



New Zealand experiences in site clean up – the value of monitoring

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Introduction

Annex III of the Protocol on Environmental Protection to the Antarctic Treaty requires that “waste disposal sites on land and abandoned work sites of Antarctic activities shall be cleaned up by the generator of such wastes and the user of such sites”.

New Zealand has completed successful clean up activities at Vanda Station (1968-1995) and Cape Roberts (1995-2000). In both cases, environmental monitoring played a key role in the management of the sites.

Vanda Station

Site use

Vanda Station, on the shore of Lake Vanda, was occupied from 1968 to 1995. Occupation resulted in disturbance by trampling and vehicle movement, excavations and erection of buildings, storage of consumables, accidental spills and waste disposal including grey water, urine, used photo chemicals and some battery acid. Removal of the eight buildings and a large amount of contaminated soil and painted rocks took over 180 person days and 70 helicopter hours to complete.

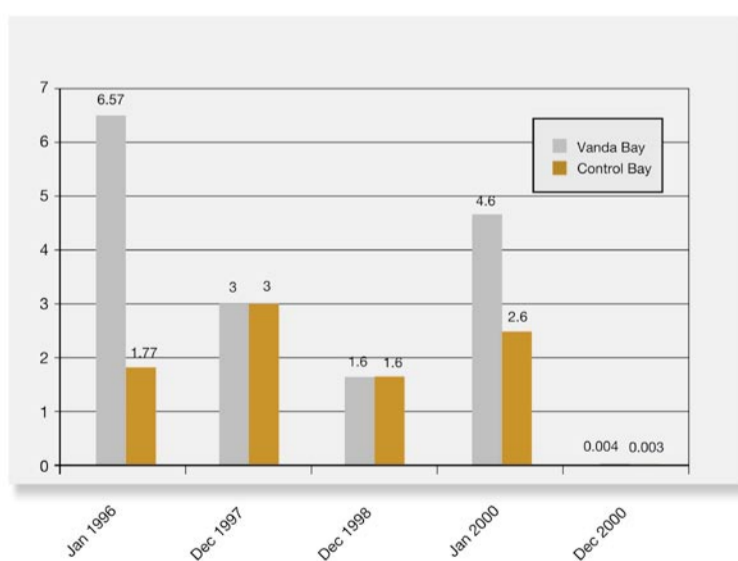
Monitoring

From the station's removal in 1994/1995 until 2001/2002, water and algae samples were taken annually from Vanda Bay (immediately adjacent to the station site) and a control site for monitoring purposes. In 1996 samples were also taken from a pond which formed in “Greywater Gully”, the main liquid waste disposal site, which has not since reformed. Analysis undertaken by NIWA (the National Institute for Water and Atmospheric Research) included dissolved nutrients, chlorophyll, particulate nutrients, algal species composition and heavy metals. From the data collected it was concluded:

“There is no evidence, to date, to suggest contamination has occurred in Vanda Bay. Any contamination of the lake is at concentrations not detectable over background levels. ... This dataset provides a robust baseline that conveys the inherent variability in the environmental parameters being measured. An understanding of this variability will allow changes to contamination to be identified at an early stage, should inundation of Greywater Gully occur.” (Sutherland, 2002).

In the event that lake water inundates the old station site, particularly “Greywater Gully”, sampling and analysis will be able to quickly ascertain whether contamination is occurring.

Figure 1: Example of Vanda monitoring data – zinc in surface water. Zinc was the only heavy metal species to show higher concentrations in Vanda Bay than Control Bay. During the period of monitoring zinc concentrations have reduced at Vanda Bay, to be almost identical to Control Bay.



Cape Roberts

Site use

An international scientific drilling project was staged from Cape Roberts between 1995 and 2000. Drilling was conducted from a sea ice platform while the Cape itself was used for storage of equipment and supplies. Baseline information about the site was collected before the project began. A strict environmental management programme, including auditing and monitoring, ran throughout the project and for two years following its completion.

Monitoring

Environmental monitoring at Cape Roberts included:

- total petroleum hydrocarbon analysis of soil and water
- visual monitoring of waste dispersal using underwater video camera
- visual monitoring of benthic communities at drill sites using underwater video camera
- visual assessment of disturbance to terrestrial environment
- skua population surveys.

Acceptable limits were set for all parameters (except skua numbers, due to high natural variability) and were not exceeded. Planned remediation was undertaken after removal of equipment, including litter picking and a novel approach to soil compacted by vehicles and storage, which was loosened by raking. After a winter the compacted areas were impossible to identify. Today almost no signs of the project remain.



Figure 2: Left: An image taken from video monitoring of the first season of drilling, showing the sea riser guide base amongst siliceous sponges, a sea floor silica needle sponge mat and other benthic organisms. (Waterhouse, 2001). Right: Cape Roberts Project Manager and Camp Assistant raking to loosen compacted soil.

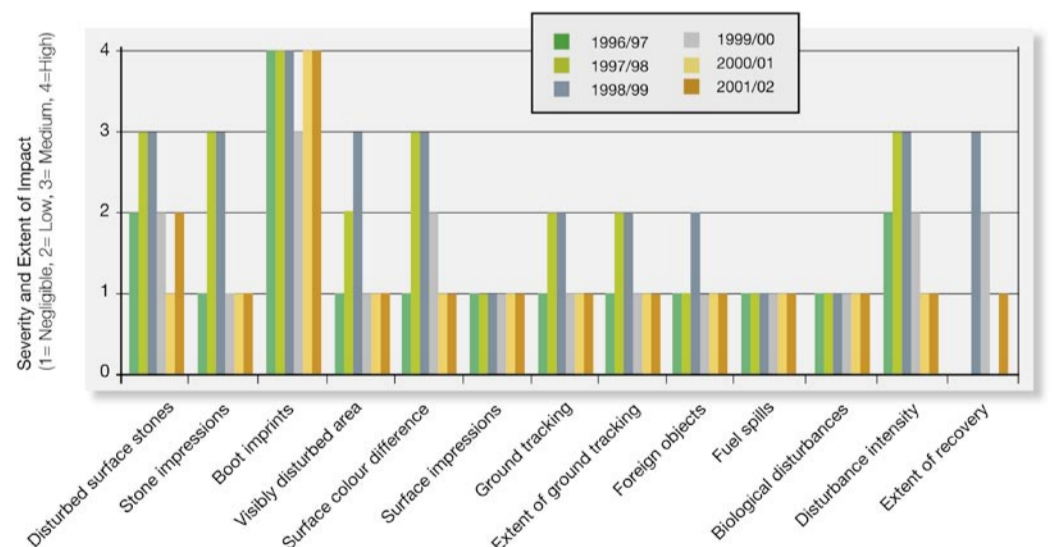


Figure 3: Example of visual assessment of terrestrial impacts – results for the Northern Plot (outside the storage area at Cape Roberts).

Conclusion

Environmental monitoring is a useful way of determining whether clean up goals have been achieved at sites of past activity. Monitoring can be particularly effective when it is integrated into planning for new activities and their eventual clean up.

References

Sutherland, D. *Lake Vanda Monitoring Report No. 7*. National Institute of Water and Atmospheric Research Ltd, prepared for Antarctica New Zealand Waterhouse, E (ed). *Cape Roberts Project Final Environmental Report 1995-2001*. August 2001. Antarctica New Zealand