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Practical training in sustainable sanitation for Tuvalu

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Abbreviations

AusAID	Australian Agency for International Development
CSTP	Communications and Sanitation Training Programme
CT	composting toilet
ET	evapo-transpiration
FSPI	Foundation of the Peoples of the South Pacific International
ISF	Institute for Sustainable Futures
IWP	International Waters Project
NC	National Coordinator (IWP)
NTF	National Task Force
PCU	Project Coordination Unit (IWP)
PPA	Participatory Problem Analysis
PWD	Public Works Department (Tuvalu)
SOPAC	Secretariat of the Pacific Islands Applied Geoscience Commission
SPREP	Secretariat of the Pacific Regional Environment Programme
ST	Supervising Trainer
TANGO	Tuvalu Association of Non-Government Organisations
TUFHA	Tuvalu Family Health Association
WASH	Water Sanitation and Hygiene
W&S	Water and Sanitation

Executive summary

Under the International Waters Project (IWP) in Tuvalu, a pilot project was established to address "waste" with the aim of reducing the contamination of groundwater and coastal water by human and animal waste.

Community-based activities included "low-tech" solutions to addressing environmental degradation while national level activities involved activities with a more strategic institutional focus. A Communications and Sanitation Training Programme was designed to investigate the current understanding of poor sanitation in Tuvalu, raise awareness of its cost to public and environmental health, and promote possible solutions

The Supervising Trainer (ST) was required to identify appropriate inputs to the Community Communications Programme, which would include use of media such radio, video theatre, music, and competitions. The Communications Programme was implemented by the National Coordinator and the National Task Force. In consultation with the National Coordinator and the National Task Force, the ST designed and delivered a practical training on appropriate sanitation systems in Funafuti and supervised the establishment of an on-site sanitation system, as a demonstration within the pilot community.

Preparations for the training included the review of relevant literature and reports such as the Baseline Assessment report (IWP Tuvalu 2004), the Solutions Report (Crennan 2004), the Vulnerability and Adaptation Project paper (Hay and Sem 2000), the cost–benefit analysis undertaken for Tuvalu (Lal et al. 2006) and other technical documents investigating the status of water supply and sanitation in Tuvalu produced over the last 15 years.

Preparations for the training began in March 2005. The "hands-on" training in sustainable sanitation was conducted from October 6–23, 2006, in Funafuti. Attendees included personnel from: government departments, non-government organisations, the private sector, and the communities, as wells as team members from IWP. Government personnel from Kiribati were also invited to attend. The training included an examination of the invisible threats to public and environmental health from inadequate management of human excreta, and compared the design and maintenance requirements of a range of common sewage treatment technologies. Construction of a waterless composting toilet was led by the Water and Sanitation Officer from the Public Works Department, and all the trainees assisted with the required masonry, plumbing, and carpentry. The trainees expressed satisfaction in acquiring new technical skills and theoretical knowledge and intended to pass the information on to their home communities. Some trainees volunteered to promote the waterless composting toilets to the wider Tuvalu community. The representatives from Kiribati have developed a proposal to have a similar training in Kiribati.

The IWP team for Tuvalu recognised that a staged approach would be required to move from initial awareness of the problem, to the development of appropriate solutions, and then on to sustained behaviour change. The community communications campaign and sanitation training were conducted in 2006. Due to the termination of the Project at the end of 2006 the sustained behaviour change will need to be achieved through ongoing activities supported by government, with possible co-funding from programmes that support integrated water resources management, including planning and regulation. Monitoring of the use and performance of the demonstration toilet will also be required for at least two years. It is recommended that the skills and capacity that have been developed during IWP be utilised to establish sustainable sanitation in Tuvalu.

1 Background and introduction

1.1 The International Waters Project (IWP)

The Strategic Action Programme for the International Waters of the Pacific Small Island Developing States involved 14 participating Pacific Island Countries: Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

IWP was designed to address the root causes of degradation in Pacific Island international waters. It intended to do this through the use of regionally consistent, country-driven, targeted actions that integrate development and environment needs (GEF/UNDP 1999). IWP has two main components: (i) an oceanic component that focuses on the management and conservation of tuna stocks in the western central Pacific and (ii) a coastal component that focuses on integrated coastal watershed management. This report refers to activities for IWP's coastal component only.

The coastal component aimed at national and community-level actions to address priority environmental concerns relating to:

- marine and freshwater quality;
- habitat modification and degradation; and
- unsustainable use of living marine resources.

To address these concerns at the local level, the IWP supported the establishment of pilot or demonstration projects in each of the 14 participating countries. Each community-based pilot project intended to address the root causes of degradation affecting marine protected areas, coastal fisheries, freshwater resources and/or waste reduction.

Community-based activities included "low-tech" solutions to addressing environmental degradation, while national level activities involved activities that have a broader or more strategic focus.

1.2 International Waters Project in Tuvalu

Under the IWP in Tuvalu, a pilot project was established to address "waste", with the aim of reducing the contamination of groundwater and coastal water by human and animal waste. The communities of Alapi and Senala on Funafuti Atoll are supporting IWP activities to provide a case study for addressing these sanitation issues more generally across the country.

To support the work of IWP Tuvalu, the project developed an integrated Communications and Sanitation Training Programme (CSTP). This programme was intended to:

- promote effective sanitation as a priority in the community and the government;
- show local residents and national stakeholders what options are available to them in terms of designing, building, operating, and maintaining safe sanitation systems in their communities;
- encourage appropriate resources to be allocated at the community and institutional levels towards the development of safe sanitation systems; and
- support efforts for the on-going sustainable management of effective sanitation systems beyond the completion of the International Waters Project in December 2006.

This Programme was developed on the assumption that a fully reticulated and centralised wastewater treatment system is beyond the financial, human and technical resources currently

available to the people of Tuvalu. This assumption was supported by the cost benefit analysis conducted in Tuvalu in 2005–2006 with the support of IWP, the Secretariat of the Pacific Regional Environment Programme, and the Pacific Islands Forum Secretariat (Lal et al. 2006) and by previous technical studies conducted over the last fifteen years (White 2005, Falkland 1999, van Putten 1988)

1.3 Communications and Sanitation Training Programme

The CSTP was comprised of five activities that (a) promoted awareness of the problem, (b) developed appropriate solutions, and (c) supported sustained behaviour change within Funafuti. The initial elements involved design and implementation of a:

(i) Community Communications Programme (including audience research);

(ii) Sanitation Training Workshop;

(iii) Groundwater Monitoring Programme;

(iv) Funding/Financing Options Workshop; and an

(v) Institutional Strengthening Strategy.

The objective of the activities described in this report was to support the work of the Tuvalu IWP CSTP via contributions to, and implementation of, items (i) to (iii). At the time of the agreement in March 2005 between the Secretariat of the Pacific Regional Environment Programme (SPREP) and the consultant (i.e. the Supervising Trainer, or ST) it was planned that items (iv) and (v) would be addressed in future work, yet to be designed. See Annex E for additional details regarding the scope of work and agreed outputs.

1.4 Duration of the work

The work commenced in March 2005 with input to development of the communications strategy, and preparation for the sanitation training, which was scheduled for June 2005. The training was postponed until October 2006 while other activities were undertaken. Annex A provides a summary of developments between March 2005 and October 2006; these developments are discussed in detail Section 3 of this report.

2 Review of relevant reports

A series of reports and publications were reviewed in preparation for the Sanitation Training Worksop; see References section for details. Extracts and summaries of a selected number of these reports are provided below, as they have particular relevance to the approach taken in development of the training workshop.

2.1 IWP Tuvalu Baseline Assessment Report 2004

A Participatory Problem Analysis (PPA) workshop was held with local community stakeholders in December 2003 (see IWP Tuvalu 2004). Participants identified some root causes associated with waste in the community, which included:

- limited financial resources and technical support available to households to install and maintain environmentally sound wastewater treatment systems;
- limited types of wastewater treatment systems available to the community;
- a lack of knowledge and awareness on the part of people within the community regarding the environmental impacts of unmanaged wastewater on surrounding marine and freshwater quality; and
- a lack of legislation and enforcement in relation to waste.

In order to further understand and quantify the extent of these root causes and to consider the identification of solutions, the IWP conducted baseline assessment work during April–May 2004. The assessment considered, among other topics:

- existing wastewater treatment systems in the community (including seepage data);
- waste stream and waste characterization;
- community social structure and governance systems;
- government and community waste services and roles, including policy and institutional arrangements for waste management;
- testing and general observation of the groundwater in the area; and
- assessment of waste issues in local school curricula.

2.2 Solutions Report: Waste Management, Pollution Prevention and Improved Sanitation in Tuvalu

In October 2004 the author undertook a one week field visit to Funafuti to review work conducted by the IWP National Coordinator (NC) and Task Force up to that time, and to support the identification of possible low-cost or no-cost options that could be piloted, with support from the IWP, in the communities of Alapi and Senala (see Crennan 2004). These options were intended to address root causes of pollution impacting marine and freshwater quality. The solutions identified reflected (i) technological solutions (ii) relevant behavioural change campaigns and (iii) institutional and capacity building solutions required to ensure the sustainability of change. Institutional or individual capacity building required to support implementation was also identified.

Recommended activities included:

1. A short-term communications campaign to raise awareness of the urgency of the issue within the communities and with government decision-makers.
2. Training in design, construction, operation and maintenance of on-site sanitation systems. An interactive community training workshop could help participants compare a range of practices and technologies such as: using the ocean beach for defecation; upgrading existing septic tanks systems; installing composting toilets; and using composted animal and human excreta as a soil improver.
3. A community-run groundwater monitoring exercise that could demonstrate the need for improved waste management. The sanitation and water quality training could provide practical skills and comprehensive knowledge about health and environmental risks and benefits so that people can make informed decisions about water supply and pollution prevention, and take the necessary steps towards implementation.

Source: Crennan 2004.

The Solutions Report is referred to throughout this report to indicate how the original concept for the practical sanitation training was conceived, and how it differed in the final implementation.

2.3 Vulnerability and Adaptation Project: Tuvalu Water Management Activity

The recommendations of the Vulnerability and Adaptation Project (White 2005) support the activities undertaken by the IWP Communications Strategy and the Sustainable Sanitation Training, and emphasise the urgency required to address water supply and sanitation challenges in a comprehensive and integrated manner at both the national and household level.

