

# **REMOTE CONTROLLED WASTE**

**An Introduction to Waste Management and  
Appropriate Technology in  
Remote Aboriginal Communities**

**1991**

**Centre for Appropriate Technology Inc.**  
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Cover photograph: Taken by CAT in a remote central desert community. The flour drum hanging in the tree has been reused to contain the remains of a dog. Contact authors for a deeper understanding of its importance to cross-cultural waste management strategies.

## Terms of Reference

The Remote Aboriginal Community Waste Management program is an initiative of the Centre for Appropriate Technology (CAT). Responding to the Walungurru Council, CAT investigated the unique needs of waste management when considered in the cross-cultural context of small and remote central Australian Aboriginal communities and outstations.

The program aims to improve the quality of life and produce a developing awareness of the impact in remote Aboriginal communities of waste accumulation in relation to:

- (1) community environment and health;
- (2) health hardware and technology design;
- (3) domestic and community values, expectations and lifestyle;
- (4) waste recovery, separation, re-use and recycling options; and
- (5) administration, education, training, employment and economic strategies.

## Acknowledgements

The report acknowledges the cooperation and assistance of a number of individuals, communities and organisations.

The Walungurru Community Council (Kintore) showed initiative by requesting the CAT to develop appropriate options for their waste management functions. The community provided valuable feedback and insights to their waste situation. In particular the assistance from Johnny Scobie (Chairman), Smithy Zimran (then Health Administrator), Ashley Scobie (liaison and research helper) and the women and men of the remote area teacher education group are acknowledged. This feedback has been used in case study examples in this report. Valuable feedback was also provided by the outstation and community representatives who participated in the Aboriginal Employment Development Program (AEDP) Technology Workshop conducted by the CAT with assistance from the Department of Aboriginal Affairs in September 1989. Feedback in the early stages of this project from Jon Willis (Anthropologist), Max Heggins (Office of Local Government) and Nigel Carrick (tree planter) was gratefully received.

The willingness of the Northern Territory Department of Health and Community Services to support the production of this report is indicative of the need to develop an innovative and comprehensive approach to the unique and ever mounting waste management needs of remote communities.

Finally, the advice and cooperation of Dr David Scrimgeour (Menziess School of Health Research) on matters relating to health in remote Aboriginal communities was an asset to this report and reflects the integrated nature of enquiries into waste science and technology and environmental health generally.



## Executive Summary

One of the great challenges facing scientists, technologists, educationists and economists entering the 21st century will be to produce innovative, constructive and effective responses to unprecedented demands for comprehensive and sustainable waste management strategies. Research and development into waste management is likely to include investigations into; values and ideals; population impact on land and resources; employment shifts caused by new waste processing industries; the education and economics of lifestyle changes; the science and technologies which reduce or re-process the range of waste a settlement produces; and, the impact waste has on our health and ecology.

The purposeful management of waste is a relatively new function for many Aboriginal communities in central Australia. The implications of practicing inappropriate waste management strategies in these communities are significant. The issues extend from environmental health, appropriate technologies and human resources to lifestyle expectations and community development in a cross-cultural and usually poorly equipped remote settlement situation.

This report, the first of a resource package on waste by the Centre for Appropriate Technology, provides an introductory explanation of how the above issues are affected by appropriate and inappropriate waste management strategies for remote Aboriginal communities. It highlights the inherent difficulties of correlating Aboriginal health with changes in the environment, the enormous impact inappropriate technologies have had on the quality of life in remote communities; the consequences of under-rating the impact hardware has on lifestyle values and expectations; and of under-rating the impact human resource burn-out has on waste management and related functions in remote Aboriginal communities.

Finally, the above issues have been integrated in a series of waste hardware design and management options for communities (particularly those on CDEP) to consider as part of their waste control strategy. The report strongly recommends that innovative and sustainable waste management strategies are implemented and supported by governments and communities. This support is seen as necessary rather than merely desirable.

A case is advanced which suggests that the lifestyle values required to regularly maintain rubbish tips and council services are the same values required to regularly clean the domestic environment and adopt personal hygiene routines which respond to the health hardware technologies introduced to communities. The report finds that significant and sustainable improvements in environmental health and waste management are unlikely to manifest themselves in remote communities while technologies and training programs are introduced which have the effect of:

- (1) decreasing broad Aboriginal participation in the design, construction, use and repair of health hardware; and,
- (2) increasing community reliance on external contractors, organisations and government departments.

The report advises against strategies which perpetuate low participation in technology as they may also risk perpetuating a dependency/welfare cycle which further reduces opportunities for remote communities to adopt value shifts supporting health hardware maintenance, effective waste control and regular personal hygiene practices. This approach increases the relative cost to the community of maintaining capital intensive waste strategies as they also tend to produce a high material and human resource turnover in remote communities. Adopting value shifts that support sustainable waste strategies and technologies is argued to be in every respect as important to improving the quality of life in non-Aboriginal Australia as it is in remote Aboriginal communities.

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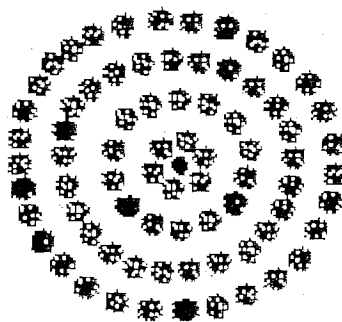
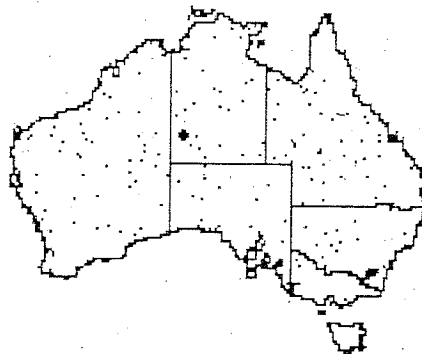
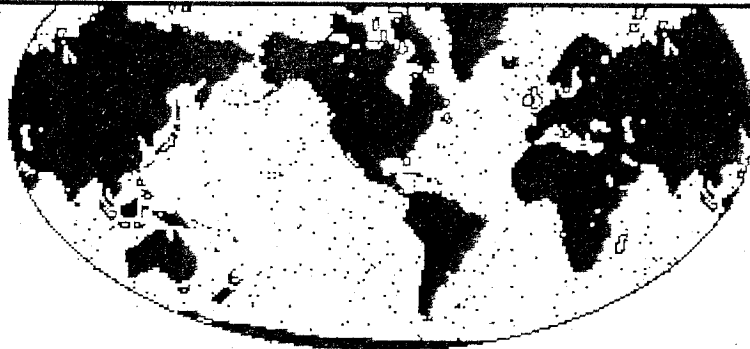


## Glossary of Terms

Burn-out	A social stress phenomenon. Usually due to day-to-day contact with many people seeking solutions to their problems. People experiencing burn-out have no or low access to quality social support groups. Burn-out can produce a withdrawal from relationships, the projection of negative attributions about people or generally acting in an unfriendly or cold manner with clients. (Gardner, G.I. et. al; 1981:p6)
Community or Domestic waste	Under utilised or untapped resources or items which are perceived to have no use value.
Economic waste	Economic strategies that increase the cost for services and technologies to Aboriginal communities or outstations without producing sustainable improvements to the quality of life or to Aboriginal participation in these services and technologies.
Hardware	Manufactured material objects.
Health hardware	Manufactured material objects designed and spatially arranged to match community lifestyles and environment factors while reducing health problems and enhancing the capacity to modify and maintain the hardware.
Intechinate	In-tek-net/ <i>adj.</i> , 1. lacking the ability to integrate human and environmental factors in a technology oriented project/solution; 2. lacking the ability to actualise scientific or technological facts in a material form or spatial arrangement that is sustainable in the cultural-settlement context of the end user. [antonym = <b>technate</b> , /tek-net/tek-nate]
Needs (re.waste management)	The project identifies an expressed "need" as a situation that if not immediately responded to and adequately resolved in an appropriate space of time will incur or continue to incur significant detrimental affects on the sense of happiness and security of the defined group (for example, the attainment of adequate comfort, food, water, shelter, movement, health, social contact, cultural acceptances etc.,)
Non-technate	Non-tek-net/, 1. possessing the ability to be technically skilled while lacking the ability to integrate human and environmental factors in a technology oriented project/solution; 2. being knowledgeable of scientific or technological facts while lacking the ability to actualise these facts in a material form or spatial arrangement that is sustainable in the cultural-settlement context of the end user; 3. <i>in philosophy of technology</i> = ignorance of the 'Technology Problematic'.
Organic waste	Human or animal body excretions and discarded foods.
Perceived or Apparent waste	Most community or domestic waste such as derelict cars and visual litter.
Potential waste	All structures and solid, liquid, organic and inorganic resources transported to or generated in the community or outstation.
Semi-traditional	A lifestyle that operates under at least two value systems and therefore two sets of expectations. A lifestyle that can produce conflicting or mismatching expectations.
Software	The knowledge, skills, values, beliefs, social organisation and expectations that determine a persons view, use pattern and choice of hardware and spatial organisation.
Technacy	Tek-na-cy/ <i>n.</i> , 1. the state of being technate. 2. generic competence in technology problem solving and communication: parallels to literacy and numeracy.
Technate	Tek-nate/ or /tek-net/, <i>adj.</i> , 1. the ability to integrate human, technological and environmental factors in an appropriate three dimensional solution of form and space. 2. fundamental cognitive skill in science and technology problem solving, experimentation and communication. 3. the ability to create appropriate solutions for human problems through the manipulation of material forms and spatial arrangements 4. skill necessary for holistic problem solving in material forms and spatial arrangements. 5. the ability to assess the impact of science and technology solutions in the context of ones lifestyle, settlement or global environment: i.e., a cross-cultural or technology transfer problem solving skill. 6. skill involved in the design sciences. - see technacy <i>n.</i> , [antonym = <b>Intechinate</b> , /in-tek-net/]
Vector	Species of insect believed to be the carrier of a particular microbe. For example, the mosquito species <u>culex annulirostris</u> is believed to be the carrier of the microbe <u>ross river virus</u> which has caused <u>epidemic polyarthritis</u> infections in the Northern Territory.
Waste	A general term canvassing community, domestic, economic, human, perceived, apparent and potential forms of underutilised or discarded resources.
Waste management technologies	Hardware designed to meet the software of the end user for facilitating the management, prevention and/or processing of waste.



