Review of Toilet Systems within the Australian Alps.

Prepared by
Johnston Environmental Consultancy Pty Ltd

AUSTRALIAN ALPS NATIONAL PARKS

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AIM OF THE REPORT

The aim of this report is to assess the various public toilet systems that are currently in use across the Australian Alps National Parks. Information for this assessment was gained by canvassing both park managers across all agencies who manage the facilities and the general public who are the end users of these facilities.

INTRODUCTION

The Australian Alps National Parks contain some of the most diverse and unique conservation reserves in the world. This uniqueness draws visitors from not only Australia, but from many other countries.

An unavoidable fact of life for park managers is visitor impacts on the resource being managed. This impact could be; rubbish left in a campground, a walking track eroding because of over use, or toilet waste. Across the all the Australian Alps National Parks there are over 200 public toilets, with these toilets being located in campgrounds, picnic areas, and backcountry locations. In the past, a majority of public toilet facilities in the Australian Alps were unsealed pit toilets. However over the past 10 years there has been a move to change toilet technology so as to be more environmentally and user friendly. This survey was designed to examine the factors relevant to planning for human waste management systems suited to particular locations and conditions across the Alps, not just toilet technologies alone from the perspective of the managers of these areas as well as the end users, the general public. Facilities within the ski resorts, private accommodation and visitor centres were not included in this survey.

METHODS

Data for this report was collected from two sources; 1) Park Managers who run the facilities, and 2) the General public who use the facilities. The information was gathered through a series of surveys which were sent to managers right across the Australian Alps (Appendix 1), and one on one interviews with the general public at various toilet sites across the Alps (Appendix 2).

The types of information, that were sought, were:

- Facility description
- Location of facility
- Environmental conditions
- Visitor use
- Visitor behaviour – social aspects
- Operation/maintenance
- Aesthetics
- Economics/cost effectiveness
- Visitor expectations, perceptions, and satisfaction of their experience of provided facilities
- Ratings of the facilities

It was decided that the best way to present this data in the report was to break it down by toilet technologies. The reason for this was:

1. Logistics - the shear numbers of individual instillations found within the Alps (200+).
2. Data was not provided on every individual instillation in the Alps. Managers provided subsets of data on the different toilet systems and how they functioned in different locations and altitudes.
3. When analysing the data it made it easier to compare how the same toilet system functioned in different locations and altitudes.

Selection of visitors to be surveyed was made to ensure that the sample was representative of the entire population without over or under representing any particular groups in the population. This was completed through choosing visitors of

varied age and gender, from different group sizes and from as wide a range of activities as possible (ie. campers, day walkers, sightseers etc.). In total, over 250 surveys were completed across the Alps during the study.

The rating scores for each toilet system were calculated by averaging all responses from managers and the public, with 1= very low and 5 =very high. However, for the success index the rating scores were still based on the responses of both the managers and the general public, but the weighting of the managers comments were triple that of the general public. This was done on two accounts:

1. To add extra weighting to the managers responses as they were commenting on both function and operation
2. To equalise for the fact that there were more responses by the public than managers for the different systems.

Also, in the general text the ratings were based on an average of all responses across all environmental zones and locations (ie. remote/non-remote) for each toilet system. However, for the success index these responses were broken down to take account the environment and location.

The equation for the success index is shown below:

(average manager rating x 3) + (average general public rating) / 4 = final score

COMPOSTING TOILETS

There are many different designs of dry composting toilets, all of which have application in modern natural resource management, including Clivus Multrum, Rotaloo or Dowmus. All of these toilet systems, when installed and operating properly in the right environment and location, are capable of providing an odour and steam free environment as well as facilitating an environmentally friendly first stage in the disposal of human waste.

The Composting process involves the digestion of organic material by many types of organisms, and produces carbon dioxide, water, heat and humus or compost. To be

effective, the process has specific requirements for oxygen, moisture, pH, temperature and carbon/nitrogen ratio.

While bacteria (single-celled micro-organisms) are responsible for most of the decomposition and heat generation in compost, other organisms such as fungi, moulds, yeasts, worms & invertebrates (centipedes, millipedes, slaters etc.) also play a role in composting.