An extract from the conclusions of this report follows:

Studies over the past 15 years in Tuvalu have revealed some continuing concerns in the water sector. These are:

- the failure to formalise the Draft Water Resources and Sanitation Management Bill and the Draft Tuvalu Water and Sanitation Plan;
- incomplete knowledge on water resources;
- large demand relative to storage;
- demand for delivered (government) water starts directly after a week of no rain;
- average demand in Funafuti appears slightly higher than the estimated average yield of rainwater storage;
- average per household storage is about 40% of that required for a 1 in 11 year failure rate;
- the limited use of groundwater, which in some islands appears a substantial resource; and
- Water use by freshwater-flushed toilets and leakage from septic tanks and pit latrines.

Together these suggest that Tuvalu is extremely vulnerable to climate variability and that adaptation is currently difficult. The priorities for the water sector in Tuvalu follow directly from these concerns:

1. Establish a sound institutional basis for the management of water and sanitation (policy, regulations, incentives, plans, organisational reform and responsibilities).
2. Increase capacity to manage water and sanitation and predict water related extreme events (household and community).
3. Improve knowledge of available water resources, demand and prediction of extreme events.
4. Improve water conservation and demand management strategies.
5. Increase household and communal rainwater storage.
6. Increase the use of groundwater.
7. Improve sanitation systems.

Source: White 2005.

2.4 Economics of Liquid Waste Management in Funafuti, Tuvalu: Cost Benefit Analysis

The comprehensive cost benefit analysis (Lal et al. 2006) has proven to be very useful in designing the communications campaign, understanding the comparative advantages and disadvantages of a range of sanitation systems and practices, and supporting the promotion of waterless composting toilets (CTs) in Tuvalu. It adds a new and persuasive dimension to the arguments for protection of environmental and public health. In short, "money talks".

An extract of the recommendations from this study follows:

Tuvalu faces some real challenges in relation to the management of its human wastes, Fekau o Tino. Taking a conservative approach, this study estimates that current largely septic based system of liquid waste management is costing the nation about NZD 500,000 a year. This estimate is based on partial analysis of the costs of poor sanitation on human health, the preventative costs incurred by individuals and government in the use of alternative water, including rainwater tanks, bottled water and desalinated water, as well as limited costs to the coastal fisheries.

A number of alternative options are available, including fix the current septic system, establish a centralised reticulated system and ecological sanitation system based on compost toilets. However, the feasible option(s) available to the government for improving the sanitation system are constrained by not only the availability of financial resources but also because of Tuvalu's unique biophysical atoll environment and where the ground water is within 2 metres of the surface. The choice of alternative system is further constrained by the

fact that Tuvalu experiences dry weather for up to 3–4 months of the year, as well as extended periods of drought. In addition in periods of rainy season and king tides, much of the land area is subject to regular flooding.

With such limiting financial and physical environments, ecological sanitation system based on compost toilet is the only option that is economically viable and does not rely on availability of water. The annual cost to Funafuti of establishing and maintaining compost system as part of a new home is even less than the current total cost to human health, preventative costs and loss in coastal fisheries. Initial capital investment necessary to convert existing homes to compost toilets is approximately the same as it would take to replace the leaking septic tanks. Even with a well operating septic tank system, the economic outcome will be one of negative net economic benefits due largely to the high shadow value of scarce water; desalinated water is known to be costly through the world because of high energy and operating costs.

Compost toilet system established using "local" material in Tuvalu has net positive economic benefits. Despite such economic benefits, social acceptability of the ecological sanitation system is, however, likely to be slow.

To encourage the adoption of compost toilets, a multi pronged and sequenced program is needed:

1. Education: A massive education program highlighting the merits of using compost toilets vis a vis other management options, including the do nothing option is needed. Economic values estimated in this study could help provide a more focussed and objective quantitative information that can demonstrate the economic costs of the current system as compared with the expected net benefits of changing over to the alternative system, including the savings in freshwater.

2. Develop an integrated liquid waste management plan, involving key stakeholders, including the Department of Public Work, Local Kaupule, Department of Environment and the Ministry of Health. Liquid waste management strategy must be linked to the national budgetary process through the national sustainable development strategy or the Kakega II, such annual budget allocation explicitly reflects the integrated approach needed to manage sanitation, water and human health, as well as the environment.

Institutional reforms: In the outcome focussed Plan, it is imperative to establish an interdepartmental waste management task force. Clearly define roles and responsibilities of each government organisation involved in waste management, while emphasising the shared responsibility for the management of liquid wastes in Tuvalu. Each agency must be adequately resourced and their program of work coordinated and harmonised.

Economic instruments: Adopt economic incentives such as subsidy to bring about conversion to compost toilets.

Legislative instruments: Develop an appropriate liquid waste management legislation in which compost toilet system is made mandatory in the design and construction of all new homes, and new additions to existing homes. The cost of doing so could be provided as a subsidy by the Government. Together with this, an effective monitoring and enforcement system would also be needed.

3. The Government could approach a development partner to assist with the conversion of the existing septic system with compost toilets for households that show commitment to the use of ecological sanitation system. The Government could also consider approaching development partners for assistance under the Clean Development Mechanism of the Kyoto Protocol.

In conclusion, Funafuti has very few choices available to it in regards to its management of human wastes. If the country does not tackle this issue urgently, the problem is likely to become more acute as population increases and if predicted climate change become a reality".

(Source: Lal et al. 2006)

3 Preparations for training in sustainable sanitation

The "hands-on" training in sustainable sanitation was conducted October 6–23 2006 in Funafuti, for personnel from government and non-government organisations, the private sector, the communities, and IWP team members. See Annex B for list of participants.

3.1 Pre-training preparations

Preparations for the practical sanitation training began in August 2004 during the visit by the ST to Tuvalu, in concert with the IWP Communications Specialist, Steve Menzies. Assessments were conducted of existing sanitation systems and practices and discussions were held with the Tuvalu IWP National Task Force (NTF). These investigations verified and supported the Baseline Assessment (IWP 2004) and led to the development of the "Solutions Report" (Crennan 2004), which proposed training in the design, construction, operation and maintenance of on-site sanitation. The training would include a basic accessible water quality monitoring component.

It was intended that the proposed training would provide householders, contractors, and relevant government personnel with the opportunity to:

- learn practical design, construction and maintenance skills;
- understand the treatment process, and the cost and impact of current technologies and practices;
- be better informed to make appropriate decisions about what technical systems and practices should be adopted;.
- be motivated to take the necessary steps to build and maintain appropriate systems and adopt sustainable behaviour;
- plan to fund construction of appropriate systems; and
- be equipped with sufficient understanding and skills to teach others about sustainable sanitation for Tuvalu.

A plan of action was formalised in March 2005 with an agreement between the ST and SPREP.

3.2 Input to communications strategy

The activities referred to in this report began in March 2005. It was originally planned that the sanitation training be conducted in May–June 2005.

Due to the time required for (i) the development and implementation of the community communications campaign, (ii) wastewater and water quality workshops funded by the Australian Agency for International Development (AusAID) and conducted by TAFE GLOBAL, and (iii) the cost benefit analysis (Lal et al. 2006), the sanitation training did not take place until October 2006

The March 2005 agreement required that the ST identify appropriate inputs to the development of the communications strategy. This was done via intermittent communications between the ST, IWP Project Coordination Unit (PCU), and the IWP NC. Some activities were recommended as best taking place in the lead up to the practical sanitation training, and others to occur as preparation for the campaign. The sequence and content of activities was decided upon by the NC, the Tuvalu team and the Communications Specialist.

The activities discussed included audience research, competitions in poem, songs and drama on campaign themes, and promotion of campaign objectives through radio and video.

3.2.1 Audience research and social marketing

Among other issues, it was advised that it could be useful to survey communities on the following:

- What do people understand about the causes of disease, including the connection between the waterborne/septic systems, contamination of the groundwater, and health problems?
- What are current toilet habits, including how often do people use the beach for defecation, and what is the reason? (e.g. no toilet, water shortage, socio-cultural preferences, convenience)?
- What do people think are the advantages/disadvantages of pour flush, water-seal or septic systems?
- What is the groundwater used for (e.g. washing clothes, gardening and flushing toilets?) Are there other non-secondary uses? What is seawater used for domestically?
- Do people know about composting toilets (CTs)? If they do, what do they think about CTs:
    - What objection would people have to using waterless-CTs?
    - What is attractive about a CT?
    - Are there any positive or negative gender issues associated with the use and/or maintenance of CT?
    - What would people do with end-product compost material? Would they use it as a fertiliser?
- How much money are people able/prepared to pay for the various kinds of toilet, including the waterless CT? What priority do toilets have in the family budget?

A survey was designed covering these and other issues. Ten people from seven villages were interviewed on 29–30 April 2006 by a team of 5 people (one from Public Health, three from the Environment Department, and one from the Persistent Organic Pollutants programme. The results were used to develop the marketing content and target audience for the national communications campaign and to establish a baseline against which to assess impact of campaign (Saloa 2006)

The Solutions Report (Crennan 2004) did not recommend promotion of one particular practice or technology. The original intention was rather to provide participants with a sound basis for making their own decisions about the most appropriate options for their communities

It was recommended that a range of treatment options and their advantages and disadvantages, including cost, be explored in the sanitation training scheduled for mid-2005, with the objective of allowing the participants to then choose the most appropriate system based on their own evaluation. However, the IWP Tuvalu team the IWP PCU staff decided that a broader campaign that introduced the CTs as the most desirable option would be the most efficient strategy, given the prevailing conditions in Tuvalu.

The sanitation training was therefore postponed until late 2006, and was preceded by the cost benefit analysis (Lal et al. 2006) and further water quality assessments, which provided solid evidence of the need for the promotion of a waterless, zero-discharge sanitation system. When sufficient evidence was gathered, based on public health and environmental data and economic considerations, “Think waterless toilets” became one of the primary themes of the campaign.

3.2.2 Media

The Solutions Report recommended that development of a video could be an effective aspect of a communications campaign. Video had been used effectively in sanitation projects in Kiribati and Tonga. The Tuvalu Communications Team followed this suggestion, and Part I of a promotional documentary was made, with the NC acting as Director, and with professional assistance from Department of Community Affairs personnel from the Tuvalu Media

Corporation. The video delivers the history and technical issues of inappropriate, or malfunctioning, sanitation systems and resulting environmental and public health problems in an engaging, accessible format.

Part 2 of the video is being produced at the time of writing this report (October–November 2006). During the sanitation training a cameraman was present at most sessions and interviews were conducted with participants and the ST. It is planned that the documentary will be edited and completed before the end of 2006.

A national campaign was launched in Tuvalu in May 2006 to promote and raise public awareness of groundwater contamination and its health/economic costs, based on the cost benefit analysis and previous studies and reports noted above. A second goal of the campaign was to develop demand for a safe toilet system.

The campaign was conducted by the IWP Communications Team, which included personnel from government ministries, non-government organisations and volunteers. The team members were selected by the NC and the PCU Communication Specialist.