# WASTE IN PERSPECTIVE



PART ONE

# 1 PART ONE - INTRODUCTION

## 1.1 GENERAL BACKGROUND AND PERSPECTIVES

For many who have visited or serviced remote Aboriginal communities the enduring visual impact of extensive solid and liquid waste and the degraded condition of capital items such as shelters, tractors and sanitation systems is the most significant impression of such communities.

Attempts to explain waste in remote communities often produce a variety of ad-hoc opinions and proposed solutions which are more destructive than constructive in their nature. This indicates a problem in defining waste in remote communities.

For example, educationists may claim that it is primarily the result of a lack of skills and training in the community. Health surveyors and engineers may be compelled to recommend higher standards of workmanship, more sophistication in capital works or greater adherence to World and urban Australian standards. Private industry and contractors may attribute laziness, lack of accountability and leadership as the main problem while others attribute the situation to a lack of government funding. Still others feel they can absolve themselves of responsibility by submitting that the extensive waste throughout a community is due to a combination of at least all these things or that waste and litter is not really a priority problem at all. To many, waste represents a conflict of aesthetic preference between those who live in the community and those who service or visit it.

There are several consequences of perpetuating the kind of speculations outlined above including:

- (1) generalised, often gratuitous, attributions projected on Aboriginal communities;
- (2) community reputations preceding and perhaps unintentionally influencing government funding strategies;
- (3) the quality of life in Aboriginal communities declining or remaining poor despite government spending on hardware maintenance and waste management capital;
- (4) judgements being made without an adequate understanding of:
  - (i) the scale of impact community waste products and practices have had on the cultural and natural assets of the land; and
  - (ii) the impact urban solutions have had on remote Aboriginal community development priorities.

These developments have maintained a lose-lose situation for government and remote Aboriginal communities. Consequently the major beneficiaries of most Aboriginal community development funding programs have been external contractors and service agents employed to remove the problem as soon as possible.

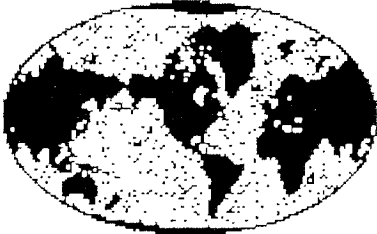
The confusion about waste problems and solutions in remote Aboriginal communities is a reflection of the global waste management situation. Relative to the efforts invested in sciences and technologies that produce phenomenal amounts of wastes and by-products, the science and technology of waste management is still very much in its infancy. This is perhaps surprising when one considers that waste accumulation can be seen to occur across almost every aspect of domestic and community life.

Within this context the Centre for Appropriate Technology, through its Waste Management program for remote Aboriginal communities, aims to investigate the confusion about waste in remote Aboriginal communities with the objective of improving the quality of life and broad participation in technology in these communities. The challenge is for government, communities and service providers to produce sustainable waste management technologies and related training programs that lead to a win-win strategy for remote communities and government.

### 1.1.1 Waste in perspective

To what extent are existent waste management problems and practices in remote Aboriginal communities unique to these communities ?

### 1.1.2 Global perspective



When we consider waste management science and technology at the global scale we note of developed countries the lack of options used to deal with their waste despite the apparent resources and advances made in science and technology generally.

For example, during one of the hottest summers in 1988 in America, the swimming beaches near New York were closed to the public because dangerous waste from long term off-shore garbage dumps was washing back onto the coastline. The economic impact on commercial fishing, restaurant and tourist enterprises was severe. In the same year on the other side of the globe, 2000 tonnes of poisonous waste from Italy was shipped for dumping in Nigeria, West Africa, only to be sent back to Europe when the Nigerian government found it consisted largely of toxic chlorinated chemicals and solvents. Six months passed before the vessel, having been rejected by Spain, West Germany and Britain, was accepted by a Dutch company given the permission to process its cargo. Also, in 1986 following a chemical warehouse fire, 200 kilograms of mercury and 30 tonnes of dangerous pesticides polluted the River Rhine. Tonnes of fish were poisoned, domestic water supplies were cut off in many German towns along the Rhine and 2 years were expected to pass before the river was sufficiently cleaned up. 30,000 people protested to the Rhine's pollution in a human chain stretching from Switzerland to the Netherlands (Mercer, 1989).

The decade just passed revealed to all nations the seriousness of the hole in the ozone layer as a threat to our planet's capacity to adequately support life. This represents the true cost of using chlorofluorocarbon (CFC) based products in our lifestyles. The eighties also highlighted the extensive and increasing degradation of the worlds' delicate rain forest reserves and the imminent impact on property development and small island countries of the greenhouse effect: both partly the result of countries maintaining energy intensive lifestyles and largely unbridled air pollution practices.

Developing sustainable waste management technologies and strategies that encourage valued lifestyle shifts have firmly established themselves as high profile necessities for improving the quality of life in settlements across the world.

These global examples reveal at least two important points about waste management relevant to Aboriginal communities:

1. **Sustainable waste management requires peer support based on informed judgements for communities and individuals to adopt appropriate value-shifts in lifestyle.**

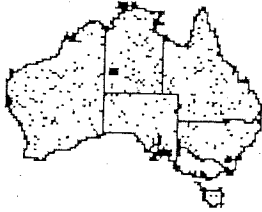
Dysfunctional waste strategies are likely to remain unless raised awareness coincides with appropriate skills and knowledge of options to make informed judgements for adopting lifestyle changes. These changes should be given full peer support by governments even though the means to achieve these changes may not follow mainstream ideals, practices and expectations.

2. **Sustainable waste management strategies require innovative technologies which are themselves sustainable.**

Dysfunctional waste practices are likely to continue until innovative research and development is encouraged to produce new options in waste management that consider

the lifestyles, functions and resources of the settlement. New options in waste hardware require care in their design to ensure that they are sustainable and "user friendly" in the context of the settlement. In many respects introducing appropriate technologies in the first stage of a waste management strategy provides the optimum catalyst in communities for: (i) subsequent lifestyle changes; and (ii), training programs that foster sustainable waste management practices.

### 1.1.3 Urban Australian perspective



The need to develop sustainable waste management strategies in urban Australian settlements differs little to the global situation. The power of the media has contributed to the heightened awareness of urban and rural Australians to: (1) the scale of dysfunctional waste strategies across Australia; and (2), public education about the opportunities we have to improve the quality of life today and for our future.

However, the evidence available suggests a lack of options in waste science and technology and a pressing need to further develop the field of enquiry into waste. It has been estimated that the city of Melbourne alone produces 2.2 million tonnes of waste products or 800 kilograms of waste per person per year. The figure represents a 25 percent increase on the annual waste the city produced 10 years ago and is expected to continue to increase by 2.5 percent each year (The Age, Sept 20; 1989). Melbourne households collectively dispose of over 500,000 tonnes of garbage per year. This is equivalent to filling the Melbourne Cricket Ground twice over (Mercer, 1989). About 35 percent of domestic garbage is packaging, usually cardboard, paper or plastic. Traditionally most of this waste has been taken to land fills or tips. However, local governments are increasingly confronted with the added cost of having to take waste further from their domestic origin as old tips fill up and new ones are found. The environmental health and economic impact of dysfunctional waste strategies have also raised public concern across Australia motivating mass protests against the raw sewage build up on Sydneys' beaches and volunteer clean-up days for the general pollution of Sydney harbour.

