire is to assist in the needs assessment undertaken as part of a wastewater-training course to be for the Pacific developed in collaboration with GPA/UNEP. You have received this questionnaire because you are involved in the water/wastewater sector or you are a member of the Pacific Wastewater Focal Group. Your assistance in filling this questionnaire would help develop a course that is appropriate for the Pacific region.

You can return this questionnaire to Kamal Khatri, SOPAC, Fax: +679 3370040 or send it by email to: kamal@sopac.org

Background

Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) is a global action programme addressing the issues concerning the interface between the freshwater and coastal environment. Wastewater discharge has been identified by United Nations Environment Programme (UNEP) as the main source of land-based pollution and reconfirmed at the 2002 Millennium Summit on Sustainable Development.

A municipal wastewater management has been jointly developed by GPA/UNEP with the United Nations Educational, Scientific and Cultural Organisation – UNESCO-IHE Institute for Water Education and according to UN/DOALOS Train-Sea-Coast standards as well as the GPA Strategic Action Plan on Municipal Wastewater and the UNEP/WHO/UN-HABITAT/WSSCC Guidelines on Municipal Wastewater Management.

The training provides participants with analytical tools, substantive information and skills on how to select, plan and finance appropriate and environmentally sound municipal wastewater management systems. The training is meant for project managers at municipal wastewater management systems. The course focuses on four elements:

- i. objective oriented planning (a methodology for analysing problems and planning solutions);
- ii. involvement of stakeholders and mobilizing local resources;
- iii. conventional and innovative approaches to wastewater management;
- iv. formulation and presentation of proposals.

For the adaptation of this course for the Pacific Region use will be made of the outcomes of the Regional Wastewater Consultation held in Majuro 2001, and facilitated by GPA, PWA, SPREP and SOPAC, which includes the Pacific Wastewater Policy and Framework for Action.

Questionnaire:

Name:

Organisation:

Type of organisation: Government Non-government Other

Position:

Address:

Email:

Fax:

1. From the following list, please tick those items that best describe your duties and responsibilities. After each item indicate whether this is a primary task (1) or other tasks that you are required to do on top of your regular duties (2).

Technical/Development and Training

- | | |
|---|---|
| <input type="checkbox"/> Project planning and development | <input type="checkbox"/> Project implementation |
| <input type="checkbox"/> Identifying appropriate technologies | <input type="checkbox"/> Monitoring and Evaluation |
| <input type="checkbox"/> Prepare project / program / activity reports | <input type="checkbox"/> Field surveys |
| <input type="checkbox"/> Operating wastewater treatment facilities | <input type="checkbox"/> Technical design |
| <input type="checkbox"/> Legislation/regulation/policy development | <input type="checkbox"/> Explore funding mechanisms |

Administrative

- | | |
|---|---|
| <input type="checkbox"/> Supervisory | <input type="checkbox"/> Staff selection and hiring |
| <input type="checkbox"/> Prepare memos and endorsements | |

Networking

- | | |
|---|--|
| <input type="checkbox"/> Render assistance to other organisations | <input type="checkbox"/> Member of task force/committees |
| <input type="checkbox"/> Represent the organisation at meetings | |

Formal Education and Training

- | | |
|---|--|
| <input type="checkbox"/> Information, education and awareness | <input type="checkbox"/> Serve as trainers |
| <input type="checkbox"/> Organize training workshops | |

Other (please specify)

2. Please list your educational qualifications.
3. What do you understand by the term 'wastewater'?
4. How many years work experience do you have in wastewater or related fields?
5. How many people in your organization perform similar tasks to yourselves related to wastewater?
6. Who is your direct supervisor and what is his/her position?
7. How many people do you supervise in the field of wastewater?
8. What equipment, job aids and reference materials do you require in performing your regular duties?