The campaign utilised a variety of media to disseminate information to the public, including a series of talk shows on Radio Tuvalu, which provided a venue for useful discussions and debate. One of the talk shows focused on groundwater pollution caused by careless disposal and poor management of liquid waste; another discussed and shared information on the formulation of the National Integrated Water Resource Management Plan and the National Water Plan.

Information was also disseminated through speech competitions, reciting of poems, drama, and songs, and poster competitions. These competitions were completed with a quiz between Nauti and Seventh Day Adventist Primary schools. The Prime Minister closed the campaign at an official function in July. The competitors performed their poems, songs and drama, and the First Lady awarded prizes to winners of the competitions (IWP Tuvalu 2006).

The ST viewed a video recording of the previous performances during the October visit to Tuvalu, and was impressed by the range of talent, creativity, and enthusiastic participation by school children and youth

Jingles and other promotional items continue to be played on the radio. Radio interviews were recorded with the NC, the landowner where the CT was built, and some of the trainees following the Sustainable Sanitation Training.

3.2.3 Evaluation of campaign

Evaluations are recommended to assess changes in attitude as a result of campaigns of this type, to determine how well the messages have been adopted by the target population. The stated objective of the campaign was "100% awareness of contamination of surface water, groundwater and lagoon by current toilet systems by August 2006". An evaluation could assist in designing the next communication phase, beyond the completion of IWP at the end of 2006.

Random queries were made by the ST during the October visit to Funafuti, and of the 20 people questioned, 8 had heard of the waterless toilet, while 12 were not aware of the waterless toilet or the campaign. It was not known whether the respondents were from Funafuti or other islands of Tuvalu.

The managing staff at the Vaiakulagi Hotel approached the ST to ask if CTs could be installed in the hotel in order to reduce their water bills. They had heard about the campaign. They were particularly interested in installing a CT in the bar area, but the ST advised that a CT receiving mainly large quantities of urine could be difficult to maintain. However, a urine-separating CT could be used for this purpose. The hotel personnel also queried whether guests would be prepared to use the CT in their rooms. They were advised that CTs are used in resorts in environmentally sensitive areas throughout the world.

A senior government official also expressed interest in installing a CT at his bungalow on his home island for the family's use and the use of visitors to the island.

The NC reported that the Communications Specialist had intended to design an evaluation but had resigned from the PCU before the campaign was completed. It was suggested a simple random survey could be conducted asking some of the questions that were asked in the April 2006 survey.

3.3 Selection of participants for the sustainable sanitation training

It was suggested in the Solutions Report (Crennan 2004) that the sanitation training be promoted as part of the Communications Strategy. In order to raise the status of the course and also of the issue of sanitation, it was recommended that participants be required to apply to attend, be interviewed to assess their suitability, and receive "trade certificates" to recognize their achievement. The course would be open to representatives from other communities in order to spread the word nationally, and also to avoid the perception that residents of Alapi and Senala were being unfairly advantaged by receiving this training. These delicate matters were left in the hands of the NC and the NTF to negotiate.

Rather than following the application and selection process suggested above, invitations were sent to participants just a week before the training was to commence. This may be one of the reasons for the reduced number of participants. There were 19 participants from Tuvalu rather than 30–35 that were expected. This was an appropriate number, however, given the logistics of organising the construction process.

The participants represented the Public Works Department, the Health Department, Tuvalu Association of Non-Government Organisations (TANGO), the Foundation of the Peoples of the South Pacific International (FSPI), the Funafuti Womens Group, the Tuvalu Family Health Association (TUFHA), Waste Management, members of the IWP focus communities of Alapi and Senali, community members from other islands beyond Funafuti, and building contractors from the private sector. The Water Sanitation and Hygiene (WASH) Officer from the Secretariat of the Pacific Applied Geosciences Commission (SOPAC) also attended for part of the course, and SOPAC sponsored the attendance of two I-Kiribati government personnel, one from the Ministry of Health and the other from Department of Environment. See Annex B for a list of participants.

Prior to the training the ST suggested to the following selection criteria for participants:

- willing and able to be involved in construction work;
- understand that their participation will be assessed and a skills/trade certificate from the Institute for Sustainable Futures at the University of Technology in Sydney awarded for their level of participation;
- be able and willing to take their skills back to their community and teach others.

The NC was concerned that the requirement to be involved in construction work would mean that women would not be able to attend, as "heavy" work was not usually undertaken by women in Tuvalu. The ST responded that it was important that women attend due to their central role in sanitation and hygiene in the home, and perhaps they could participate in the lighter construction activities. Building a sanitation system is a very effective way of understanding how and why it works, how it should be used, and how to repair it, and it could be empowering for women and girls to have these skills.

Two women participated in the course and despite being middle-aged and without construction experience, both were actively involved and learned and applied new skills throughout the training. Both women said they would like to conduct training with their communities after the course. The representative from the Funafuti Womens Association, Nuseta Papamau, said that

she would seek assistance from the IWP NC to develop a proposal for funding to run a sanitation construction workshop for other women, and the Director of TUFHA, Emily Koepke, planned to conduct a session using the ST's presentation slides at her upcoming workshop for men on environmental health. Ms Koepke asked the representative from Waste Management, Vavao Saumanaia, to assist her as a resource person.

3.4 Selection of a site for the toilet construction

The NC and NTF decided on the following criteria for the site where the waterless-composting toilet was to be built:

- enough space for the toilet house and the evapo-transpiration trenches;
- Sufficient clearance from neighbour, and agreement of neighbour;
- easy access to site;
- householder should own the land, and the family is willing to use the composting toilet;
- preferably a family that did not have a toilet.

The ST requested that the owner be prepared to sometimes let others use the toilet, or at least talk with others about their experience with the toilet.

The IWP NC indicated that it was ultimately the decision of the Funafuti Kaupule to select the owner on whose land the composting toilet would be built. However, he added that the promotional aspect of the ownership would be considered. The week before the training commenced the selected landowner withdrew, apparently because the family felt there was not sufficient room to construct the toilet house and the evapo-transpiration (ET) trenches.

A second landowner was selected in time for the training to commence. This household had no toilet and the family usually used the beach, or neighbours' and relatives' toilets.

3.5 Certification of the training

The Institute for Sustainable Futures (ISF) at the University of Technology in Sydney was approached by the ST to provide certification of the course (not accreditation, as this is a long expensive process taking several years and more than AUD 100,000).

A series of meetings were held during 2005 with the Director of the Institute, Dr Stuart White and the International Programs Manager, Dr Juliet Willets, to discuss the IWP Tuvalu course content and objectives. As the training will provide skills that could also be used to generate income in Tuvalu or elsewhere, it was considered consistent with the Institute's poverty reduction goals as well as capacity building to reduce pollution and associated health threats.

When the NC contacted the ST consultant in June 2006 to resume arrangements for the sanitation training, it was necessary to renegotiate the terms of certification with ISF. Meetings were held on July 5 with ISF staff in Sydney to confirm that the certification was still in place.

It was initially intended that the Certificate (attached to this report as Annex C) provide a percentage evaluation of participation in the two components of the course: theory and management of on-site sanitation systems; and design and construction of waterless composting toilet. Participants were informed of the formal certification process at the opening of the course and this appeared to add value to the training. At the end of the training it was decided by the ST and the NC that it was not necessary to give a percentage evaluation as it was too difficult to fairly assess relative involvement, and it was decided that all participants had contributed and participated to the best of their ability.

Attendance was noted on a daily basis and most of the participants were committed and involved throughout the entire course, despite the intense heat and demanding circumstances of

the construction process. Those who had to be briefly absent because of other obligations, (such as the representative from the Health Department), apologised and explained the reasons that they were required to attend to other duties, and advised when they would return.

At the final training session on Friday afternoon, Certificates were presented to all the participants who completed the course, by the Director of Environment, and the ST.

3.6 Building materials

Prior to the training it was necessary to provide construction and design information to the Tuvalu team to allow plenty of time for preparation.

When the NC contacted the ST in June 2006, it was suggested that he visit Sanitation Park in Suva to inspect CTs there, as he was due to visit Fiji for an IWP Lessons Learned meeting. Sanitation Park is an interactive education facility located at the Fiji School of Medicine. It is intended that the Park be used by Environmental Health students from across the region and the general public. It has demonstration models of a properly constructed septic tank and treatment trench, a ventilated pit latrine, a sanitary well, and a waterless composting toilet. Information is also available on costing and locating a variety of technologies to assist communities to select an appropriate toilet system that suits their socio-economic, environmental and hygiene conditions.

Unfortunately the NC did not have time to visit the Park and explore material and design options for toilet construction for Tuvalu, so the ST proceeded with the standard design.

Technical drawings, written technical specifications, and two materials lists from previous double batch CT constructions, and sketches of the proposed demonstration system were emailed to the IWP NC in June 2005 to pass on to the Water and Sanitation (W&S) Officer at Public Works Department (PWD). A list of required tools for construction was also included. From this information the W&S Officer was to asked to develop a list of materials that could be purchased in Tuvalu. Any outstanding items which could not be replaced by locally available materials were to be brought in by the ST.

Unfortunately the full set of technical drawings was not passed on to the W&S Officer, but he nevertheless managed to draw up a materials estimate, which was a remarkable achievement since he was unfamiliar with the design and the concept of a waterless double batch CT.

When the ST arrived in Tuvalu on October 6, the misunderstanding was rectified and the W&S Officer was provided with a full set of drawings and explanation of design details during a meeting also attended by the Director of Public Works, the IWP NC and the PWD carpenter. It was agreed at this meeting that the W&S officer would lead the construction of the CT, with the support of the ST, the NC, and the PWD carpenter (acting as construction foreman). It was decided by the Tuvalu IWP team that construction be led by the W&S Officer in order to provide personnel with experience in conducting a training of this nature, and to facilitate local ownership of the design and construction of the CT for Tuvalu.

An additional meeting was held by the ST and the W&S Officer to discuss design and construction issues in more detail.

In August the NC requested that the ST purchase the toilet pedestal and seat in Australia. The ST researched availability of pedestal and seats for waterless-composting toilets and ordered a fibreglass pedestal from Nature Loo in Brisbane, because it would be relatively light to transport by plane. A wooden seat was also purchased as it was recommended by the manufacturers as being durable for tropical conditions.

3.7 Training agenda

When the NC contacted the ST in June 2006 to resume arrangements for the training the ST inquired about the content of the training for 2006, given the events that had taken place since

the training strategy had been formulated in March 2005. The NC requested a global overview of CT usage, followed by the construction training. The ST expanded this to cover the topics suggested in the Solutions Report, and which were required in the contract agreement of March 2005: namely a comparative review of sanitation options, including using the beach..