Under optimal conditions, composting proceeds through three phases:

l) The mesophilic, or moderate-temperature phase, which lasts for a couple of days. Initial decomposition is carried out by mesophilic micro-organisms, which rapidly break down the soluble, readily degradable compounds. The heat they produce causes the compost temperature to rapidly rise.

2) The thermophilic, or high-temperature phase, which can last from a few days to several months. Once the temperature rises above about 40°C, the mesophilic micro-organisms become less competitive and are replaced by others that are thermophilic, or heat loving. At temperatures of 55°C and above, many micro-organisms that are human or plant pathogens are destroyed. Temperatures over about 65°C kill many forms of microbes and limit the rate of decomposition. During this phase, high temperatures accelerate the breakdown of proteins, fats, and complex carbohydrates like cellulose and hemicellulose, the major structural molecules in plants.

3) The curing and maturation phase can last for several months. As the supply of high-energy compounds becomes exhausted, the compost temperature gradually decreases and mesophilic micro-organisms once again take over maturation of the remaining organic matter.

Waterless composting toilets however, rarely provide the optimum conditions for complete composting of human waste. This can be the result of the following: poor site selection, inappropriate installation, inadequate toilet selection/design, or incorrect maintenance. These problems are often exacerbated by local climate conditions, and in particular for the majority of cases, cold climate areas.

Clivus Multrum Toilet Systems

Clivus Multrum composting toilets have been operating in all climatic conditions in Australia for over 20 years and is the largest selling public facility composting toilet in the world. However, across the Australian Alps a mixed response was found to this system. At lower altitudes in the ACT and Victoria the system was seen to function moderately well, however at higher altitudes in NSW the system was seen to function very poorly.

Common Responses to Surveys - Managers

Local environments where system is in use:

This system has been found in all environments in the Australian Alps except for the true alpine area. However, recently it has been removed from some of the higher elevation sites in NSW.

Location and Access:

Most facilities are located in areas easily accessed by a dirt or sealed road and are found in camping areas, picnic areas and at trail heads.

Usage Patterns:

The usage pattern for these facilities is all year with only 1-10 people per day visiting the facility all year round. With the facilities in camping areas, and the low level of usage, the urine to faeces ratio is around 2:1.

Problems with Visitor Behaviour:

- Theft and breakage of solar panels.
- Vandalism.
- Graffiti
- Rubbish placed in the toilet (eg. Nappies, sanitary napkins, bags etc.).

Operation and Maintenance Issues:

- The composting process was seen to be compromised by:
    - Shock loads (use patterns)
    - Cold weather seems to stop the composting process.
    - Maintenance difficulties in higher sites during winter.
    - Rubbish in the toilet
- The degree to which waste material needs to be handled was seen as a problem.
- Due to OH&S problems, maintenance of the system cannot be contracted out.
- System regularly gets clogged up at the convergence for the urine receptacle that is hard to fix.
- Considered to be a high maintenance system.
- Design resulting in confined working conditions considered a problem.

Costs and Operational Effectiveness:

The systems were not seen as cost effective as the capital cost was between $100,000 to $200,000 and they also had a reasonably high maintenance cost ($200 dollars per month). At higher elevations they were seen as having poor operational effectiveness, but at lower altitudes they were seen as ok.

Ratings:

NSW – 1/5

ACT – 3/5

Victoria – 2/5

Common Responses to Surveys – Visitors

Environmental Issues relating to the facility:

- A few respondents felt the facility has a large visual impact on the local environment. Seen as not appropriate for a natural setting.
- Queries were made about what happens to the waste after composting.

Issues relating to the use of the facility:

Positive:

- Clean.
- Easy access – good for disabled people.
- Running water

Negative:

- Smell
- Vandalism/maintenance
- Visually unpleasing
- Did not work in cold weather

Ratings:

The general public rated this system on average across the Alps as 2.5/5.

Rotaloo Toilet Systems

Male/Female integrated cubicle. Consists of six separate bins with an air circulation fan run by solar power. These systems have only been used in Victoria at this stage.

Common Responses to Surveys - Managers

Local environments where system is in use:

Sub-alpine, montane and tablelands.

Location and Access:

All Rotaloo systems in the Australian Alps are found in remote locations (Victoria) in camping areas, with access by management trails.