### 1.1.4 Political viability of sustainable waste strategies in urban Australia

The emerging "green" vote in State and Federal elections is testimony to the strength of public concern about current waste management options. Respondents in a recent poll to rank political issues put environment second, behind the economy and ahead of social welfare and industrial relations (Mercer, 1989). An extensive environmental report for the Melbourne City Council titled "Domestic Waste Recycling: Municipal, Community and School Involvement" (1987), found that "the ideals of these philosophies [environment and energy conservation] are now politically viable". Advocating the need for lifestyle changes towards sustainable waste management, the Environmental Protection Authority's recycling unit manager noted that:

"more and more we will be moving towards recycling as a regular part of our daily existence, not only in our homes but in our office too" (The Age, Sept 20, 1989).

The school and the education system is seen in many reports to play a major role in providing environmental and recycling education for teachers, students and the school's community in preparation for the lifestyle values required to maintain an improved quality of life through our future.

In response to the broad and growing public concern and resource demand on the Australian economy, recent initiatives have been implemented by both the Federal government and private enterprise. In July 1989, the Federal government announced its Environment Policy/Strategy to spend over 500 million dollars during the next ten years. The government also declared that the 1990's will be the decade of Landcare with government promoting awareness, participation and education programs in rural and urban communities. Private enterprise has also recognised the strength and scale of the environmentally conscious consumer market. The Coles supermarket chain

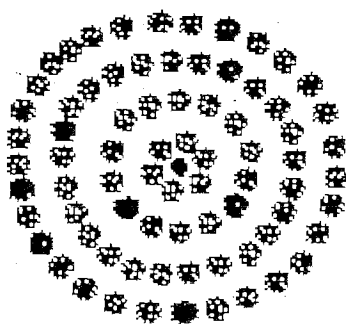
is working towards selling itself as an environmentally conscious supermarket (The Age, Sept 20, 1989).

However, while government and private enterprise initiatives are generally in the right direction it is unlikely that the measures taken and proposed will have a significant impact on reversing or even slowing down our current rate of energy consumption and degradation of the environment. Economically, consuming and degrading our natural assets (clean air, water and fertile soil) at a rate equal to or faster than we can replace or upgrade it is a disastrous strategy.

These urban Australian examples raise a number of important issues about waste management in remote Aboriginal communities which need to be resolved:

- (1) How will the cross-cultural economics of small and remote Aboriginal communities cope with current options in recycling technologies and programs? Are these options equally accessible to remote Aboriginal communities as they are to urban and rural communities across Australia?
- (2) If packaging also represents the larger proportion of the waste in remote communities, what initiatives can the community store and other service agents take to improve the quality of life in these communities?
- (3) Which media medium is the most locally controllable, effective and sustainable in remote communities to enhance participation, public awareness and education programs on waste? Who will operate the medium?
- (4) If the school in remote Aboriginal communities is expected to play a significant role in the provision of sustainable waste management education, what curriculum, material, and human resources will be required to afford the school quality time towards teaching the new subject area?
- (5) Many remote Aboriginal communities are still attempting to obtain adequate shelter and water. If waste management solutions are an emerging priority among urban Australian lifestyles how appropriate will the impact be if these solutions are forced upon the lifestyles of remote Aboriginal communities?

### 1.1.5 Small and remote community perspective



Imagine a small and remote community located in an Australian desert climate. The range of waste seen to accumulate in the community includes: plastic bags, discarded fuel drums, building and packaging materials, and abandoned or temporarily vacated shelters. Adding to the challenge of controlling this waste is the limited availability of reticulated water, extreme weather conditions and energy losses due to inefficient shelter designs.

The community also produces a lifestyle dependent on external specialists to maintain common and private hardware. It is almost entirely dependent on government funding and capital resources which have to be brought in from hundreds of kilometres away. This significantly increases the relative cost of hardware used in the community and if spare parts or particular tools are not available major delays can occur to the repair of waste management technologies. As a result, some hardware may undergo unorthodox or make-shift repair work.

The community also serves as a resource provider for a number of its smaller outstations which lack reliable water and power. Septic systems in the community tend to fail and alternative means are often used. The attitude of the community towards the waste their lifestyle produces is a general desire to remove, reuse or reduce as much of the waste as possible. However, community members also find it difficult to: realise their desires; gain access to or operate the technology options provided to deal with the waste; or, they have come to expect that the waste and any broken down waste management hardware will eventually be removed by someone else or replaced by the government (H.Quilligan, pers comm, 1989). Hence, the lifestyle and environment of the community creates a

different perception of time and cost compared to urban Australian communities.

Waste awareness and education programs are usually reviewed by program coordinators but fall short in the community due, in part, to the difficulty people have in recognising types of waste for effective separation (H. Quilligan, pers comm, 1989). Also, the waste management hardware options available in the community may not be easily used, maintained and accessed by all. The latter may be a disincentive for people to realise their desired waste management goals despite the provision of waste awareness and education programs.

The community described above and its waste management status could easily be mistaken for a remote Aboriginal community in central Australia, but it is not. It is a general description of one of Australia's Antarctic Stations. The lack of waste science and technology available for remote communities is one reason why a study into waste management for Antarctic bases was recently commissioned by the Australian Antarctic Division (AAD Programs Coordinator, pers comm 1989).

The logistic similarities between remote Aboriginal and Antarctic communities suggests that certain aspects of their waste management strategies are compatible. It is significant that one aspect of the Antarctic waste management strategy is to dramatically minimise packaging and maximise separation prior to goods being transported to the Antarctic. It is appropriate that such options be seriously considered for remote Aboriginal communities.

### 1.1.6 Nature of the problem

There is evidence to suggest that the logistic problems of waste management in remote Aboriginal communities are not endemic to these communities and therefore can not be generalised as an "Aboriginal problem". However, it is also clear that the remote cross-cultural lifestyle and environment of Aboriginal communities are factors significantly limiting the appropriateness of conventional waste management solutions.

The global and urban Australian perspective on waste examined in this report reveals the world deficit in options for dealing with our by-products and therefore the general difficulty of the challenge faced by Australian scientists, educationists, economists and technologists. When waste management was considered at the small and remote community level the enquiry into waste and its impact presented even greater resource limitations and challenges than those of urban Australian communities. It follows that when strategies are required to produce effective waste management systems in the cross-cultural and environmental context of small and remote Aboriginal communities the nature of the challenge becomes unique. The situation, therefore, requires unique solutions and innovative approaches for researching and responding to the waste management needs of remote Aboriginal communities.



# CASE STUDY OUTLINE

## PART TWO



The need for research and development into cross-cultural waste management in remote communities

## 2 PART TWO - CASE STUDY OUTLINE

### 2.1 THE WALUNGURRU COMMUNITY (KINTORE): A WASTE MANAGEMENT CASE STUDY

#### 2.1.1 Background to the study

Kintore is a small and remote semi-traditional Aboriginal community situated in the western desert region of central Australia in the Northern Territory. Settlement development recommenced in Kintore in late 1980. The current waste study is a view of Kintore nine years after its establishment.

Located approximately 50 kilometres from the Western Australian border Kintore's main service and resource node is Alice Springs some 520 kilometres further East via a 380km dirt and there after sealed road. Depending on the condition of the road average travelling time may take between 5.5 and 7 hours or if rains have occurred in the area the road may be impassable for several days or weeks. Between Kintore and Alice Springs fuel stops are usually available near the half way mark at Papunya or Mt Liebig though trading hours are restricted. Kintore is also accessible by air charter services from Alice Springs and a HF Two way radio network provided by the Royal Flying Doctor Service (RFDS). Two satellite linked telephone lines were commissioned in 1991. Including outstations, the community provides for a population of approximately 500 where 20 are non-Aboriginal (see diagram 1). The dominant languages spoken in the community are Western Desert and some Warlpiri. Generally, oral English is poor and used selectively as a second language.