A draft training program was emailed to the NC in August 2006 for the Tuvalu team's review and comment. The draft program is attached as Annex D. It was understood that the agenda needed to be flexible to allow for variable construction progress, which may proceed faster or slower than anticipated. The program consisted of a background/theory section and practical construction sessions.

The NC confirmed approval of the draft program on 29 August.

4 Content and structure of the sanitation training

The training consisted of two components:

- the background theory and management of on-site sanitation treatment; and
- the practical skills to design, cost, construct and maintain a fixed double batch composting toilet. There are many different types of composting toilet designs and most work well.

The fixed double batch system was chosen as a demonstration model, as the ST has had extensive experience with this system in the Pacific, US and Australia, and has found it be the most durable and easy to maintain of the many designs available. It can be built from locally available materials so is not dependent on imports for construction, or maintenance. The design had been improved after feedback from users in the Pacific and Australia.

t is also easy to see how the system works because the composting chambers are not sealed, as in the mobile batch systems or the continuous systems. This is not to say that the fixed double batch is the only CT design that is suitable for Tuvalu. There is a mobile batch system that has been successfully used for 5 years by a family in Senala, and they are happy with it. Whatever designs are finally chosen by the people of Tuvalu, the principles of a composting toilet are easily observed in the fixed double batch. These principles can then be applied to other design types.

Although a draft agenda had been provided by the ST and accepted by the NC, it was mutually understood that the implementation of the training would be flexible to allow for the weather, the experience and skills of the participants and any unexpected developments that might occur during the 2-week period. The ST queried whether the prospective participants understood English and if not what arrangements for translation should be made. The NC responded that he thought that those likely to attend would be comfortable with presentations in English.

4.1 Daily process and content of Funafuti training

The sustainable sanitation training was aimed at capacity building for all those involved, including the IWP team. It commenced as soon as arrangements for the training began in March 2005, and then resumed in June 2006. The way in which an event is planned and organised in the preceding months will determine how successful the actual event is. The preparatory stages have been described in Section 3.1.

This following section summarises the key elements of an interactive process that determined the final content and structure of the Practical Training in Sustainable Sanitation. The development of the social dialogue was as important as the technical exchange of information and skills.

DAY 1, October 9

On arrival in Funafuti by the ST, a meeting was held with the NC and ST to discuss arrangements for the training including materials, personnel who would assist in the training, selection of participants, site for CT construction, location for theory sessions, provision of meals and refreshments during the training and the communications campaign to date. As it had been 2 years since the training was originally planned, there was a lot of detail to understand about what had occurred in IWP Tuvalu since October 2004.

DAY 2, October 10

Meetings were held with personnel from PWD, the NC, and the ST; roles and responsibilities were allocated for the construction of the waterless CT.

Roles and responsibilities

As referred to in Section 4.1.5 of this Report it was decided that the PWD W&S Officer would lead the construction, with supervision and support by the ST and the NC and his team. The Director of Public Works suggested that the W&S Officer invite participants who had construction skills to assist with training, and to take responsibility for overseeing specific construction tasks. Design and building materials issues and options were also discussed, and arrangements were confirmed for use of PWD tools

Selecting a site on householders' land

A meeting was held with the owner on the land where the CT would be built. The meeting was attended by the NC, the ST, the PWD W&S Officer and the Director of Environment. Teosa Ioasa and his wife Simanoe had no children but were living with his stepfather and the wife's bother and their two children. The neighbour (who had a family of 6 people) would also probably use the CT. The land was adjacent to a large *maneaba*, and it was possible that other community members would also use the toilet with Teosa's permission. A partly constructed concrete block house was located on the land, and it was decided by the landowner that the toilet would be located approximately 2 meters from this house, leaving open the possibility of including the CT in the final construction of his house. The unfinished house belonged to Teosa's brother, who had gone to live abroad. Teosa hoped to finish the house when funds were available

Other considerations for locating the toilet included: privacy; the proximity to the neighbour's house and boundary; prevailing winds, especially on the cyclone side; and convenient placing of the evapo-transpiration trenches where there would not be regular pedestrian traffic.

Venue preparation

The venue for the theory sessions was inspected by the NC, the ST and the IWP Administrative Coordinator for the training. The theory sessions were to be held in the youth centre belonging to the Tuvalu Family Health Association and discussions were held with the Director of the centre regarding the training. Seating was arranged and the projection equipment checked.

DAY 3. October 11

The training was officially opened by the Director of Environment and morning tea/breakfast was provided.

Meals and refreshments

Throughout the training women from the Funafuti communities prepared at least two meals a day for the trainees. The payment for these meals by IWP therefore provided income to the

communities and also advertised the training. The women who provided food on the construction site all expressed an interest in the CT and a desire to have one. (This interest may have partly been because the CT was being built free of labour and material costs to the owner).

Sitting fees

After the opening, one of the participants, a senior community member from the island of Nukulaelae, Foia Paeniu, complained about the lack of "sitting fees" for the participants. The requirement for participants to be paid to attend workshops and trainings has developed over the last decade across the region. In some cases the amount is to cover daily travel costs, which is reasonable, but more often the amount is a substantial attendance fee. In some countries participants will not attend unless sitting fees are paid, and it was reported that some invitees did not attend the training because they knew there were no fees. The NC explained to the trainees that there was no allocation in the budget for sitting fees and that food would be provided in lieu of fees. The Director of Environment explained that the training would provide the participants with skills that could lead to employment in Tuvalu and elsewhere, and would enable them to better protect their family's health and the environment.

At the beginning of the opening theory session, the ST explained the process of certification and how the Institute of Sustainable Futures at the University of Technology supported the training and its goals. It was also explained that attendance at such a course would cost at least $1000 per person in Australia. There were occasional ongoing references to the lack of sitting fees for the first couple of days of the training, but by the beginning of the second week the most vocal critic announced that he was more than happy with what he was learning from the training, and no longer felt that sitting fees should be provided.

The first theory session examined the source and content of sewage and how it can threaten public health and the environment. Information was provided primarily through photographs and graphics in slide presentations.

Request for translation

Within 5 minutes of the opening session one of the participants complained that the presentation should not be in English and indicated translation was required because most of the information was unfamiliar and difficult to understand. From then on for all the theory sessions, the ST presented each slide and associated information, and the NC translated, before moving on to the next slide. This slowed down the sessions but allowed time for repetition and understanding (as it became apparent that most participants actually understood the English presentation).

Discussion was stimulated by the translating process because the participants asked questions in Tuvaluan. If they were required to ask questions in English this would have been a deterrent, due to the fear of being teased by their companions about their English speaking ability. The only drawback to the translating process was that the ST did not understand exactly what was being said, and so was less able to target information or feedback accordingly.

Unseen threats in human and animal excreta

One of the major obstacles to awareness of the threats of untreated human and animal waste to public health and environmental is the fact that pathogens (disease causing organisms) are invisible to the naked eye. Therefore presentations included information on the morphology of heleminth eggs (worms), especially round worm or *Trichuris*, which is very common in some Pacific Island countries. *Trichuris* was chosen as an indicator as heleminths are one of the most persistent pathogens in the environment, surviving most waterborne treatment, and the eggs are able to live for up to 7 years in the soil.

The information on heleminths was drawn from research by Dr Greg Berry, who conducted extensive research into the impact on pathogens within a functioning CT (Berry 2001). Dr Berry was sub-contracted by the ST in March 2005 to provide input into the training. When the training was postponed until October 2006, he was not able to attend, but continued to provide input into the re-design and content of the updated training. His research was presented in an accessible format to demonstrate that the composting process in an effective CT can destroy heleminth eggs, and therefore other less resilient pathogens.

Fertiliser value of CT compost

Dr Berry also studied the fertiliser value of composted human excreta, and the history and current uses of dry sanitation in Asia and Central America. The results of these studies were also included in the presentations in a simple format through graphics and photographs.

On-site sanitation options

The design and maintenance of a range of on-site sanitation systems was presented and discussed including ventilated improved pit latrines, septic tanks with treatment trenches, evapo-transpiration beds, sand filters, aerated wastewater treatment systems, and CTs. Comparative advantages and disadvantages of all these treatment options were discussed with a particular emphasis on their suitability for the social and geophysical conditions of Tuvalu.

Construction steps for CT

For the final session the PWD presented the slides which the ST had prepared on the steps required to build a CT. This presentation used photographs of CTs being built in Fiji and Vanuatu. The early introduction to the technical aspects of the training were necessary because on the following day the trainees would lay the foundations and slab of the CT.

The trainees appeared to appreciate the first day of presentations and discussions and were particularly affected by the demonstration of the impact of pathogens on the human body.

DAY 4, October 12

It was recommended that foundations and the slab be poured early in the training to allow 3 days for the slab to cure.

Foundation and slab construction

All the trainees turned up on site at 7am ready to begin construction. Unfortunately the W&S Officer was late arriving and then had to leave again because he was collecting materials for construction. The group was left to clear and level the site.

One of the trainees from the private sector who had experience in building took over supervision. It had been recommended by the ST that foundations should be built according to local requirements for soil and weather conditions. There was some discussion among the trainees regarding different methods for pouring the foundations and slab and the required depth of foundations. As there was not agreement on this issue, the ST provided direction by reference to the technical drawings and it was decided that the plans would be followed for the construction of this CT, with any possible local modifications included in the manual. The W&S Officer finally arranged for delivery of materials and returned to the site, but by that time some mistakes had been made in measuring dimensions of the toilet structure and cutting the formwork for the slab, which he asked the trainees to correct.

Some of the trainees were professional building contractors, and others had very little experience of construction work, so it took some time for the group to adjust to this difference in skills. Despite intense heat and some debate over how the task should be achieved, the foundations and slab were successfully laid at the end of the day's work. Breakfast was served

to the group mid-morning, and a late lunch after the slab was poured. Meals were served in the nearby maneaba. Cold drinks were supplied throughout the day.

At the end of the day's work, two representatives from Kiribati, Noketi Karoua, and Nenebo Benetito, arrived on the scheduled flight from Suva, with the WASH officer from SOPAC, Kamal Khatri, to participate in the training. Unfortunately they were not able to attend from the beginning of the training due to late booking of their flights.

DAY 5, October 13

The trainees returned to the TUFHA meeting room to continue with the background theory session while the slab cured.

Roles and direction for CT construction

The first session of the morning was a lengthy discussion about the construction process of the slab which occurred on the previous the day. Participants were invited to comment or ask questions about what they did not understand. The following issues were raised in Tuvaluan. Some translation in English was provided to the ST, and the representatives from SOPAC and Kiribati.