Usage Patterns:

The usage pattern for these facilities is all year with only 1-10 people per day visiting the facility all year round. With the facilities in camping areas, and the low level of usage, the urine to faeces ratio is around 2:1.

Problems with Visitor Behaviour:

On the whole visitors to these areas have generally been well behaved. Vandalism to this point has been non-existent, however a little bit of rubbish has been found to be entering the system (ie. nappies and sanitary napkins etc.).

Operation and Maintenance Issues:

- In a sub-alpine environment the system was considered to work very well.
- The solids compost well, however a problem was seen with the evaporation of liquids.
- The bins only need to be emptied once every twelve months, which is good from a maintenance point of view.

Costs and Operational Effectiveness:

The capital costs were relatively high compared to a 'long drop' (10 to 15 times more expensive), but the managers of the areas believe that the benefits to the environment negate the cost. Running costs were seen as minimal with the facility only requiring slightly more maintenance than a long drop (~$100 per month). The operational effectiveness was seen as good, especially considering the sensitive environments where these facilities are located.

Ratings:

The facility is rated 4/5 by the staff of Vic Parks.

<u>Common Responses to Surveys</u> – Visitors

Environmental Issues relating to the facility:

- In general was seen as environmentally friendly by visitors to the areas.
- There was some concern about the visual aspects of the facility on the local environment.

Issues relating to the use of the facility:

Positive:

- Mainly Clean

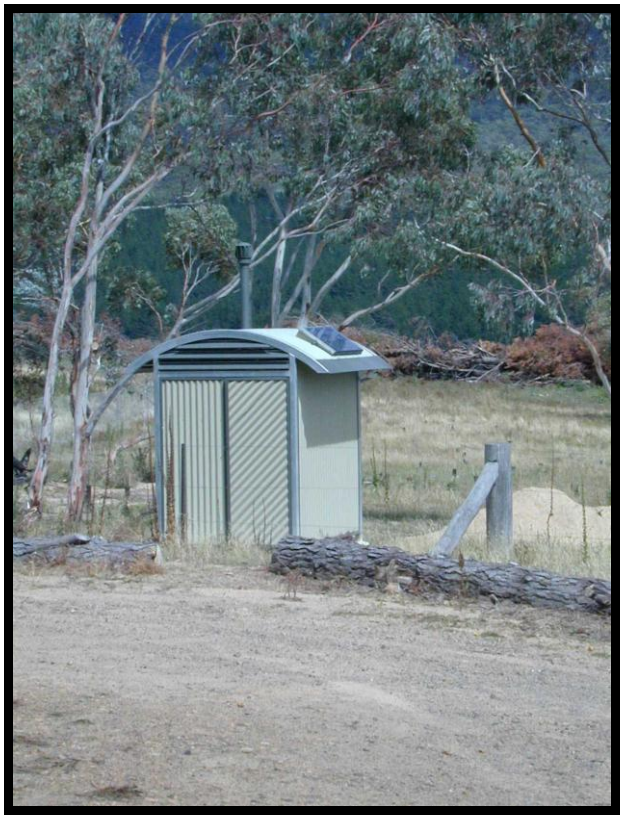
Negative:

- Slight smell.
- One comment on there being no toilet paper.
- Design of pedestal seen as too large for children;

Ratings:

The facility was rated on average 4/5 by the visitors to the area.

Dowmus Toilet Systems



Common Responses to Surveys - Managers

Local environments where system is in use:

This toilet system is in use in sub-alpine, montane and tableland environments.

Location and Access:

Most facilities are located in areas easily accessed by a dirt or sealed road and are found in camping areas, picnic areas and at trail heads. Dowmus systems have been used at some time within all jurisdictions (A.C.T, NSW and Victoria).

Usage Patterns:

Usage patterns are generally seasonal (especially at higher altitudes) with up to 500 people a day using some facilities during the peak periods, dropping down to between 1-10 visits during the off peak times. Urine to faeces ratios varies from 4:1 to 8:1 depending on use.

Problems with Visitor Behaviour:

- Rubbish placed in system, which affects the composting process.
- Vandalism, including broken plumbing, broken signs.
- Breakins to the storage/composting area.
- The rake to turn over the pile has been stolen a couple of times.