<input type="checkbox"/> Computer	<input type="checkbox"/> Laboratory equipment
<input type="checkbox"/> Office equipment	<input type="checkbox"/> Reference books/design manuals
<input type="checkbox"/> Water quality testing equipment	<input type="checkbox"/> Survey/engineering equipment
<input type="checkbox"/> Water pollution control equipment	<input type="checkbox"/> Other (please specify)

9. On an average work day, how many hours would you spend on tasks related to wastewater?
10. What other organisations do you work with on wastewater issues and please describe the nature of these interactions?
 - NGOs
 - Private sector companies
 - Government departments
 - Municipal councils
 - Community Organisations
 - International donor organisations
 - Other (please specify)
11. Is the majority of your work
 - Office based
 - Field-based
 - A combination of both field and office work
12. Please list any specific training you have completed related to wastewater
13. Do you feel you require further training related to wastewater issues? Please be specific about the type of training and list in order of decreasing preference.

Training Topic	
	Most preferred
	↓
	Least preferred

14. If you need to seek assistance in performing your tasks related to wastewater, whom do you consult?
 - Colleagues
 - Wastewater focal group
 - Regional Organisations
 - Educational Institutions
 - Supervisor
 - NGOs
 - Internet
 - Other (please specify)
15. Based on the background information provided, do you think this course would be relevant to you or others in your organisation?
16. Would you be interested in participating in the course? If so, which particular element of the course are you most interested in?
17. Please indicate any preference you would have on the mode of delivery?
 - Full-time
 - Part-time
 - Distance learning
 - Face to face teaching
18. The course length is proposed at 1 week. For the elements to be covered do you think this length of time is
 - Sufficient
 - Insufficient
 - Unsure
19. Are there topics that have not been included in the outline provided that you think would be useful in such a course?
20. Are there any elements that you think would not be useful?
21. Are there any general comments or issues relating to wastewater that you would like to raise/see being addressed?

ANNEX 3

QUESTIONNAIRE ANALYSIS

Potential participants to the course were asked to fill in the needs assessment questionnaire. The purpose of the questionnaire was explained on the front page together with some background information on the training course. A total of seven filled questionnaires (out of 50 potential respondents) were received and the following provides the analysis done question by question.

Existing Capacity

1. This question asked respondents to select duties and tasks that they perform as part of their work from the lists under the headings of Technical, Administrative, Networking, and Information. Respondents were also asked whether the tasks were primary or secondary, however only 2 people followed this and therefore this was not included in the analysis.

All the respondents are involved in project planning and developments and almost all follow through project implementation, monitoring and evaluation. Most of them are involved in supervisory roles and generally hold managerial positions. All have represented their organisations in regional meetings and workshops and most were actively involved in national task forces.

Technical

Project planning and development	7/7	100 %
Project implementation	6/7	86 %
Monitoring and evaluation	6/7	86 %
Prepare project/program/activity reports	5/7	71 %
Explore funding mechanisms	5/7	71 %
Identifying appropriate technologies	4/7	57 %
Field surveys	4/7	57 %
Legislation/regulation/policy development	3/7	42 %
Technical design	2/7	29 %
Operating wastewater treatment facilities	0	0 %

Administrative

Supervisory	6/7	86 %
Prepare memos and endorsements	5/7	71 %
Staff selection and hiring	4/7	57 %

Networking

Represent your organisation at meetings	7/7	100 %
Member of task force/committees	6/7	86 %
Render assistance	4/7	57 %

Information

Information, education and awareness	6/7	86 %
Organise training workshops	6/7	86 %
Serve as trainers	5/7	71 %
Other	1/7	14 %

2. When asked about academic qualifications most of the participants were highly educated with degree to post-graduate level of studies in science.

3. When asked on what they understood by the term 'wastewater', with the level of education most tackled this question very well. Also the answers depended on the level of understanding and experience with wastewater, with the one person from a water utility confining wastewater only to household effluent, whereas others had a broader perspective that included outflow of industries.

4. Work experience: The degree experience in wastewater or related field varied from 0 – 10 years of experience. With one respondent not having any direct experience in the field of wastewater.

Number of years work experience	Number of Respondents
0	1
1-2	1
3-5	2
6-7	2
8-10	1

5. When asked about the number of other people performing similar tasks as they were, the answers ranged from 0 – 4 people. In their organisations, 42% indicated that none were performing similar tasks as they were. With 29% (2 people) had 1-2 people performing similar tasks. And 29% mentioned 4 people to be carrying out similar tasks as they were.