- There were "too many cooks" on the construction site, and the trainees expected overall construction to be led by the W&S Officer, as this is what had been arranged at the end of the theory session on the preceding day.
- The participants were there to learn how to understand and build a waterless composting toilet, and not just to assist in construction work. Therefore they expected that procedures would be explained (such as the correct mix for the concrete) to those without building experience, and they would not be criticised by those with more skills, if they made a mistake.
- It was suggested that materials should be organised prior to construction so that the W&S Officer could be on site to direct proceedings, and there would be no delays in continuing with construction.

This surprisingly frank exchange was very useful as it helped to sort out group dynamics early in the training. It is often the case at trainings and workshop in the Pacific that people have strong complaints but are too polite to say anything, and grievances only emerge at evaluation time, or informally after the workshop, or people just stop attending the training, in silent protest.

In response to the group's comments there was more discussion about how the trainees could be divided into small groups with one experienced builder taking responsibility for supervising a particular task. It was resolved that ongoing construction would proceed more smoothly the next week. The ST encouraged participants to ask her any questions on the construction site if they didn't understand what is going on. However, it was understood that general shyness might prevent this from happening

History of dry sanitation and CTs in developed and developing countries

The ST presented a history of dry sanitation technology from the time that it began in Asia at least 1000 years ago, and spread to the rest of the world. Different models and agricultural practices (using the toilet compost as a fertiliser) were discussed from China, the Himalayan regions, Central America (El Salavador and Guatemala), the Pacific Islands and Australia. This presentation let the participants know that CTs are not a new invention that is going to be tried out in Tuvalu. They have been used in a wide variety of cultures and geophysical conditions over long periods of time.

"Water Tommorrow"

Technical problems occurred with the author's laptop due to a power surcharge, followed by a damaged CD, and the TS was not able to proceed with more detailed slide presentations of CTs in Fiji, Vanuatu and Tonga on DAY 5.

Water Tommorrow, a video from the Water Voices series made by the Asian Development Bank for the Third Water Forum in 2003, was shown. It addresses water and sanitation issues, particularly groundwater pollution, in Tonga and Kiribati. It includes the promotion of CTs by the Development Officer in Tonga and personnel from Langafonua (Tongan Womens Association), and the island wide installation of CTs by the Town Officer and Village Committee on Ata'ata. Trainees reported that it was very interesting to see live footage of people in other Pacific countries facing and discussing the same problems they experienced in Tuvalu.

The WASH officer from SOPAC presented general information and statistics on sanitation and hygiene issues in developing countries. Poor maintenance of existing "low-tech" water supply and sanitation technologies was discussed.

After the training sessions the ST offered to assist the W&S Officer to lead the construction, but he responded that he could do it, and would be better organised the following week. It was definitely the preferred option that the W&S Officer continue to lead the construction, as one of the goals of the training was to better equip Public Works personnel to manage sanitation in Tuvalu. As the W&S Officer had only received the full set of technical drawings at the beginning of the training week, he had limited time to prepare for the training.

DAY 6, October 14 (Saturday)

The training stops for the weekend break.

The ST met with the IWP Administrative Coordinator to discuss training logistics and to get further translation and understanding of what had occurred at the sessions in the first week. Preparations for the training that had occurred in Tuvalu over the last few months were also discussed. The Coordinator was asked to record questions that trainees asked in Tuvaluan during sessions to assist the ST in keeping track of the trainee's needs, but as she had many tasks to attend to she was not always present at the training.

It would have made her job easier and more productive if she had been included in the initial meetings that took place with the IWP and PWD personnel on Days 1 and 2, when roles and responsibilities were discussed.

DAY 7, October15 (Sunday)

The ST met with the representatives from Kiribati and SOPAC to go through the theory and background sessions which they missed on Day 3.

DAY 8, October 16

Training on the construction site began at 7am. At breakfast the W&S Officer held discussions with the trainees who would undertake each task.

Constructing the composting chambers and evapo-transpiration (ET) trenches

Mixing of mortar, and laying of blockwork and reinforcing for the composting chambers was shared by the group, with the two women actively involved in construction.

The height and size of the composting chambers can be varied according to need. The group discussed the likely number of people who would use the CT, and decided that the chambers should be 5 rows of cement blocks in height.

The evapo-transpiration trenches were dug and lined with concrete blocks.

At the end of day's work, the group was asked if they had any comments or questions. Most were satisfied with how the work was conducted. There was one complaint that all the required tools should be on site when needed. Some tools were borrowed from PWD and some rented from the contractors.

DAY 9, October 17

Construction began at 7am

Completion ET of drainage and trenches and upper slab

The ply formwork for the slab was prepared.

The ET trenches were lined with plastic and a thin cement lining poured on the base and allowed to dry. When it dried the trench was filled with coral aggregate over the draining pipe. Before finishing the top of the trench with sand, the NC suggested that a plastic cover was needed to prevent the trenches filling up with water in heavy rain, as the mounding will not be sufficient to direct run-off in Tuvaluan conditions. Old rice bags are used.

The design of the trenches should be adapted to Tuvalu soil and rainfall conditions, and the performance of these CT trenches needs to monitored. The trenches are finally mounded with sand. The area should be fenced off to protect the trenches.

The walls of the composting chambers were plastered.

The slab for the floor of the toilet room was reinforced and poured leaving a space for the toilet seats and the vent pipes**.**

The ST went with the W&S Officer to check at the hardware that the pine timber is treated (against rot). It was decided to build the frames for the access doors of the chambers in treated pine, rather than hardwood, which is more difficult and expensive to buy. The framing for the access doors to the chambers was prepared.

At the end of each day's construction the W&S Officer told the group what would be done the next day and any problems were discussed.

After the training, the TS and the NC viewed Part I of the documentary that the NC had directed, and discussed the approach and content with the film producer from the Tuvalu Film Corporation. This is an excellent production.

The I-Kriibati requested that they be able to stay for the completion of the training. They had been booked to leave with the SOPAC WASH officer on DAY 11. The NC and the TS supported their ongoing attendance, and the WASH officer was asked to contact SOPAC and request permission for them to stay. SOPAC personnel in Suva agreed to their ongoing attendance.

DAY 10, October 18

Construction begins at 7am.

The base of the chambers was rendered (plastered) so that the plenum floor slopes down into the drainage that connects with the ETs. Great care was taken to achieve a smooth finish by the PWD carpenter.

Framing and cladding of superstructure (toilet house)

The ST accompanied the W&S officer and three of the trainees to collect materials from the hardware store. The other trainees were instructed to plumb the superstructure and install rafters for the roof. During the wait for the materials, not all the trainees were occupied and

this led to some minor complaints. The W&S officer is the only person authorised to purchase materials so this makes his full time presence on-site difficult. He sometimes appears to be reluctant to delegate new tasks, in case mistakes are made in his absence.

The superstructure was framed in treated pine and the zincalume roof is laid.

Vent pipes were installed into the composting chamber. The W&S officer prefers to bend the pipes outside the roof line to avoid cutting a hole in the roof. The NC points out that the vent pipes should be installed in a straight line to maximise airflow and convection. The ST advises that this is correct. However, she has had experience of CTs not having vents at all, so it is a matter of weighing up the potential loss of convection against the possibility of rain getting into the toilet room. The pipes should be painted black to assist convection. It is agreed that and if there is trouble with smells the vent pipes will be re-fitted through the roof. However if the CT smells it is probably because it has not be maintained properly, (e.g. not enough dried leaves) rather than the lack of convection.

The marine ply cladding was attached to the superstructure. The timber was painted with primer to protect against rot. This is especially important for the timber inside the composting chambers.

The WASH officer from SOPAC handed out H_2S water kits to all the participants to test their home water supply (please refer to Section 5 of this report for more detail).

DAY 11, October 19

Construction began at 7am

The trainees broke into small groups to do the following tasks:

- Construct false floors from hardwood, and paint with primer;.
- Install the top of the vent pipes above the roof line fit flashing;
- Install the runners for the baffles on the access door frames, and make baffles using double thickness marine ply for strength and long term durability;
- Prepare blockwork footings for the steps and allowed these to dry. The steps were framed in treated pine;
- Build the door of the toilet room of marine ply and treated pine;
- Apply a top coat to the toilet house.

The ST was mainly focused on the internal fittings for the composting chambers to ensure that they were properly constructed to provide a firm seal and durability, and was concerned that too much time was being spent on finishing touches the superstructure. However, she realised that the appearance of the toilet house was equally important particularly for the introduction of new technology, which some may think as being too simple, and too much like the pit latrine.

The trainees were very careful to do a good job on painting the toilet house. The trainees also decided to clean up around the toilet area to make it look attractive, and suggested to the owner that he pave the place with small stones. Tiling the floor of the toilet house would also enhance appearance and show that a CT can be just as classy as a flush toilet.

The trainees worked from 7 until after 4pm to get all these tasks done.

DAY 11, October 20

Construction began at 7am. It was intended that the construction be completed by mid-morning so that the group could return to the TUFHA centre for the wrap-up sessions

The landing for the steps was completed. The door to the toilet was made too big and needed to

be reduced by planning the frame. Once this was s done the door was fitted.

Bolts were drilled through the frame of the chamber access doors and wingnuts used to screw the access doors to the frame. The access doors were double marine ply fitted with handles.

Coverings were cleverly made for the top of the vent pipes by heating and cutting the plastic. This will keep out heavy rain but will also further restrict airflow, so this needs to be monitored.

The guttering was attached to the facia board, and the base of the toilet seat fitted with a marine ply collar so that it can be bolted to the concrete slab floor.

The producer and cameraman from Tuvalu Film Corporation attended the morning construction and interviewed the landowner, trainees, and the ST. After the interviews, the producer and ST discussed attitudes to health/environment/existing sanitation practices/CTs and how these complex issues can be most effectively presented in a short documentary. The producer had his own doubts about CTs which he discused, mainly to do with style and appearance. He is however impressed by the interior of the CT house

As these final tasks take longer than expected, so the group does not assemble at the TUFHA centre for the final session until early afternoon. There was a suggestion that the construction site should be left earlier, but it is important the trainees be involved in the final details to that they can see that important features are not left unfinished.

At the TUFHA centre a video was shown of a composting toilet trial in Kiribati that took place in 1993–1995 on Kiritimati, which was of particular interest to the I-Kiribati trainees. The rest of the participants were also interested in the Kiritimati experience and attitudes, and in the section on Australian CTs, which showed families using CTs installed in modern bathrooms, and the compost being removed.