Kintore Population Estimates 1980 to 1990  
(Including Outstations)

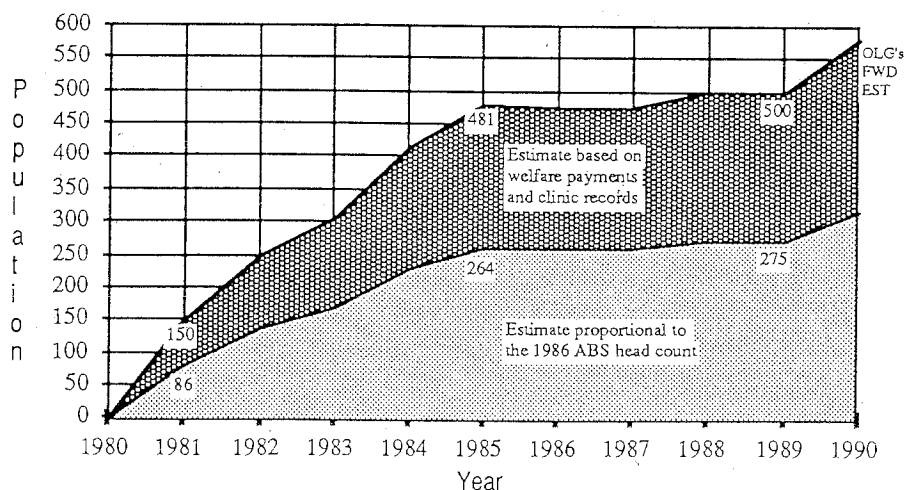


Diagram 1: Kintore's population growth since 1980

In May 1989, the CAT received a request from the Walungurru Community Council to assist their waste management functions. The CAT proceeded with the Council's request to develop an integrated framework and methodology appropriate to the comprehensive nature of the waste management problems being faced by the community. Fieldwork for the Kintore Waste Project was conducted during the latter part of 1989.

### 2.1.2 Aims of the project

The CAT waste management project is on-going and aims to produce positive outcomes in the following areas for remote Aboriginal communities:

- (1) community environment and health;
- (2) health hardware and technology design;
- (3) domestic and community values, expectations and lifestyle;
- (4) waste recovery, separation, re-use and recycling options; and
- (5) administration, education, training, employment and economic strategies.

### 2.1.3 Case study objectives

In the context of the general project aims described above the objectives specific to the Kintore waste management case study are:

- (1) to investigate the waste situation at Kintore and other participating communities;
- (2) to produce appropriate, achievable and practical strategies in the areas of training, employment and technology for managing the range of waste products that enter and accumulate in the community;
- (3) to tailor the above strategies to the lifestyles, resources and environment of the Kintore community; and,
- (4) to broadly consult with the people of Kintore and participating communities to achieve the aims and objectives of this project.

## 2.2 CASE STUDY METHODOLOGY

### 2.2.1 Basis to the methodology

The establishment of Kintore and other remote Aboriginal communities produced a requirement for basic resources and services. The largely unscreened technological transfer that has accompanied the introduction of these services has produced an unprecedented input of potential waste material that can be seen to accumulate across community functions. Previous studies conducted by the CAT (ATWORK Report, 1988) suggest the main functions performed in remote Aboriginal communities which involve hardware interactions are:

- (1) **Networks:** (A) Transport;  
(B) Water management;  
(C) Communication;
- (2) **Shells:** (D) Domestic shelters and spaces;  
(E) Community shelters and spaces;  
(F) Waste management; and,  
(G) Enterprise.

## 2.3 RESEARCH FRAMEWORK

To produce the most effective description and analysis of Kintore's waste situation the research framework was structured around the predominant hardware dependent functions performed in communities as listed above. The information collected from these functions was then organised in the context of the following waste management domains:

- (1) Values, roles and habits (i.e., lifestyles);
- (2) Environment and health;
- (3) Technology design (hardware and software);
- (4) Education and training; and,
- (5) Community administration and programs.

Merging the domains of waste management with community functions provided the framework for collecting and discerning information about waste in the community. Expressed as a matrix (see diagram (2)), the framework provided a diagnostic tool for developing integrated waste management strategies. The method involved collecting information about waste for each cell of the matrix. The analysis involved comparing the cells to identify patterns of waste interaction and sources.

WASTE INTERACTION	CATEGORIES OF COMMUNITY WASTE MANAGEMENT				
	CATEGORIES OF FUNCTIONS	VALUES, ROLES & HABITS	ENVIRONMENT & HEALTH	TECHNOLOGY DESIGN	EDUCATION & TRAINING
TRANSPORTATION	1A	2A	3A	4A	5A
WATER MANAGEMENT	1B	2B	3B	4B	5B
COMMUNICATION	1C	2C	3C	4C	5C
DOMESTIC SHELTERS AND SPACES	1D	2D	3D	4D	5D
COMMUNITY SHELTERS AND SPACES	1E	2E	3E	4E	5E
WASTE MANAGEMENT	1F	2F	3F	4F	5F
ENTERPRISE	1G	2G	3G	4G	5G


Waste interactions found in all other cells were translated to management strategies for the cells marked 

Diagram 2: Research Framework

### 2.3.1 Data collection and methods used for identifying needs

The data collection process aimed to identify patterns of needs related to the ability of individuals and the community council to effectively manage waste. These needs were categorised in the following ways to assist the waste management study:

- (1) Expressed need: this is defined as usually non-verbal and is observable. It is a measure of what people do in action and routine and reflects the current capacity to satisfy needs.
- (2) Felt need: this is defined as usually verbal and is a measure of the most desired option known at the time.
- (3) Normative need: this is defined as a verbal or written reference to a standard option proposed by experts.
- (4) Comparative need: this is defined as a verbal or written desire to have the same option as a neighbour or other group. It is often a measure of competitiveness between groups and their status to each other.

Four general methods of investigation were adopted to obtain information about the waste management needs of individuals and the community council.

<u>Methods of investigation for the researcher</u>	<u>Kinds of needs usually elicited</u>
1. Observations and quantitative surveys	Expressed needs
2. Participation in projects	Expressed and Felt needs
3. Specific questions	Felt, Comparative and Normative needs
4. Counselling/intentional interviews	Verbal reflection of Expressed needs

Given the research framework (the matrix) and a technique for obtaining and describing needs (the methods of investigation) the researcher requires a framework for identifying the sources of needs in the community.

Jon Willis 1988 suggests that there are generally three sources in a settlement or defined group of people from whom specific needs may be identified and compared. Willis lists the three sources as:

1. The client or client group: They are the receivers or users of a service or technology.
2. The caretakers: They are the providers or operators of a service or technology.
3. The administrators and data banks: Policy, standards and statistics.

The above framework was adopted to assist the investigation process of this project.

### **2.3.2 Method of data analysis and pattern recognition**

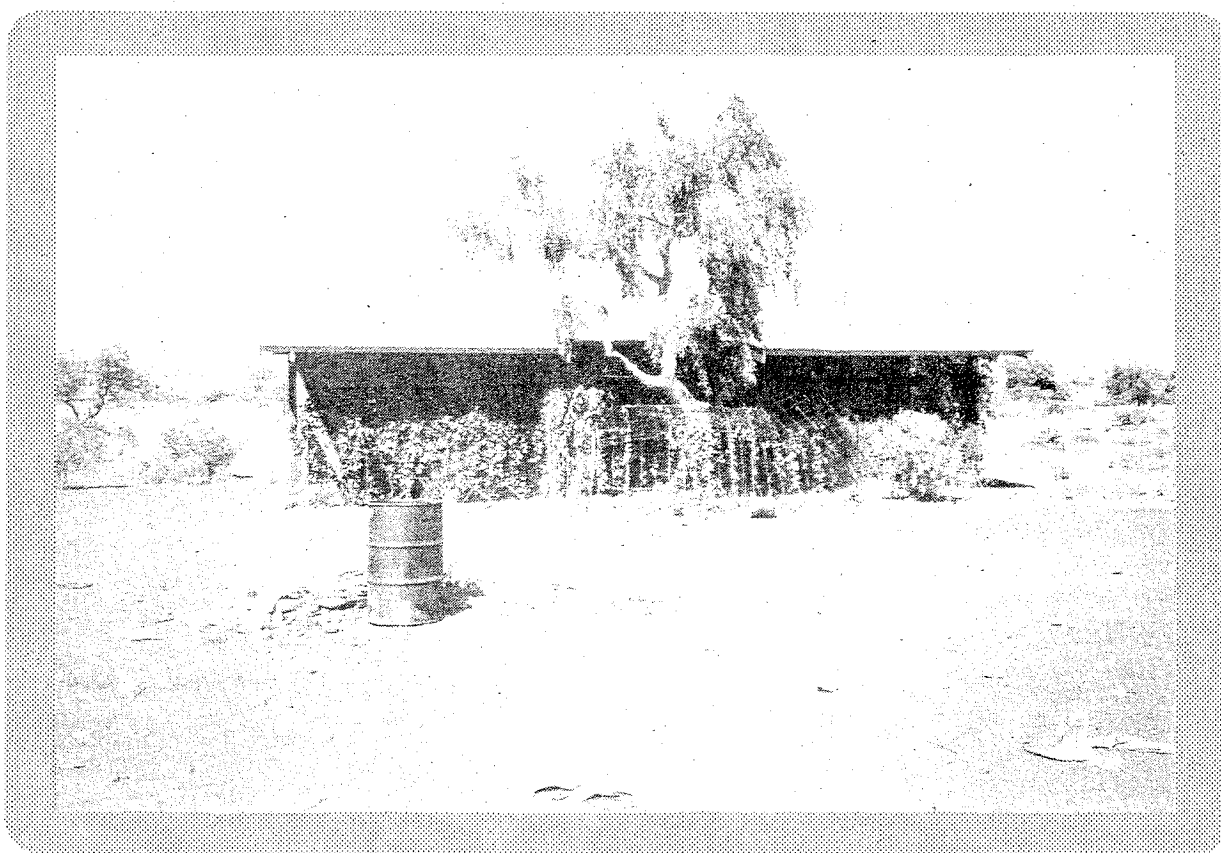
The data analysis process was guided by a systematic review of the information collected in each of the cells of the research matrix. Patterns of waste interactions were identified on the basis of how the information collected in one cell suggested possible links with the information collected in other cells.