Operation and Maintenance Issues:

- Health/OH&S problems as staff have to rake the pile by hand.
- A lot of handling of waste material.
- Due to OH&S problems, maintenance of the system cannot be contracted out.
- Insect problems.
- High maintenance – Twice that of Clivus systems and about four times that of 'long drops' (sealed pit toilet systems).
- Due to design, it is hard to remove any rubbish from the pile. This has to be done by reaching down through the pedestal.
- Due to the design, it is hard to check the health of the system. This also has to be done by reaching down through the pedestal.
- Composting process considered not to be reliable in cold weather.
- The pile biota, moisture and C:N ratio needs to be regularly monitored
- Needs regular replacement of worms in pile.
- Needs a regular addition of C material to keep pile healthy.
- Not considered suitable for remote areas due to the high maintenance demands.

Costs and Operational Effectiveness:

For a composting system, this facility has a relatively low capital cost (~$10,000). However, the running costs are high due to the amount of maintenance needed for the system (at least $500 or more a month depending on use).

Ratings:

This system was rated as 1/5 on average by Park staff across the Alps.

Common Responses to Surveys – Visitors

Environmental Issues relating to the facility:

- As a composting system visitors to the areas generally saw the toilets as environmentally friendly.
- A respondent was worried that an animal could get caught within the system

Issues relating to the use of the facility:

Positive:

- clean

Negative:

- Smell is bad.
- Maintenance.
- Vandalism.

Ratings:

On average the general public rated the system across the Alps as 3/5.

Integrated Eco-Village Toilet System

Summary

The Integrated Eco-Village composting toilet at Charlottes Pass is a purpose built structure containing a modified Dowmus toilet system, that was designed to provide an ecologically sustainable system in one of the most visited summer destinations in the Australian Alps in the coldest environment found on the Australian continent. The facility contains 2 female pedestals, 1 male pedestal, 1 male urinal and 1 disabled pedestal with all pedestals designed to separate the urine and faeces. The facility is also equipped with a solar air pre-heater, urine holding tank, which can be pumped out, a recycling pump, moisture monitor, temperature probe connected to the fan, and damper for re-circulating the air. The toilet building is designed to facilitate the solar air pre-heater, ensuring that the compost chamber is insulated and maintained at a stable temperature.

Common Responses to Surveys - Managers

Local environments where system is in use:

Alpine/sub-alpine.

Location and Access:

Charlotte Pass turning circle on the edge of the alpine area of Kosciuszko National Park. Access to the facility is by road in summer and by oversnow vehicles in winter.

Usage Patterns:

The usage pattern for the facility is seasonal (summer), with over 1000 people per day visiting the facility during peak periods. In winter usage ranges between 10-100 people per day depending on conditions. Due to the high usage of this facility the urine to faeces ratio is 40:1.

Problems with Visitor Behaviour:

- Blocking of urine chamber (intentional and unintentional).
- Removal of toilet seats.
- Minor vandalism (graffiti)
- One case of a person smearing faeces on the walls

Operation and Maintenance Issues:

- Maintenance of the facility is carried out by contract.
- Flooding of the area where the compost chamber is contained can occur if the pump fails.
- Poor ventilation.
- Blockage of the urine chamber.
- During peak periods (summer) daily cleaning and pumping out of the urine tank every 2-3 days is needed due to visitor numbers.

Costs and Operational Effectiveness:

This facility had a very high capital cost ($150,000) due to the environment and location. The facility is deemed to be cost effective, however running costs are moderate to high due to the amount of usage.

Ratings:

The facility is rated 5/5 by the area manager of Kosciuszko alpine area.

<u>Common Responses to Surveys</u> – Visitors

Environmental Issues relating to the facility:

- A few respondents felt the facility has a large visual impact on the local environment. Seen as not appropriate for a natural setting.
- Smell

Issues relating to the use of the facility:

Positive:

- The use of a composting system in such a fragile environment.

Negative:

- Smell - Ventilation.
- If the urine chamber was blocked, the toilet became filled with urine.
- Faeces getting caught between the urine and faeces reciprocals.
- Toilet seat missing.
- For the cost, some respondents thought a better system could have been devised for the area.

Ratings:

The rating of the Integrated Eco-systems toilet system by the general public was 2/5.