The Director of Environment arrivesdfor the final session. Timo Vilaimu was asked to give a presentation on his experience with the mobile batch CT that his family had been using for the last 5 years in Senala. Timo talked about how the compost reduces to one eighth of its original volume over the composting period. He said that they change the bins every 5–7 months and use the compost on their fruit trees and taro. He also commented that he thinks the CT the trainees have built is an improvement on the system he has at home, because it includes the ET trenches. Timo was very active throughout the CT training, and quietly contributed to all stages of the construction. He has spent 30 years as a seaman and has 5 children. He is the younger brother of Seimeli Manase, who has publicly advocated the CT for Tuvalu. The family has had no water shortage problems since using the CT.

The ST presented slides of the construction of the CT by the Tuvaluan trainees, highlighting the most important design steps, and emphasising the need to plan ahead, and have materials and tools on site ready for work.

The Director of Environment made a closing speech and the Director and ST presented the Certificates to all the trainees.

After the meal some trainees remained to see further presentations of composting toilets in Australia including their use in homes, resorts, training centres, schools and National Parks and World Heritage Areas.

Sadly, that morning a senior community member had died when he was collecting toddy, so many of the participants left to go the wake.

DAY 12, October 21 (Saturday)

The ST visited the CT to talk with the family. The landowner was much more relaxed about talking with the ST when none of the trainees were present. He explained what he understood about using and maintaining the toilet and it was clear that he knew what the correct procedure

was. He had installed a drum to catch the run-off from the gutter and was aware that the trenches needed to be protected. He reported that the W&S Officer had been there early that morning finishing off the fittings for the toilet seat.

The ST met other trainees in the street, and at a restaurant, and talked with them about their experience of the training (see Section 5.2).

DAY 13, October 22 (Sunday)

The ST and the NC met so that the ST could provide copies of all the slide presentations and the NC could provide copies of reports of all the activities that have taken place in IWP Tuvalu since the project began, but particularly over the last 2 years. The NC and ST discussed the successes and challenges of the training and campaign

The participants from Kiribati asked to meet with the ST to discuss their interest in having a similar training in Kiribati. The ST provided them with copies of the presentations so they could give a presentation to their colleagues in the Health and Environment Departments on returning to Kiribati.

DAY 14, October 23

The NC and ST met and downloaded graphics that could be used in the IWP documentary.

The Kiribati participants and ST left for Nadi where they met to discuss a strategy for sustainable sanitation in Kiribati. While conditions in Kiribati and Tuvalu are similar, there are also significant differences, and all the socioeconomic and geophysical conditions need to be carefully considered so that any activities are appropriately targeted. The Kiribati participants advised that they had learned a great deal from the training in Tuvalu and appreciated the Tuvaluan hospitality, and SOPAC's sponsorship of their attendance. They indicated they would report to their superiors and hoped to develop a strategy and proposal for assistance in the coming months.

4.2 Evaluation of training

There was no time for formal evaluation of the training when the sessions were completed on the afternoon of 20 October, as construction had finished later than expected and more than half the participants had to leave by 5pm. The ST spoke individually to most of the participants during the afternoon tea, or over the next three days, and asked them what they felt were the negative and useful aspects of the training.

The only negative comment from any of the participants was that there was too much time spent waiting around building materials, tools, or transport to collect materials for the construction site.

Other responses from some of the participants (listed as the groups/organisation they represent) are provided below:

- TANGO/FSPI: the CT construction and information on health aspects of poor sanitation would be used in youth education programs. Links could also be made to regional programs relating to destruction of the reef by discharge of human and animal waste.
- TUFHA: the Director would include the training information in their work with men on environmental health, and other family health programs. She said had previously been one of the most critical of the idea of CTs but now would like to volunteer to promote CTs for Tuvalu.
- Funafuti Womens' Association: she had learned new building skills and confidence, and now understood how to teach other women how to build and take care of a

waterless toilet, and why it was necessary in Tuvalu.

- Building contractors: they had increased their building qualifications, and they now also wanted to build a CT at their homes.
- Disaster Coordinator for the National Disaster Management Office: he also has a construction business, and was about to install a septic system in his aunt's house, and will soon build a new house himself, and was now considering a CT. He would monitor how the CT at the training site worked to be sure it was the right decision.
- Waste Management: training had confirmed and expanded the skills and understanding that he received under the AusAID Waste Management Project. He wanted to build a CT on his home island.
- Ministry of Health: said that it was a "very interesting training", which had helped to overcome his doubts about the CT, and understand more about pathogens in the environment.
- Representatives from the islands of Vaitupu, Nanumaga, Nukufetau, Nanumea, and Nui Islands: they would take the information back to their island committees and would like to build CTs if costs could be reduced. They appreciated getting qualifications and skills that might help them get paid work
- Representative from Nukulaelae Island: he was "really happy" to have attended the training and increase his understanding of pollution and health, and now knows how to build a CT; he had added to his skills as a carpenter (he originally complained about the lack of sitting fees, but now thinks all the hard work was worth it).
- Household with movable batch system: the training had provided very helpful background information to what his family had already experienced with the CT over the last five years, and he now knows how to improve their system.
- Participants from the Kiribati Environment and Conservation Division, and Ministry of Health: they very keen to tackle groundwater pollution problems in Kiribati and use what they had learnt at the Tuvalu training.
- Members of Alapi and Senali communities: they wished that the CT had been built at their house.

It would be useful for the NC and NTF to record any other comments they heard from participants, or from other people who talked about the training, as this may help in designing campaigns on the outer island after IWP. The informal evaluation that the ST was able to conduct was limited by not being able to understand Tuvaluan.

5 Community-based water quality monitoring

The Solutions Report (Crennan 2004) suggested a community-based groundwater monitoring programme be conducted to further establish the links between poor waste water management and degraded environmental and public health. The intention was to actively involve members of the community in measuring the impacts of their activities on the groundwater system. This suggestion was included in the March 2005 Agreement with SPREP.

In the Solutions Report, it was explained that simple "strip tests" can be distributed to households and/or communities so they can test their own water either from the well, the rain tank or the desalination plant. With sufficient education on how to use the simple presence/absence strip test, there should be no need to tell people that their water is either safe or contaminated, as they can see the results for themselves. If results indicate high risk, households would be instructed to treat their water to make it safe before drinking (Mosley et al. 2004).

Having people participate in the monitoring themselves is an effective way to encourage the adoption of alternative wastewater management and sanitation techniques. It is an excellent way of demonstrating that invisible pollution exists and can be measured.

The use of H_2S strip test kits was included in the March 2005 Agreement, and it was also suggested that boreholes could be installed near village wells and samples taken from the bores and the wells that are currently in use. This would have helped to establish a base line quality for faecal indicators and other indicators that are a concern. This monitoring could be performed by a school science class or selected volunteers from the within the communities.

A further suggestion was that after one month of collecting samples for baseline quality, all the residents in the study area could be requested to make arrangements with relatives outside the study area to use their toilet, or to use the beach, so that the toilets in the study area could be closed**.**

This proposed strategy was based on the original plan that the sanitation training would occur early on in the awareness campaign, in mid 2005. It was suggested that the composting toilet that was to be built during the sanitation training could be installed in the study area and used by the families involved in the groundwater monitoring programme. After a period of six months it would be possible for the septic tanks and latrine pits to be emptied in order to observe any changes in water quality when the sludge is removed.

When the sanitation training was postponed this community-based monitoring strategy did not proceed. Water quality workshops and assessments were conducted with government personnel instead.

5.1 Water quality workshops and assessments

The water quality workshops were funded by AusAID as part of their small grant technical assistance program and occurred in June and December 2005. The workshops were attended by representatives of Ministry of Health, Department of Environment and the Public Works Department.

Water quality assessments were conducted on well water within the villages, rainwater from storage tanks, pond water near the piggery, groundwater at the landfill site and burrow pits, saltwater from the ocean side, lagoon water near jetty and filtered seawater from the desalination plant. Water was tested for dissolved oxygen, temperature, pH, colour odour, turbidity, suspended solids, salinity, nutrients, heavy metals and bacteria (Water Quality Testing Results June and December 2005). A project report on these workshops has not yet been provided by AusAID but the results were used to support the IWP campaign.

5.2 Trainees testing water supply

The ST decided to go ahead with introducing the strip tests so that they could be used in future awareness-raising campaigns, and to give the trainees the opportunity to test their water supply.

The ST planned to collect the H_2S kits while in transit through Fiji but as she had to transport the CT toilet seat, she requested the WASH officer from SOPAC, who was attending the training, to collect the kits from the suppliers in Suva and bring them to Tuvalu, with some relevant SOPAC publications. On 18 October the WASH officer was asked to hand out the kits at the construction site, and explain the simple process of using them. This consists of filling up the flask with water to the mark on the glass, and then observing any colour change over the next few days. Instruction sheets were provided how to judge the colour change and what it meant.

The trainees were told to keep the flasks in the dark and bring them the next day to discuss any changes. Only 2 people brought the flasks back and neither had any serious colour change.

Most of the group said they had forgotten to try testing their water supply but would do so the next day. Nobody returned their flask the following day either. A trainee commented that perhaps if there was a serious colour change people may be embarrassed to show the whole group who would then know their water supply was polluted.

The NC said that it would be helpful to use the H_2S kits in the awareness work with school children.

6 Lessons learned

IWP in Tuvalu was conducted between 2001 and 2006. The ST was involved in the development of the original background documents in 2002 that support the regional project, in particular a synopsis of information on community based solutions to waste management pollution prevention and improved sanitation in Pacific Island countries (Crennan and Berry 2002). The first visit to Tuvalu by the ST occurred in 2004 and from that time the ST had some involvement in the design and implementation of the pilot project for Tuvalu. This involvement was for the most part long distance in nature, however, and it is from this perspective that the following comments on lessons learned are made.

6.1 The positive lessons from IWP Tuvalu

Sanitation is a complex and challenging issue to deal with as it touches on the most personal aspects of human life. It involves traditions, habits and beliefs that are learned from childhood and are extremely difficult to change. Poor management of sanitation can cause serious impacts to health and the environment, which are largely invisible.

Any campaign that succeeds in changing behaviour is this area is to be congratulated. Tuvalu was the only country involved in the regional IWP that chose this path, although many PICs are facing serious threats from poor waste water management. IWP has tried a number of different strategies that could be useful elsewhere.

6.1.1 Integrated approach

The communications campaign and the training in sustainable sanitation were a good example of an integrated approach to water supply and sanitation, involving government, NGOs and CBOs, and the private sector. The initiative taken by the PWD to lead the training despite having no experience building a sanitation system of this kind showed considerable initiative and commitment to the long term goals of the project. The active involvement of the key stakeholders throughout the programme was achieved through personal contact by the NC and the NTF, and by collection of background data that supported public health and environmental protection through promotion of waterless CTs.