The range of information collected is not claimed to be exhaustive, rather it represents a broad integrated exploration of waste management needs across community functions. It is hoped that the information compiled in this project provides a platform for further research and development in waste management for remote communities.



# CASE STUDY FINDINGS

## PART THREE



200 litre drums often become too heavy for people to use and empty effectively. Consequently, waste from the yard is often only raked to the base of the drum.

## 3 PART THREE - CASE STUDY FINDINGS

### 3.1 VALUES, ROLES, HABITS AND WASTE: CELLS 1A TO 1G

This section of the project investigated the lifestyles, values and expectations in remote Aboriginal communities as they relate to waste management. The focus was on how cultural factors could influence waste management strategies and technology design.

#### 3.1.1 Community lifestyles

There is a significant lack of reference literature available that focuses on the evolving relationship western desert Aboriginal culture has had with specific kinds of waste and the introduction of waste producing technologies and services. Consequently, the cultural or "human factors" have been largely ignored (even dismissed) when technologies and services have been introduced as solutions for the waste management problems faced by remote Aboriginal communities and outstations.

In general, the design and nature of most hardware and services introduced to Kintore have assumed the resources, lifestyles and values of mainstream suburbia. It is probably this lack of understanding about the "human factors" attached to the seemingly "non-human" hardware solutions introduced to remote Aboriginal communities that has produced much of the economic waste and social stress (Aboriginal and non-Aboriginal) evident in Kintore and other remote communities today.

The study found that certain types of waste can have a significant cultural value attributed to them and therefore must be disposed of in a particular way by a particular person: for example, clothing and weak or small pups. The significance of the values/hardware relationship has remained largely non-visible to government departments and often the ancillary staff servicing communities due to the intimate and selective nature of the relationship that exists with waste (and potential waste) in communities. This lack of awareness has in the past formed the basis of many inadequate judgements which recommend "conventional"<sup>1</sup> mainstream urban solutions for the "non-conventional" cross-cultural and remote environment of Aboriginal communities.

#### 3.1.2 Human resource burn-out

When conventional urban technology and training solutions are introduced to the cross-cultural environment of remote semi-traditional Aboriginal communities, they also introduce a set of implied values and expectations which are based on the lifestyles and resources of their origin. A consequence of these transferred solutions is often human resource burn-out by those whose values most closely assimilate the values and lifestyles of the cultural context of the solutions' origin.

If the mismatch of values between 'solution provider' and 'solution user' is significant it may manifest itself in several unwanted ways. Community staff expected to convey the values-shift of introduced solutions may find that their work load or extra-curricula expectations are higher than if they lived in the resource and cultural context of the solutions' origin. Inappropriate solutions may produce a high turnover or performance drop<sup>2</sup> in staff, increased cost of services, greater community dependence on external resource providers, decreased Aboriginal participation in the maintenance of solutions and a poor sense of continuity or stability in the cross-cultural relations of the community. Staff that aspire to the implied values of introduced hardware solutions become necessary ancillaries (and so a necessary added cost) to these solutions if they are to survive their new environment. Ancillary staff have become a necessity in communities not only for their technical skills, but also for their values. Hence, conventional waste management strategies can often produce dependency/welfare expectations which affect both the quality of life in the community and as well as the capacity for ancillary staff to meet increasing community demand for their services.

To illustrate the impact of burn-out in Kintore consider the council's current waste management system. The council operates up to two tractors and one hydraulically operated tipping trailer for its



waste collection functions. These tractors are also used to collect firewood. The design of the tractors and trailer require that they receive regular maintenance to ensure their continued operation. When a tractor tyre is punctured or regular maintenance is required the community is reliant on their Essential Services Officer (ESO) to perform these functions. However, the community also relies on the ESO to regularly maintain the power station, domestic and community water supply and a host of other technologies reliant on regular maintenance schedules, special tools and spare parts. In this environment the community has come to expect that the ESO solves not only their major problems but also many of their minor regular maintenance problems. When this happens, the ESO experiences a high day-to-day contact with people seeking solutions to a wide range of problems over most hours of the day. These experiences produce an equally high social stress environment which can quickly lead to burn-out.

The waste and wood collection functions of the council may be severely affected during these times. A lack of regular wood supply during winter or the accumulation of rubbish during warm and rainy periods may lead to environmental health concerns in the community. Meanwhile, the ESO may withdraw from relationships with others in the community or project negative attributions about people. These are typical reactions of someone experiencing burn-out particularly where there is no adequate access to a valued social support group (Gardner, G.I. et. al; 1981:p6). Hence, inappropriate waste management technologies and strategies can lead to a lose-lose situation for both community and government.

Kintore, therefore, operates at least two value systems and sets of expectations. It is a semi-traditional Aboriginal community. This suggests that both Aboriginal and non-Aboriginal people constantly seek workable combinations of the different values operating in the community. This situation has produced conflicting expectations between as well as within people in Kintore. The introduction of inappropriate waste management technologies and services can thus manifest frustration in the community because their design implies incompatible lifestyle adjustments for their operation and maintenance.

There is a need to design waste management technologies and strategies that are more compatible with Aboriginal community lifestyles and reduce the dependency/welfare factors leading to staff burn-out. There is also an urgent need to provide greater access to a social support group for the Aboriginal and non-Aboriginal ancillary staff in remote communities while there is a need for these people to be the agents to carry the value shift that accompanies new technology.

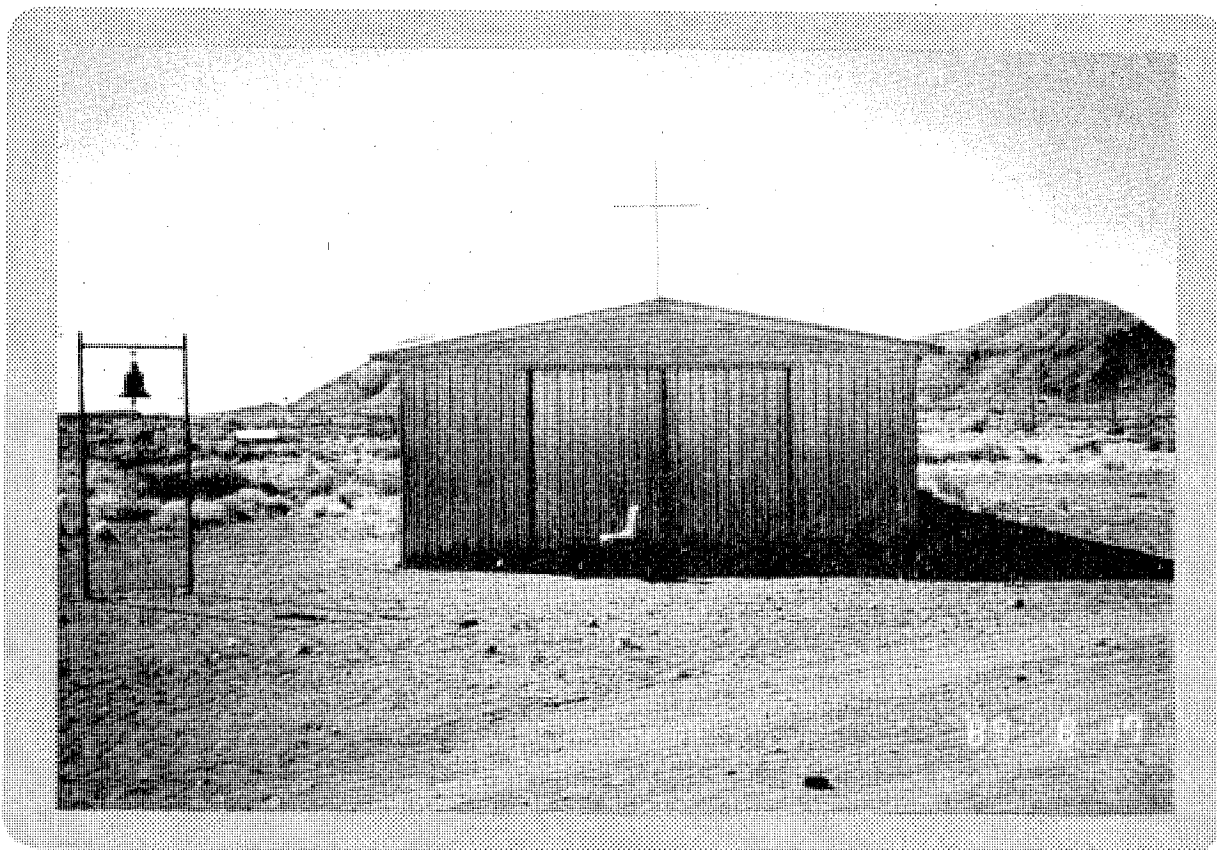
### 3.1.3 Aboriginal cleaning strategies and perceptions in remote communities

Contrary to general visual impressions, most families attempt to keep their living spaces relatively free of organic wastes. Ground surfaces where people gathered or sat were usually swept with branches or raked when appropriate hardware was available. Places of spiritual significance were also cleaned regularly and often fastidiously depending on the site. The humble metal clad church in Kintore, grave sites and certain water holes provide examples of the cleaning values associated with sites or structures that are important to the community.