Batch Waterless Composting Toilet System

Summary

The Tasmanian Parks and Wildlife Service in collaboration with the Department of Environmental Studies, University of Tasmania have developed the alternating batch waterless composting toilet system. This public toilet system was designed to meet the variable loadings and climatic conditions common to the remote areas of Tasmania, such as the Overland track or Cradle Mountain where individual uses may exceed 15, 000 people per annum. The systems general design comprises of two toilet cubicles, which sit over two alternating batch composting cage systems. The composting cages consist of large rectangular expanded galvanised steel bins. Each cage is fitted with three doors, on full width half door at the top, and two split doors on the lower section. The doors are opened for pile management and end product disposal. One pedestal sits over each chamber. Only one batch composting cage/chamber and one toilet is used at any one time. When the composting bin in use becomes full, the batch is closed and the corresponding toilet above locked off. The second batch and corresponding toilet is then placed into use. The closed batch is left to continue composting for a further twelve-month period, and then the contents are removed for off site disposal. This toilet system has been added to the report as it is being considered for use in Victoria and works in similar conditions to those found in the alps on the mainland of Australia.

Common Responses to Surveys - Managers

Local environments where system is in use:

Montane and Sub-alpine

Location and Access:

The units are found in remote locations at Pelion Plains on the Overland track and Pine Valley, Tasmania.

Usage Patterns:

The usage pattern for the facility is seasonal (summer), with over 50-100 people per day visiting the facilities during peak periods. In winter, usage ranges between 1-10

people per day depending on conditions. The urine to faeces ratio of these facilities is approximately 2:1 – 4:1.

Problems with Visitor Behaviour:

- Rubbish placed in system, which effects the composting process.
- Minor vandalism (graffiti).
- Toilet users do not always add bulking agent (rice husks).
- Visitors can block the strainer in the liquid collection tray with rice husks.

Operation and Maintenance Issues:

- The toilet requires periodic inspection and cleaning. Every two weeks minimum in summer, and monthly in winter.
- Removal of rice husks from around the dome strainer in the liquid collection tray or from the collection basket in the solids collection basket.
- The pile may need raking on occasions.
- Removal of composted material is carried out by hand and has to be transferred to an authorised waste disposal site.
- Excess liquid waste needs to be pumped out where on ground disposal/treatment is found to be inappropriate.

Costs and Operational Effectiveness:

This facility was seen to have a relatively high capital cost (~$100,000) depending on the environment and location. However, the system was deemed to be cost effective, with low running costs ($100 –250) depending on the season.

Ratings:

The facility is rated 4/5 by the local rangers in Tasmania.

Visitor Response

No visitor surveys were carried out for this system.

SEPTIC TOILET SYSTEMS

Summary

In the Australian Alps National Parks, public septic toilet systems are found only in a few locations with the majority of these found within the ACT. These facilities were a response to increasing demands on the more accessible areas of the Alps due to the urban growth of Canberra during the 1960s and 70s. These facilities consisted of four flushing toilets, equally shared between male and female, surrounded by concrete block walls and a reinforced concrete roof. External features include a water tank filled from a stream or water source and a septic tank with associated dispersal trenches.

The need to be close to a permanent water supply in order to fill the tank, and the consequent need to dispose of effluent immediately adjacent to the source of water, now seem strangely incompatible, especially in a National Park.

<u>Common Responses to Surveys</u> - Managers

Local environments where system is in use:

Montane and Tablelands.

Location and Access:

All systems are located in roadside locations in picnic or camping areas and are all easily accessible by road for easy maintenance.

Usage Patterns:

Usage patterns vary between seasonal for the facility at Corin, and all year usage for the other facilities. Usage ranged from 50-100 (especially on weekends) to 1-10 during weekdays and off-peak periods with an average urine/faeces ratio of 8:1.

Problems with Visitor Behaviour:

Due to proximity to roads and Canberra, vandalism and theft has been a problem especially for the systems not close to any ranger stations. Issues include:

- Broken windows
- Broken taps
- Flooding due to taps being left on
- Writing on walls
- Rubbish left on floor
- Defecation on the floor
- Theft of toilet paper
- Theft of pumps

Operation and Maintenance Issues:

Septic systems in areas some distance from the local ranger station were described as requiring a lot of maintenance. Issues include:

- Ventilation – smells
- Problems with freezing of pipes/cistern in winter which effects both functioning and cleaning of the system.
- Quality of effluent released to the soil is poor.
- Requires a lot of maintenance to maintain system in a satisfactory condition.
- When pumps break down, it takes time to fix/replace equipment and pump water from water source.