The integrated approach taken by IWP Tuvalu provides a solid platform for a national strategy to bring all the players together with a clear allocation of roles and responsibilities in water supply and sanitation management. Hopefully the government will make use of the considerable development of capacity that has occurred during the IWP, and not allow “brain drain” and loss of momentum that can so often occur after a project of this nature is completed.

6.1.2 Practical skills

Participants in the sanitation training provided feedback that they really appreciated (i) gaining a clear understanding of how poor sanitation can impact on their family’s health, and (ii) acquiring practical skills to do something about these problems. Some commented that it was the best workshop they had attended in this regard. Receiving a “trade certificate” added further value to the training. Further feedback indicated that the success of the training was to be judged by the level of attendance. It was reported that if participants do not feel that a workshop is valuable they simply do not turn up after a couple of days, even if they are paid

sitting fees. The training was quite long, especially for community members and the private sector trainees who were not being paid for time away from their businesses and subsistence activities.

6.1.3 Sound basis of information and data

IWP Tuvalu recognised that a staged approach, supported by solid evidence, would be required to move from initial awareness of waste water management problems to the development of appropriate solutions, and then on to sustained behaviour change.

The staged approach consisted of the following activities:

- working with the focus community to identify the social and physical issues through the PPA process;
- confirmation of the problem through baseline and water quality assessments;
- audience research to ascertain current attitudes and appropriately target messages;
- media competitions to provide interactive awareness raising;
- exploring a range of sanitation technologies and options and comparing their advantages and disadvantages;
- collecting data on direct and indirect waterborne diseases in the community;
- conducting a cost–benefit analysis of the options to address the problem, including doing nothing; and
- providing training to a cross-section of the community on the health, economic and technical issues of waste water management, providing them with the practical skills to do something about the problem, and the ability to pass these skills on to others.

The collection of solid information and data has been a thorough and logical way to undertake the program and this process could be a useful model for other sanitation campaigns. Increased awareness of waste water management problems and the development of appropriate solutions appears to have been achieved by these activities. However, the next stage is the achievement of actual behaviour change on a national level; this will need to be monitored within the Tuvalu community.

On a national level it is planned that this behaviour change will be achieved by replicating the work of IWP through other agencies, through the development and implementation of village water plans, and national government departmental plans, such as the National Integrated Water Resources Management Plan.

6.2 Possible Improvements

Project activities are constrained by the social and political context in which they are conducted and the priorities, capacity, and motivation of the people involved. However, within those constraints there is often room for improvement.

6.2.1 Maintaining communication with colleagues and stakeholders

More detailed and consistent communication between all players and stakeholders involved in Tuvalu IWP could have enhanced its achievements

This refers to communication between personnel within the region, within the country, and within the local team, and includes sharing of relevant documentation and inclusion of all parties in planning developments and changes.

Keeping in touch takes time and effort, but not keeping everyone fully informed can result in much wasted time, energy and resources. This is due to misunderstandings and confusion, loss

of interest and commitment, conflicting schedules, and reduced capacity to undertake roles and responsibilities.

The work context in the Pacific is particularly challenging as personnel are usually scattered over vast distances. For example, in the case of IWP the PCU was in Samoa, and each of the NCs was in a different country around the region; consultants and advisers are from other countries within and outside the region. E-mail has helped; although too much time can be consumed responding to emails, it has revolutionised the Pacific workplace if used efficiently. Formerly communication in PICs was only by fax, with one fax machine per department (and often that suffered from technical problems). Now many individuals within organisations have e-mail access, so there would appear to be no reason for not keeping all the players informed of significant developments. If there is not enough time to maintain communication with programme colleagues then the work commitments and resources should be revised to make it possible.

The achievements of the Tuvalu IWP could have been even more significant if communication had been fully maintained between all those who were involved in achieving the goals of the project.

6.2.2 Time management

IWP lasted longer then most donor-funded projects in the Pacific Islands. However, as the main community-based activities in Tuvalu were conducted towards the end of the six years, there is no time to assess the impacts of those promotional activities within the timeframe of the project. This includes technical and social monitoring of CT usage and maintenance, and assessment of the communications campaign.

It can be recommended that certain actions, evaluations and monitoring continue beyond IWP, but this is not guaranteed unless there is the personnel and funding to support these requirements. The NC and the Task Force would be in the best position to analyse whether the timing of project activities could have been improved, and if so what could have been done differently to alter the schedule of the campaign.

7 Ongoing sustainability

The IWP in Tuvalu will conclude at the end of 2006. Considerable time energy and money has been invested in attempting to achieve the goals of the project. To have long term impact there is need to ensure that activities continue beyond 2006.

7.1 Monitoring Requirements

As IWP is drawing to a close there will be little time for the IWP team to monitor the impact of the practical activities described in this report, but it is recommended that personnel in the agencies taking over from IWP, including the PWD, conduct the following monitoring activities:

1. Function of the CT at Tesoa Ioasa's house, including:

- the trenches to ensure there is no surcharge in heavy rain;
- the ventilation pipes to ensure that there is sufficient airflow;
- the use of bulking agent (ensure it is readily available, and note what vegetation is used);
- the design of the toilet seat to assess whether the shape causes any cleaning or maintenance difficulties.

2. Response of community to the CT at Tesoa' Ioasa's house, including:

- The family's experience using and maintaining the toilet. The most critical maintenance time usually occurs when the first chamber is full and the seat needs to be moved to start using the second chamber. The next critical phase usually occurs when the first chamber needs to be emptied after a period of composting. Ongoing support of the host family is recommended for the first couple of years of usage when a new type of sanitation system is being introduced. A malfunctioning toilet can undo years of hard work promoting the concept. Ideas for improvement of the design should be recorded.
- If other people outside the host family use the toilet, what are their comments?
- General feedback should be obtained from the communities of Alapi and Senala to the composting toilet, and any feedback from families or individuals outside the pilot communities.

3. A meeting of all the participants in the training should be held before IWP concludes. An attempt should be made to assess in what way the training has impacted their activities and decisions (if at all), and the reasons for any behaviour change.

7.2 Nationwide Activities

For the work conducted by IWP Tuvalu to have an impact beyond the end of the project, action will need to continue on a national, village, and household level, including the following.

- Formulation of village water and sanitation plans throughout Tuvalu
- Promotion and enforcement of village regulations regarding sanitation and water supply.
- Education and awareness programs maintained in Funafuti and extended to other parts of the Tuvalu island group.
- Endorsement of the Water Bill 2006 by Parliament.
- Endorsement of the National Integrated Water Resources Management Plan by communities and government, and measures put in place for implementation.
- Lessons learned during IWP Tuvalu communicated to the wider community.
- Public awareness and education activities maintained, including completion and distribution of the documentary.

Funding will be required to support the above activities and various sources have been considered in the Sustainable Strategy Report prepared by the NC (IWP 2006b).

The Sustainable Strategy recommends finding partners for ongoing activities by:

> targeting donors with strong community-based funding programs, and local implementing organisations with interest in community development, environment generally, and waste management specifically. Partners selected for implementation are the Ministry of Works and Energy, the Tuvalu Public Works Department, Tuvalu Waste Management Project, Health Department with a potential financing partner AusAID. For funding, target organisations including Canada Fund, Global Green Grants, FAO, UNEP GPA, SPREP-Waste Program, NZAID-GEF Small Grants Program, SOPAC, and EU.
>
> Source: IWP Tuvalu 2006b

Given that the cost to Tuvalu of poor sanitation in Funafuti has been estimated at NZD 500,000 annually, it may be that the government should consider borrowing the necessary funds to

establish effective and sustainable sanitation.

Where sanitation systems are built for individual households it is recommended that the family make some financial contribution to the cost of the system in addition to assisting with labour Experience in other Pacific Island countries indicates that the system is much more valued and likely to be maintained if people have had to make a contribution toward installation

8 Recommendations

The following suggestions are made to ensure that the achievements of IWP Tuvalu have a lasting impact

1. The skills of all government and project personnel whose capacity was enhanced during the implementation of IWP should be fully utilised to support sustainable sanitation for the country.

2. The principles and practicalities of sustainable water supply and sanitation should be enshrined in regulation and planning.

3 An integrated and consistent approach to water supply and sanitation management should be strengthened by formalising the networks and working relationships that were established during IWP, between and within government departments, non-government organisation and the private sector.

4. The capacity of householders to conduct effective pollution control and health protection should be supported by extending the sustainable sanitation training to other communities throughout Tuvalu. This would include basic skills in water quality testing in particular using the H_2S strip test.

5. The function of the composting toilet constructed during the training should be closely monitored for at least two years after installation, and the host family provided with support during the period of two composting and maintenance cycles.

6. All the trainees from the sustainable sanitation training should be provided with the construction manual when it is published (see Crennan 2007), and the manual should be made available to the wider public with the understanding that any individual construction work will require supervision and final approval of the PWD.

7. The design and construction of the composting toilet should be included in the building code.

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Annex A: Summary of Project Developments - March 2005 to October 2006

In August 2004 a scoping visit was made to Tuvalu by Steve Menzies, Communications Specialist from the IWP Project Coordination Unit (PCU) at SPREP, with Resource Strategist Dr Leonie Crennan. Assessments were conducted of existing sanitation systems/practices and discussions were held with the Tuvalu IWP National Task Force (NTF). These investigations verified and supported the Baseline Assessment (IWP 2004) and led to the development of the "Solutions Report: Waste Management, Pollution Prevention and Improved Sanitation in Tuvalu" (Crennan 2004) which proposed a training in the design, construction, operation and maintenance of on-site sanitation. The sanitation training was conceived as an integral part of the communications strategy which was being developed by the PCU and the NTF.

It was intended that the proposed training would provide householders, contractors, and relevant government personnel with the opportunity to:

- learn practical design, construction and maintenance skills;
- understand the process of treatment, cost and impact of current technologies and practices;
- be better informed to make appropriate decisions about what technical systems and practices should be adopted;.
- be motivated to take the necessary steps to build and maintain appropriate systems and adopt sustainable behavior;
- plan to fund construction of appropriate systems; and
- be equipped with sufficient understanding and skills to teach others about sustainable sanitation for Tuvalu.

In March 2005 an action plan was formalized through an Agreement made between the Resource Strategist and SPREP that the consultant would undertake the following:

- identify appropriate inputs to a Community Communications Programme;
- plan and implement a training workshop on appropriate sanitation systems on Funafuti (this workshop will include reference to monitoring activities); and
- lead the establishment of an on-site sanitation system (or systems) as a demonstration site within the pilot community.