Random observations over the past few years and during the waste project suggest that the area within and around the front of the church was usually cleared of waste and contrasted with areas outside other public structures such as the store, school and clinic. Although the spiritual aspect of the site is likely to be a significant factor in keeping sites such as the church clear of waste, other observations suggest that the store being closed on Sunday mornings may also be important: people were less likely to bring packaging to the church if the store was closed.

Though the arts and crafts shelter and yard in Kintore was observed to be reasonably free of waste, the cleaning responsibility for this area belonged to a non-Aboriginal resident in the community.

In other circumstances bush brooms made of branches were used to clear sitting areas. Cleaning routines were therefore most consistent in the out door living spaces around the fire places of "houses", temporary dwellings and places or structures of spiritual or survival significance.



The Kintore Church

### 3.1.4 Women and waste

Women in small remote Aboriginal communities are often expected to undertake a broad range of tasks in the domestic/family environment including enterprise activities. These roles and expectations have generally increased the involvement of women in the operation, maintenance and provision of various technologies. Child care, food supply and preparation, education and health care are just a few of the roles which have placed women in greater contact with waste management related functions.

This contact has increased the work burden on many women in developing communities and has also increased the number of problems they face and are expected to solve. Many of these problems are due to inappropriately designed waste management technologies. Disposable nappies block septic flush toilets; the materials, layout and design of shower corners, tap fittings and automated washing machines are often unserviceable, expensive or difficult to service quickly; and, 200 litre garbage drums are too heavy (for men and women) to manoeuvre easily while being grossly inefficient to use as an incinerator. Clearly, there is a significant need to broadly consult women in the design and development of appropriate waste management technologies and strategies in remote Aboriginal communities. There is also a significant need to improve womens involvement in the design and provision of waste management technologies.

### 3.1.5 The fire-place and waste

Fieldwork observations suggest that waste build up tends to occur at a point just beyond firelight security around the out door living spaces of dwellings. This is an important factor influencing waste management techniques and hardware designs in Kintore. An explanation for this may lie in the perceptions people have about darkness and safety. Beyond the security of the firelight are the uncertainties of both real and unreal creatures (particularly for children): snakes and “Mamu” (bad spirits) are examples.

While a deeper investigation into the relationship between waste management patterns and darkness was beyond the scope of this study there was sufficient evidence to suggest that waste management in the living space around fire places does have relevant design implications for domestic waste systems.

### 3.1.6 The anonymity and ownership of waste

The anonymity of waste blown into dwelling areas along with the decentralised family clan lifestyle of the community and the lack of personal easy-to-use hardware to deal with waste can produce sporadic patterns of waste management throughout the year. Technologies such as the existing tractor and trailer are difficult to manoeuvre near clusters of temporary camps where the anonymous waste has blown. This situation produces waste that is not easily or regularly collected by council workers. The waste is not identified with, or seen to be the responsibility of, the dwelling groups closest to the waste. The result is that wind blown waste from other camp areas has no known origin and therefore no known focus of responsibility attached to it.

There is also some evidence to suggest that seasons (i.e., the weather) and special community events dictate cleaning schedules for managing public waste in common community areas. There are expectations during the cold of winter to use the tractor and trailer for the collection of firewood rather than waste. In this context public waste is perceptively non-visible during the day-to-day priority activities of the community.

### 3.1.7 Use patterns of dwellings and waste

Television sets, fans, small electric cookers and video recorders which in most cases were privately organised and paid for were found to be fairly common facilities in dwellings with or near a power source. However, washing facilities, internal and external shelving, solid waste receptacles and tools, grey water drainage and perishable food storage devices (usually related to government grant expenditures) were lacking or inadequate in the sample of "houses" visited in Kintore. Though several of the dwellings visited had washing machines it was unlikely that many would remain functional beyond 12 months because of their increased usage pattern (ATWORK Report; 1988).

This inequitable proportion of waste management hardware to other types of hardware found in and around "houses" reflects both the apparent lifestyle priorities in the community as well as the low value given to waste disposal needs in and around the living spaces of remote Aboriginal community dwellings. These factors highlight:

- (1) a need to incorporate ancillary tools and hardware that support domestic waste management systems;
- (2) a need to treat the "house" design as a device that facilitates the management of domestic waste. There is little evidence to suggest that government funded housing designs for remote Aboriginal communities include the "house" as an integral part of a community waste management strategy.

### 3.1.8 Self-significance and controlling technology (qualitative criteria for designing appropriate health hardware)

One of the fundamental goals of appropriate, intermediate or development technology is to increase individual control over the hardware and general resources required to facilitate functions in the community. To assist this process hardware is usually designed about the lifestyle, skills, perceptions and resources of the community. They are also designed with as much community involvement as practicable so that the initial solution is an upgradable, internally maintainable and achievable step towards the desired goals of the community at any one time in the development process. Each step of development consolidates previous achievement and works towards developing more valued controls over the hardware individuals use for their day-to-day and season-to-season activities. The fact that this process has not been a predominant nor consistent feature of Kintore's

community development history is one reason why there is abundant evidence of a great gulf in the capacity for individuals to reconcile their lifestyle needs with the urban technologies that have been introduced (albeit paternally and in good faith) into their remote community environment.

New four wheel drive vehicles are rarely functional beyond 18 months. In less than 8 years 2 attempts to run a community garage for extending the life of community vehicles (a conventional urban solution) have not been sustainable and hence no longer exist. Similar examples of unsustainable technologies in Kintore include: "houses" and housing facilities; earth moving equipment; aqua-privy toilets; the storage of dwelling waste and potential health hardware resources such as pallets of pre-mixed concrete in bags; workshop tools; packaging from the store; electric washing machines; and trucks, trailers and backhoes. **Even if all these things were a sustainable maintenance expense for the government it is unlikely that individuals, or the community as a whole, would ever become technologically proficient (i.e., technate) and therefore self-determined or adequately self-reliant while development is pursued in this way.**

The people and values behind the hands maintaining the majority of domestic and community hardware are the real controllers of community management processes and therefore waste management programs in Kintore. Without appropriate technologies, skills and values for the hardware requirements (i.e., without the appropriate level of technacy) in the community all the well meaning literacy, numeracy, health promotion programs or community management training workshops are impotent.

When new technologies take away the control individuals have over old technologies used to facilitate their contribution to the community or family, individuals may experience a sense of loss to their perception of self-worth. Efforts to regain this sense of significance can often manifest in ways that don't always reveal the cause of the initial loss of worth experienced. For example, commandeering a vehicle or rendering a vehicle unserviceable can be a means to re-assert and demonstrate personal control and significance to peers and themselves - even if only for a short moment.

The achievement of self-significance is therefore fundamentally related to technologies which promote maximum valued involvement. In the first instance these technologies should be sustainable, upgradable and modifiable. All these qualities promote greater individual control over the hardware environment. Hence, all these qualities should be reflected in the design and implementation method of community and domestic waste management technologies introduced to Kintore. Ideally, new waste management technologies should be easy to use in terms of skills, energy efficient in terms of human effort, require no special tools to operate or adjust and reduce dependency on regular maintenance support from outside the community.

### 3.2 ENVIRONMENT, HEALTH AND WASTE: CELLS 2A TO 2G

This section of the project investigated the impact of waste on the environment and health of Kintore. The focus was on how waste/environment interactions could guide the development and implementation of appropriate waste management strategies and technologies in Kintore.