- Environmental issues – overflow – that can cause contamination of local water sources and groundwater.

Costs and Operational Effectiveness:

- Easy to clean
- No handling of waste
- All facilities in the ACT were rated as cost effective when it came to running costs as their close proximity to each other reduced maintenance and water pumping costs. It is recognised that this would be different if the facilities were more scattered. They are seen as fairly expensive to build (upwards of $50,000), but low cost to maintain ($100 - $150 per month) as long as they are at a low altitude and in an area less prone to vandalism.
- The availability of water is seen as a limiting factor. Extra facilities and higher maintenance is required.

Ratings:

- At lower altitudes (tablelands) where freezing of the system was not an issue, in locations were the facilities could easily be maintained, water was easy to obtain and were more secure from vandalism (eg. Close to Rangers station etc) septic systems were rated highly at 5/5.
- However at higher altitudes (montane and above), in areas harder to maintain and secure these systems were only rated 2/5.

<u>Common Responses to Surveys</u> – Visitors

Environmental Issues relating to the facility:

- Large concrete structure which has a large visual impact on the local environment. Seen as not appropriate for a natural setting.
- Perceived water quality issues relating to septic systems. There were many comments on the potential of the system to contaminate local waterbodies and groundwater.

Issues relating to the use of the facility:

Positive:

- Clean
- Easy access for disabled except cubicles a bit small
- No smell, or smell not to bad (unless the pumps fail)
- Running water

Negative:

- Rubbish scattered around the area (toilet paper, bottles etc)
- Old
- Visually unpleasing
- Did not work in cold weather (2 responses by people who had tried to use the system in winter)

Ratings:

The rating of all septic systems by the general public was 4/5.

PIT TOILET SYSTEMS

Summary

A traditional pit toilet found within the Australian Alps National Parks consisted of a hole in the ground, over which a concrete slab (usually), frame, pan and seat and roof were installed. These toilets were notoriously smelly, the pit contents leaked out into the surrounding ground water, and the frames were prone to vandalism and weather. Maintenance on these units is high. Pumping these toilets out was also very difficult as the liquid waste usually leached away leaving the solid waste in a hard block. This required the toilets to be filled with water 2 to 3 days before the toilet was pumped out so complete pump-outs were possible. Again this was very maintenance intensive

Changes in environmental legislation and more effective toilet design have meant that the traditional unsealed pit toilet is being replaced by other designs, including sealed tank units.

Standard Pit Toilet System

Common Responses to Surveys - Managers

Local environments where system is in use:

Standard unsealed pit toilet systems are in use in all environments found within the Australian Alps except in the true alpine areas above the treeline, although they are slowly being phased out of the more sensitive environments (eg. areas with a high watertable, or sensitive vegetation communities).

Location and Access:

Standard unsealed pit toilets are found in all types of locations from camping areas to trail heads, however the majority of these facilities have all but been removed from the more highly used areas of the Alps. The majority of these facilities are found in the more remote locations in the Australian Alps.

Usage Patterns:

Usage patterns for these facilities across the Alps range from very low usage in the more remote locations (ie. 1-10 people a week) to moderate usage in peak times (10-50 people a day). Urine to faeces ratios ranged between 2:1 in less popular areas to 8:1 in the areas utilised more by the general public.

Problems with Visitor Behaviour:

- Rubbish left on floor.
- Rubbish/nappies etc. put in hole.
- Vandalism – although only a low percentage.
- Defecation in areas surrounding the facility due to people not being willing to use the facility.
- Graffiti on doors and walls

Operation and Maintenance Issues:

- Low maintenance.

- Cleaning required every 2-3 weeks, however this can be difficult to achieve in the more remote locations where access is an issue. Cleaning includes the removal of cobwebs, leaves and rubbish.
- Some unsealed units in more remote locations are capped when full, and the unit is relocated (pedestal and frame).
- In more accessible areas the toilets are pumped out every 1-2 years.
- Smell. Ventilation is an issue with most facilities.
- Flies and mosquitoes are a problem.
- Rubbish in the toilet. This can cause problems if the toilet needs to be pumped out.
- During times of high rainfall, some facilities have experienced problems with flooding. This is also a problem in areas with poorly draining soils.
- Leaching untreated waste into groundwater and local waterbodies is also seen as a management issue.