From March 2005 until June 2005 the consultant conducted preparations for the sanitation training and provided ongoing input to the development of the communications strategy with the assistance of Dr Greg Berry, Agricultural Sanitation Specialist. It was originally planned that the Sanitation Training would be conducted early June 2005

Input to the Communications Strategy was conducted through telephone and email discussion with the PCU Communications Specialist and the National Coordinator regarding possible activities and critical theme messages that would be useful in the communications campaign.

The activities which were discussed included: audience research; competitions in poem, songs and drama on campaign themes, and promotion of campaign objectives through radio, and the production of a video (see Section 3.2 of the Training Report for details).

The consultant also participated in radio interviews and programs conducted by the Australian Broadcasting Commission and Pacific Magazine discussing the water supply and sanitation challenges faced by Tuvalu and the possible solutions that were being developed by the International Waters Project.

Preparations for the Sanitation Training included the following:

- development of guidelines for the selection of participants for the training;
- development of guidelines for the selection of a household for the construction of a

demonstration waterless composting toilet;

- meetings, telephone and emails communications, with the Director and staff of the Institute for Sustainable Futures (ISF) at the University of Technology in Sydney to certify the training in order to raise the status of sanitation and create the added attraction of providing potential employment skills;
- design of an appropriate waterless-composting toilet for Tuvalu;
- preparation of a list of building materials for the demonstration toilet; and
- development of the content and agenda for a practical training course to be conducted in Funafuti.

(See Sections 3.3 -3.7 of Training Report for details).

In June 2005 it was decided by the National Coordinator and the PCU to postpone the Sanitation Training and conduct other prior activities. These activities included:

- wastewater technology workshops and water quality assessment workshops for government personnel funded by AusAID;
- a cost benefit analysis study to assess the economic feasibility of alternative sanitation systems for Funafuti;
- ongoing development of the National Water and Sanitation Plan; and
- a national campaign to promote waterless-compost toilet in Tuvalu

These activities aimed to generate and communicate objective information on the relative merits of alternative sanitation solutions for Funafuti as a means to inform policy makers and support effective long term plans for waste management in Tuvalu

In June 2006 the National Coordinator contacted the Resource Strategist to request that preparations for the Sanitation Training be resumed and revised, taking into account developments over the preceding twelve months.

The Practical Sanitation training was conducted in Funafuti, October 6–23 (see Training Report Sections 2-7 for details of preparation, implementation and immediate outcomes of Sanitation Training).

Annex B: Participants in the Sustainable Sanitation Training

	Name	Affiliation	Age
1.	Timo Viliamu	Senala Community (seaman)	59
2.	Vavao Saumanaia	Landfill Supervisor Waste Management Project Government of Tuvalu	56
3.	Foai Paeniu	Nukulaelae Island Community (seaman)	61
4.	Apisaloma Simeona	Alapi Community	56
5.	Petisone O'Brien	Private Construction Company	48
6.	Tusaga Faimalaga	Nukufetau Island Community	43
7.	Pasega Katipupu	Public Works Department	53
8.	David Toomu:-	Environmental Health Officer PMH Princess Margaret Hospital	34
9.	Semese Alefaio:-	Tuvalu Association of Non Government Organisation (TANGO)	
10.	Sumeo Silu:-	Private Construction Company & Disaster Coordinator for National Disaster Management Office	33
11.	Teosa Tema:-	Demonstration Compost Toilet Landowner	29
12.	Suiga Kokea:-	Funafuti Youth Community	23
13.	Angus Amasone:-	Nui Island Youth Community	24
14.	Tutokotahi. Opapo:-	Nanumaga Island Youth Community	24
15.	Vete Telina Maka:-	Nanumea Island Youth Community	24
16.	Paitela Tapuli:-	Vaitupu Island Youth Community	19
17.	Emily Koepke:-	Coordinator Tuvalu Family Health Association (TUFHA)	58
18.	Nuseta Papamau:-	Funafuti Womens Group	51
19.	Gunter Koepke:-	Water Resource Management & Leader of Compost Toilet Construction (PWD) Public Works Department	29
20.	Noketi Karoua:-	Ast Pollution Control Officer Environment and Conservation Division Kiribati pollution.ecd@melad.gov.ki	30
21.	Nenebo Benetito	Assistant Health Inspector Environment Health Services Ministry of Health and Medical Services P.O.Box 268 Nawerewere / Tarawa. Ph: 28265 or 28595	37

22. Kelesoma Saloa	Coordinator for International Waters Programme Environment Dept.		37
23. Kamal Khatri	Water and Sanitation and Hygiene Officer,	SOPAC	26

Annex C: Certificate

institute for sustainable futures

UNIVERSITY OF TECHNOLOGY SYDNEY

This is to certify that

Nuseta Satalaka

attended the

Practical Training in Sustainable Sanitation

and successfully completed the following subjects

1. Theory & Management of On-site Sewage Treatment Systems

2. Design and Construction of Double Batch Composting Toilet

11th – 20th October 2006

Tuvalu

.....
Ampelosa Manoa
Director of Public Works

.....
Dr Leonie Crennan
Supervising Trainer

INTERNATIONAL WATERS of the Pacific Islands

SPREP

Annex D: Training schedule

(Draft)

Practical Training in Sustainable Sanitation for Tuvalu

International Waters Programme

Funafuti, Tuvalu

9th October to 20th October 2006

1. Theory and Management of On-site Sanitation Treatment

2 Design, construction and maintenance of

Composting Toilets (CT)

Coordinator : Mr Kelesoma Saloa

Supervising trainer: Dr Leonie Crennan
Construction Leading Hand: Gunter Koepke
Local Construction Advisor: Ampelosa Manoa
Administration Coordinator s: Falealilli Fefiloi Tauasi

Day/Date WEEK 1	Activity/topic	Feedback and Assessment
Monday 9/10/2006	• Arrival of Trainer on Funafuti.. • Meeting with Coordinator and government and community counterparts	
Tuesday	• Inspection of proposed location for CT construction, and	Discussion with site

10/10/2006	design siting of toilet and drainage system • Inspection of building materials and tools • Check training venue, teaching materials/facilities etc	householder, assistant builder, assistant trainers
Wednesday 11/10/2006	**Opening of Training** ***Course Program– Goals and Certification*** <u>Introduction</u> • What is in sewage? • Why and how can it cause illness? • Why and how can it damage the environment • How to protect people and environment against these problems • Advantages and disadvantages of technology and practices: Reticulated systems, septics, pits, using the beach, CTs • Group inspects CT construction site	Group discussion of understanding, doubts, objections preferences.
Thursday 12/10/2006	• Design and pour slab for CT • Discuss material and design guidelines/ options (Allow 3 days for slab to dry before construction)	Group assists with design and labour
Friday 13/10/2006	• History of CTs and other dry sanitation systems in developed and developing countries • Construction and use of CTs in Pacific Islands • Inspect existing CTs on Funafuti • Maintenance requirements and challenges • Possible design improvements • Inspect septics and other systems to discuss possible pollution	Group discussion with existing users of CTs regarding advantages and disadvantages
Weekend		

WEEK 2 Monday 16/10/2006	**Composting toilet construction continues** • Lay concrete blocks for composting chambers • Discuss material and design guidelines /options	Group assists with design and labour.
Tuesday **17/10/2006**	• Prepare and lay false floor in composting chambers • Prepare reinforcing and frame for floor of CT toilet room • Pour slab for floor of toilet room • Install ventilation • Discuss material and design guidelines/ options.	Group assists with design and labour.
Wednesday 18/10/200	• Prepare and construct drainage system • Discuss material and design guidelines/ options.	Group assists with design and labour
Thursday **19/10/2006**	• Prepare and begin construction of toilet room • Install stairs to toilet room • Install doors of compost chamber • Discuss material and design guidelines/ options.	Group assists with design and labour
Friday 20/10/26	Review understanding of design, construction, and maintenance **Closing ceremony and presentation of Training Certificates**	Group discussion Trainer evaluation of participation. Participant evaluationof training
Weekend	Complete any outstanding construction details and work with householders on usage and maintenance	
Mon 23	Meet with NC for de-brief. Supervising Trainer departs Funafuti	

Input to Community Communications Programme
Training in Theory and Management of On-site Sanitation Treatment and Design, Construction and Maintenance of Composting Toilets (CTs)

Annex E: Consultant outputs, scope of work, and inputs from IWP Tuvalu

Consultant outputs

It was agreed[1] that the key outputs of the activities described in this report would be:

- An enhanced community communications programme that raises awareness of the nature and local treatment of the sanitation problem in Funafuti and promotes the use of safe sanitation systems (including those promoted in the Sanitation Training Workshop);
- A Sanitation Training Workshop addressing on-site sanitation for up to 30 members of the pilot communities, other communities, and relevant government and non-government agencies such as the Public Works, Health and Environment Departments. In addition to technical skills this workshop should also result in increased understanding among participants of the key issues arising from poor sanitation management and threats to human health and the surrounding environment.
- Development of at least one on-site sanitation system as a demonstration site within the pilot community. The nature of the demonstration system will be determined in consultation with relevant stakeholders.
- The development of a certification system to recognise participants who successfully complete the Sanitation Training Workshop.
- Guidance on the development of an appropriate groundwater monitoring programme to support sound sanitation management.
- A general report on activities undertaken, and a simple manual to support the sanitation training.

Scope of work

The ST would work with the IWP Tuvalu national coordinator to:

- identify appropriate inputs to a Community Communications Programme;
- plan and implement a training workshop on appropriate sanitation systems on Funafuti, which would include reference to appropriate monitoring activities; and
- lead the establishment of an on-site sanitation system (or systems) as a demonstration site within the pilot community.

In the process of this work, the ST would liaise closely with individuals and institutions involved in IWP and waste management, including the Lead Agency and Public Works Departments, as relevant.

Inputs to be provided by IWP Tuvalu

To support the work of the ST to undertake the tasks identified, it was agreed that IWP Tuvalu would:

- Identify all relevant persons (e.g. stakeholders, government staff, experts) that the ST should meet.

[1] SPREP/Crennan TOR Agreement, March 2005, extended in July 2006.

- Identify an appropriate site for the system to be built with full approval of relevant community /householders.
- Make arrangements for all meetings and workshops including, but not limited to, sending invitations to attendees, booking people's time, catering, booking venues and travel.
- Supply all potentially relevant documents and datasets (either electronic or paper based) to the ST prior to the training with sufficient lead time for their full and proper use.
- Provide the ST with office space and access to basic office equipment (e.g. printers, photocopiers, telephones, stationery) during the time spent in Tuvalu.
- Provide the ST with access to relevant members of government staff to discuss issues related to the project.
- Provide all locally necessary materials for the establishment of a demonstration sanitation system at the host sites.