#### 3.2.1 General scale of environmental impact

During 1989/90 Kintore accumulated the following quantities of waste. The figures below represent a sample of the most visual and predominant waste items:

1. 70,000 Aluminium cans
2. 30,000 1.25 litre Petalite plastic bottles
3. 34,000 Check-out plastic shopping bags
4. 680 16kg flour drums
5. 137 Retread tyres (store purchases only)
6. 400 Tyre tubes (store purchases only)
7. 58 Plastic leaf rakes
8. 30 Vehicles (320 "Rubbish cars" were counted in the community)

### 3.2.2 Weather and waste

The weather patterns of remote communities play a significant role in the development of appropriate waste management technologies and strategies. The movement and deposition of air-borne waste, the design of health hardware, the breeding cycle and movement of vectors and animals, the demand for firewood, the return to sorry camps, the micro and macro environments of popular childrens' playing areas, the living domains of families and the seasonal pattern of daily work activity are all influenced in varying degrees by the weather.

Unfortunately, Kintore does not maintain a basic weather station. However, approximations of the Western desert region have been made based on readings from weather stations at Giles, Papunya and Yuendumu. More specific weather information, particularly in relation to local wind and flooding, was based on CAT's 9 year association with the Kintore community and feedback during field trips.

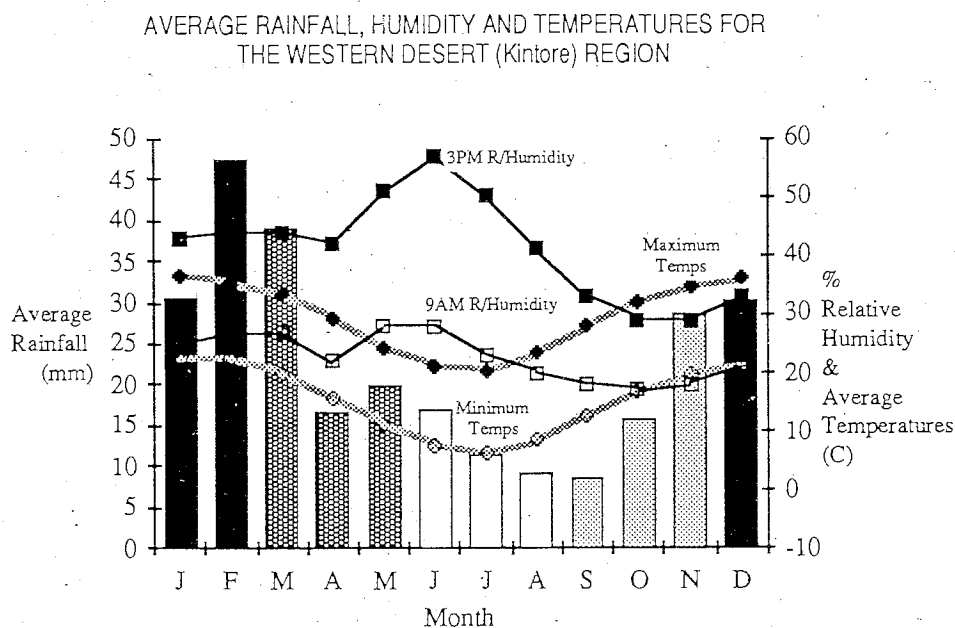


Diagram 3: Average rainfall and maximum/minimum temperatures for the Kintore region

Periods of heavy rainfall usually flood most sections of the community; particularly around its southern precincts. Much of this flooding is caused by run-off from the catchment areas of the Kintore ranges. It was noted that many of the block houses in the community did not have adequate surface drainage. Water from running taps would pool around the base of dwellings and in the event of rain would have little opportunity to escape.

Kintore operates a battery of open waste disposal trenches to its west. During periods of rain these trenches are often filled to depths which weeks later continue to attract children, dogs and other animals and insects. Community feedback suggests that the most noticeable animals and insects near the area include mice, rats and mosquitos. The trenches provided a wind protected haven for mosquito to breed as pools of water remain often for periods longer than 10 days: the time most mosquitos take to develop from the larvae stage into an adult mosquito. Initially positioned down wind of the community and designed to be back filled regularly, in certain weather conditions during the year the dump is dysfunctional. Northerly and Westerly winds and warm 22 C to 32 C average temperatures occur during the same times of the rainfall season. This situation provides a means for insects from the dump to be carried into the community area.

### 3.2.3 Wind and waste

In general terms Kintore is a windy place, subject to large dust storms and frequent willy-willies. This situation frustrates efforts to manage waste blown into domestic living spaces. In this environment efforts to clean the living spaces outside dwellings are punitive while the vast majority of waste in the public domain is not effectively controlled.

The predominant winds around Kintore are Easterlies with South Easterlies often occurring during March, April and May (standard Autumn).

Generally, most morning winds during the year are between 11 and 20 km/hr. Winds during September, October and November (standard Spring) gust a little stronger at 11 to 30 km/hr. Afternoon winds tend to be weaker often between 6 and 10 km/hr with winds blowing between dead calm and 10 km/hr during June, July and August (standard Winter).

During the months from March to August (standard Autumn and Winter) gales of over 41 km/hr are rare occurring only 2% to 3% of the time (about once a month). During the months from September to February (standard Spring and Summer) gales over 41 km/hr are more common occurring 6% to 8% of the time (up to about 3 times a month). Some of these gales are strong Westerlies (over 41 km/hr), though their occurrence is only 2% of the time (less than once a month during the windier seasons).

Geographically, Kintore is located between two mountains on its Eastern and South South Western sides with a small valley between the two mountains exposing the community to Southerly winds. These mountains can act as catalysts in the formation of large willy-willies when strong winds come from behind them (NE to SSWesterlies).

Essentially, the variable wind conditions suggest that the greater bulk of the solid lightweight waste in Kintore must first be disposed of in a single, short and possibly energy intensive project so that waste management programs for domestic living spaces are not undermined by disincentive amounts of anonymous waste blown into domestic areas. The variable winds continue to act as a disincentive to maintaining an on-going waste management strategy. The initial energy intensive project should be conducted during the low wind times of the year. The best chance for these conditions occur during afternoon hours especially through the months of Winter (June, July and August).

### 3.2.4 Health impact

The UPK environmental health report on the Pitjantjatjara lands notes that acute and chronic diarrhoea are related to inadequate waste removal. Removal of waste from the living area and the control of dogs and insects interacting with waste is likely to reduce prevalence of diarrhoeal disease, skin infections (scabies), chronic gut parasite infection, hepatitis and polio in children and adults.

The large amount of solid waste which lies around the general community domain of Kintore is immediately obvious to any visitor, particularly non-Aboriginal people who usually find it aesthetically displeasing. There are many reasons why the Kintore community should investigate ways of disposing this waste. It is important to realise, however, that the bulk of the solid waste does not have a direct impact on health. Many of the health problems of Kintore can be attributed to poor environmental hygiene, but it is not so much the rubbish which is responsible - it is inadequate water for personal hygiene, inadequate facilities for disposal of excreta, and crowded conditions in the home which result in diseases such as diarrhoea, respiratory infections, skin infections, eye and ear infections, rheumatic fever, meningitis, and hepatitis (see notes by Dr Scrimgeour in Appendix).

In the investigation of waste management at Kintore, the researchers defined waste in its broadest sense, to include faecal matter, organic waste, waste water, and solid waste. The impact of waste on health is categorised as follows:

- **Faecal Matter**

Inadequate or inappropriately used facilities for disposal of human excreta are a distinct health hazard, resulting in the transmission of organisms causing diarrhoeal disease, intestinal

parasitic infestation, and hepatitis A. Disposal of human excreta generally requires functional toilets and facilities for the removal of "disposable" nappies.

When offered a choice between pit toilets and flush toilets, most Kintore people opt for flush toilets. This is seen to be the most desirable option because people know that most non-Aboriginal people have flush toilets, they are considered more up-market, and pit toilets sometimes can have a mild odour in the close vicinity. Flush toilets are prone to breakdown and to date Kintore has not had the resources to immediately effect major repairs. During the teams visits to Kintore nearly all flush toilets were blocked and thus represented a health hazard. Pit toilets have other advantages - they do not depend on a functional water supply, and they can be used for the disposal of disposable nappies.

Although there was not a great amount of dog faeces noticeable, this also represents a potential health hazard, particularly in the transmission of *Campylobacter*, a diarrhoea-causing organism. A community-controlled program aimed at controlling the number of dogs should help alleviate this problem.

- **Waste Water**

Inadequate or blocked drainage from taps and water supply points results in water lying around in contaminated pools. These are attractive to toddlers and dogs, particularly in the summer months.

Tap outlets are generally fixed to the side of the house. This arrangement means waste water pools in the sitting and playing areas at the side of the house! A greater number of taps appropriately arranged in the yard would help improve the quality of the domestic space.

- **Organic Waste**

Organic waste is not a large problem because dogs tend to act as scavengers and quickly remove any discarded organic matter (or at least convert it into dog excreta). When organic waste accumulates, it is a potential breeding ground for flies, which can contribute to diarrhoeal disease and trachoma.