Costs and Operational Effectiveness:

Capital (~$1500) and running costs (~$100/month) were seen as low, however the operational effectiveness was seen as only moderate by all state agencies surveyed due to environmental issues.

Ratings:

NSW – 2.5/5

ACT – 2/5

Victoria – 2/5

<u>Common Responses to Surveys</u> – Visitors

Environmental Issues relating to the facility:

- There were many comments on the potential of the system to contaminate local waterbodies and groundwater.
- Smell and sanitation.
- One person actually commented on an animal being trapped in the pit.

Issues relating to the use of the facility:

Positive:

- Having a toilet facility in a more remote location.
- Fairly clean.
- Simple
- Blended into the environment

Negative:

- Smells, poor ventilation.
- At one location the waste material was nearly coming out the top of the pedestal. Seen as unhygienic.
- Used as a rubbish reciprocal by some hikers/campers.
- Design of pedestal seen as too large for children

Ratings:

The average rating of all unsealed pit toilet systems by the general public was 1.5/5.

Sealed Pit Toilet Systems

This type of toilet is really an upgraded version of the pit toilet. The major changes are in the frame which has gone from wood to steel, the ventilation pipe is larger, a fume extractor fitted to top of vent pipe and all waste goes into a 4mm thick plastic tank buried underneath the floor slab.

The advantage of this unit over previous designs is:

- Reduced maintenance due to steel frame and sheeting
- Reduced smell due to extractor vent on roof
- Reduced vandalism due to frame sheeting easily replaceable
- All waste both solid and liquid is contained and taken off site.

Common Responses to Surveys - Managers

In a lot of cases, this was the toilet system preferred by managers where there was good road access, due to low costs and the ease of maintenance and cleaning.

Local environments where system is in use:

Sealed pit toilet systems are in use in all environments found within the Australian Alps except in the true alpine areas above the treeline.

Location and Access:

Sealed pit toilets are found in all types of locations from camping areas to trail heads and from roadside areas to wilderness areas.

Usage Patterns:

Usage patterns for these facilities across the Alps range from very low usage in the more remote locations (ie. 1-10 people a week) to very high usage in more accessible areas (ie. 100-500 people a day). Also depending on the location the urine to faeces ratio ranged between 2:1 in more remote locations to 10:1 in the more accessible locations.

Problems with Visitor Behaviour:

- Rubbish left on floor
- Rubbish/nappies etc. put in hole
- Vandalism – although only a low percentage
- Defecation on the floor
- Graffiti on doors and walls

Operation and Maintenance Issues:

- Maintenance for these systems was seen as a clean down every 1-2 week (depending on usage) including the removal of cobwebs, leaves and rubbish.
- Rubbish in the toilet can block hoses when pumping out the facility.
- Pumping out of systems and disposal of waste materials usually carried out by contractors.
- No handling of waste by staff – No OH&S issues.

- Toilets are pumped out yearly on average, although they need to be checked when nearing becoming full.
- Tend to smell when close to full.
- Can cause problems if the tank cracks.

Costs and Operational Effectiveness:

Capital (~$2000) and running costs (~$100/month) were seen as low and the operational effectiveness was seen as excellent by all state agencies surveyed.

Ratings:

These ratings are an average of responses for each state.

NSW – 5/5

ACT – 4/5

Victoria – 4/5

<u>Common Responses to Surveys</u> – Visitors

Environmental Issues relating to the facility:

- If the system was not maintained, some visitors perceived that the system could overflow.
- Visitors were curious about what happened to the material pumped out. Was it disposed of in an environmentally friendly way?

Issues relating to the use of the facility:

Positive:

- Clean
- Simple
- Blended into the environment

Negative:

- Smell, especially when close to being full.

- Some designs, especially in more accessible areas, seen as too small for disabled people.
- Design of pedestal seen as too large for children

Ratings:

The average rating of all sealed unit pit toilet systems by the general public was 3.5/5.