6. Whom do your directly report to? Most of the respondents had their director (71%), other 29% was divided into one reporting to the Port Folio Manager and one to the Principal Environment Officer. This result indicates that the directors in each of the organisations could play a major role in decision making with regard to wastewater management.

7. On supervising of people in the field of wastewater 57% reported none, while the other 42% reporting supervision, one from this group supervising almost seven people.

Number supervised	Number of Respondents
0	4
1	2
7	1

8. Of the seven respondents 86% were noted to make use of reference books and design manuals in performing their regular duties. Second on this list was of course computers and office equipment. This indicates manuals are a very good source of information and most may be office based (Q 11 will show this). One person indicated the use of awareness raising materials.

Reference books/design manuals	6/7	86%
Computer	5/7	71%
Office equipment	4/7	57%
Water quality testing equipment	3/7	42%
Survey/engineering equipment	2/7	29%
Water pollution control equipment	1/7	14%
Laboratory equipment	1/7	14%
Other	1/7	14%

9. Hours of work day spent on wastewater? Most respondents indicated 4-5 hours (42%). It also depends when work on particular projects or programmes that is related to wastewater is required. Overall all spend some time on wastewater at one time or another.

10. Other organisations you work with in wastewater? Almost 86% of the people have close interactions with the government departments. The non-government organisations, community organisations and international donor agencies are also contacted. It can be seen from here that any agendas with respect to wastewater can be implemented or enforced more effectively if the government gives its endorsement.

Government departments	6/7	86%
NGOs	4/7	57%
Community Organisations	4/7	57%
International donor agencies	4/7	57%
Other	4/7	57%
Private sector companies	1/7	14 %
Municipal councils	3/7	42%

11. When asked whether majority of work carried out is office-based, field-based, or a combination of the two, the following result was obtained:

- A combination of both field and office work: 86%
- Office-based: 29%
- Field-based: 0%

With 86% of the people involved in a combination of office and fieldwork; a field trip during any training exercise should be appropriate.

Training Needs

12. Respondents were asked whether they received any training on wastewater? None of the respondents had received specific training with respect to wastewater. This indicates that such training will be an eye opener.

13. Training topics of interest include:

- Innovative technologies/low-cost solutions available for community wastewater management.
- Water Quality Testing – methods of sampling and interpretation of data.
- Dry sanitation/compost.

14. When asked where the respondents seek technical assistance related to wastewater, 86% indicated that Internet as the best resource to use (could be due to easy access). Of the seven participants 71% appreciated the expertise available through colleagues; this could be in the same office or another organisation. The others that were frequently consulted included wastewater focal groups, regional organisations, educational institutions, supervisors and non- government organisations.

Internet	6/7	86%
Colleagues	5/7	71%
Wastewater Focal Group	3/7	42%
Regional Organisations	3/7	42%
Educational institutions	3/7	42%
Supervisor	3/7	42%
NGOs	3/7	42%
Other	2/7	29%

15. Relevance of course: Generally the respondents agreed that the course is relevant (86%) to the region, except for one negative response.

16. Interest in course: the seven respondents showed strong interest.

17. On the mode of delivery of the course, generally it was felt that full-time and face-to-face teaching was the most appropriate.

- Full-time: 57%
- Part-time: 14%
- Distance learning: 0%
- Face-to-face teaching: 42%

18. The course length was proposed to be one week, with 42% feeling this much time is sufficient and 29% thought it was insufficient or were not sure.

- Sufficient: 42%
- Insufficient: 29%
- Unsure: 29%

19. When asked whether there were any topics of interest not included in the outline, and would be useful for the course the following responses were noted:

- 42% reported the outline was appropriate.
- Other comments included: more Pacific case studies and technologies applied in the Pacific, ground profile in atolls and assimilative capacity of different soils and environment.

20. Elements that would not be useful: No comments received

21. Issues of relevance:

- Need for integrated management involving all stakeholders such as government departments and communities.
- Course to be relevant to the Pacific region and technologies discussed need to be acceptable and affordable by PICs.
- Development of some kind of work plan or strategy to guide workshop participants in applying or implementing what they learn from the course when they go back to work.