SUCCESS INDEX

A summary of ratings of public toilet facilities across the Australian Alps showing individual rated scores (1= very low to 5 =very high). These rating scores were based on the responses of both the managers and the general public. However, the weighting of the managers comments were triple that of the general public as shown in the equation below:

(average manager rating x 3) + (average general public rating) / 4 = final score

Toilet Type	Tablelands		Montane		Sub-alpine		Alpine	
	R	Non-R	R	Non-R	R	Non-R	R	Non-R
Pit Toilet – sealed unit	2.5	5	2.5	5	2.5	5	N/A	
Pit toilet - unsealed	2.5	2.5	2	2	1	1	N/A	
Septic	2	4	2	2	1	1	N/A	
Clivus Multrum	3	3	3	3	1	1	N/A	
Dowmus	2	3	1	2	1	1	1	1
Rotaloo	4	4	3.5	4	3	3	N/A	
Eco-Village	N/A		N/A		N/A		N/A	4
Batch Waterless (Tasmania)*	N/A		4	4	4	3	N/A	

R = Remote Non R = Non remote

** Note no visitor surveys were carried out for this facility.*

APPENDIX 1

Survey Form for Managers

Australian Alps
Toilet Inventory Project

Information Survey to Assess Success and Effectiveness Toilets across the Australian Alps – Managers Survey

Date:_____ Area/State:_____

Contact details for the Office Responsible for the facility:

Postal Address:_____

Ph:_____ Fax:_____

1. *Could you please describe the type of Facility* – eg. type of process/technology, manufacturer (if applicable) and any important modifications/ design features.

_____

_____

_____

_____

2. *Could you please describe the Location of facility* – descriptive geographical location and AMG co-ordinates

_____

_____

_____

_____

(For the following questions please circle 1 answer)

3. What is the local environment?

a) Alpine b) Sub-alpine c) Montane d) Tablelands

e) Other (please specify):_____

4. What facilities are nearby to the toilet?

a) Hut b) Camping area c) Picnic area d) Trail head

e) Viewing area f) Other (please specify):_____

5. What is the management/recreational use category where the facility is located?

a) Wilderness b) Remote c) Non-remote d) Roadside

e) Other (please specify):_____

6. What type of access is available to the facility?

a) Road b) ATV c) Walking trail

d) Other (please specify):_____

7. What is the usage pattern of the facility?

a) Seasonal a i) Summer a ii) Winter b) All year

8. Estimate of numbers using the facility daily at peak periods?

a) 1-10 b) 10 –50 c) 50 – 100 d) 100 – 500

e) 500 – 1000 f)1000+

9. Estimate of numbers using the facility daily at off-peak periods?

a) 1-10 b) 10 –50 c) 50 – 100 d) 100 – 500

e) 500 – 1000 f) 1000+

10. What is the urine/faeces ratio?

a) 1:1 b) 2:1 c) 4:1 d) 8:1 e) greater (if yes please specify)_____

11. What is visitor behaviour like at the facility– treatment of the facility (eg. Vandalism, rubbish down toilet) and how does it effect the operation of the facility.

_____

_____

_____

_____

12. Operation/maintenance of the facility– problems encountered (eg. with composting, access design, environmental impacts/pollution); maintenance requirements (ideal and actual) and how do they effect the operation of the facility.

_____

_____

_____

_____

13. Is the facility cost effective

Yes no

14. Capital and running costs v. operational effectiveness

_____

_____

_____

_____

15. On a scale between 1 and 5, how would you rate the facility?

Bad		Average		Good
1	2	3	4	5

APPENDIX 2

Survey Form for the General Public

Australian Alps
Toilet Inventory Project

Information Survey to Assess Success and Effectiveness Toilets across the Australian Alps – General Public Interview - Survey

Date:_____ Area/State:_____

Facility:_____

Name:_____ Age:_____ Area Code:_____

1. *Could you please describe any positive or negative issues relating to the Facility and its use.*

Positive:

_____

_____

_____

_____

Negative:

_____

_____

_____

_____

2. Was the facility well maintained.

Yes No

Comments:

3. Do you think there are any environmental issues relating to the facility:

4. On a scale between 1 and 5, how would you rate the facility?

Bad		Average		Good
1	2	3	4	5

CONTACTS

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