- **Solid Waste**

Solid waste, which as already stated is the most obvious waste problem from an aesthetic and an ecological point of view, does not represent a great health hazard. While there is always the possibility of trauma resulting from sharp metal or glass, this does not appear to occur often. Disposable nappies could be considered a solid waste problem, but the health hazard is due to the faeces and has been considered above. A potential hazard is represented by used needles from the clinic, but these appear to be adequately disposed of. Spare tyres, containers and other objects capable of retaining water allow breeding of mosquitoes, with the potential for mosquito-borne diseases such as Ross River Fever.

### 3.3 TECHNOLOGY DESIGN AND WASTE: CELLS 3A TO 3G

This section of the project investigated waste interactions where they are affected by inadequate and inappropriate technologies. The focus was to develop design criteria that would lead to improved technology designs to assist the community's waste management functions.

#### 3.3.1 Dwelling area receptacles and tools for waste management

Field observations suggest that only a small proportion of dwelling waste found its way to the trenches of the community dump. Generally, the majority of waste formed well compacted shallow mounds within throwing distance of each dwelling domain. Despite this, temporary dwellings did not have adequate access to a waste management system. Restricted vehicular access to clusters of temporary dwellings limited the effectiveness of the community's tractor and trailer used for collecting waste. The conventional tractor and trailer solution conflicts with the social and sheltered spaces of temporary dwelling domains.

- **The 200 litre drum**

Kintore and many other remote communities use old 200 litre drums as the principle waste storage hardware between the domestic living space and the Kintore council's removal function. The mounds of rubbish and topsoil or sand which result from raking are transferred to the 200 litre drum or left positioned around the perimeter of the living space. Objectionable material is often removed before the raking process and placed in the 200 litre drum which generally does not have a lid and is easily ransacked by the camp dogs or knocked over by children. The 200 litre drum is difficult to lift or re-position in the living space. On occasions drums are burned out or used as incinerators. This leaves a fine ash deposit which settles to the bottom of the drum and becomes quite heavy if mixed with rain water. The weight of the container (often over 70 kg) is also greater than it would be with urban rubbish because of the high soil content of the material raked up and placed in the drum. Trailers used by councils to collect rubbish are in general far too high to lift and tip 200 litre containers, consequently there is a large disincentive to collect rubbish.

- **Plastic rakes and waste**

During the financial year 1988/89 the Kintore store purchased 58 plastic leaf rakes at a cost of \$3.70 each. Designed for raking leaves and lawn cuttings, the rakes were assessed as most inadequate for collecting the type of waste usually raked together in the yards of dwellings in Kintore. A technical criteria for domestic waste management tools or devices is that they effectively aid in the disposal of packaging material such as aluminium drink cans, plastic bags, cardboard boxes, clothing and parts of small electrical appliances. The device must also be capable of removing these items even when they are partially buried and wet.

- **Community dumps and trailers**

The most common method of treating solid waste in remote communities is the trench and fill method. In general a series of trenches 20 metres long, 3 metres deep, 3 metres wide and separated by 20 metres are dug by a bulldozer. The dozer driver is generally a contractor who is not involved in the regular collection of rubbish. Rubbish trailers or trucks are reversed into the pit to dump rubbish. Rubbish should be back-filled regularly, however, most communities do not have a bull dozer or other appliance to achieve this.

Another weakness of this option is an aversion of Aboriginal people to reversing vehicles. The openness of many remote communities requires minimal use of reverse gear. Add to this the often poor mechanical condition of fittings including poor brakes and the absence of mirrors on tractors and it is easy to understand why the trenches are not used as designed. It is not desirable under these conditions to back into or up to a trench. In many situations the distance between trenches precludes turning and backing up. There are a number of examples of rubbish trailers falling into the pits when reversed up to them.

The majority of available trailers and tip trucks have rear tipping actions and are not satisfactory in this application. Under these circumstances even when rubbish is collected in the town it often does not find its way into the trench.

A range of lightweight collection appliances and side tip trailers may provide greater incentive to effect the lifestyle changes necessary to maintain new waste management strategies.

- **Rubbish, fence lines and natural flora**

Whilst in most circumstances we are implored to pick up rubbish, there are examples in remote communities which suggest, that with some assistance from introduced hardware, it is better to leave some waste on the ground.

One of the most significant waste control techniques which can be employed to take care of the light visual waste is the selective placement of mesh fences (see also the paper on Flora and Waste Management in the appendix of this report). Fence lines in remote communities often show signs of dune formation and the main initiator of this soil trapping capability is the build up of wind blown rubbish. After the initial deposition of soil/rubbish a small rain will trigger



the germination of wind blown seeds. This growth stabilises the soil and further increases the ability to trap soil and rubbish thus increasing the rate of deposition. As the depth of the dune increases so does the ability of the topsoil to retain water for longer periods of time allowing the establishment of other shrubs and bushes.

If fences are positioned so they follow the contours of the land without spanning too great a distance it is possible to establish numerous small water traps that enable larger trees to develop. The end result is an effective wind break that needs absolutely no maintenance and continues to trap and slow surface run-off and wind-blown soil and rubbish. Also, if fences around living spaces are arranged to allow many access points for pedestrian traffic but restrict vehicular access the whole amenity of the living space is improved. This definition of the living space by a fence also establishes a clear demarcation of responsibilities for rubbish collection between individuals and Council.

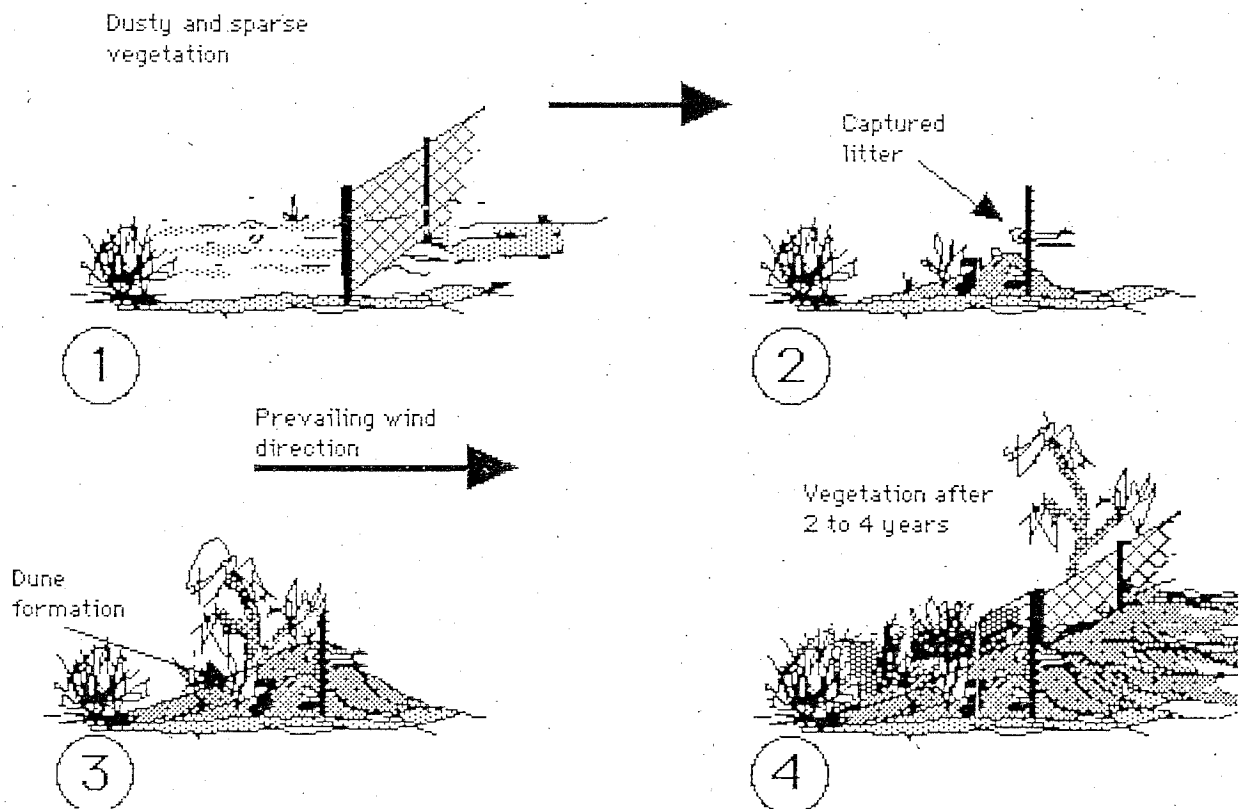


Diagram 4: Schematic of plant regeneration due to the interaction of wind, litter and mesh fences

It is important to ensure that the arrangement and configuration of fences concur with the lifestyle patterns of the community. It may well be that merely fencing off quarter acre blocks may not enhance either waste management strategies or community use of space.

#### • Housing and transport programs

The Kintore community recently undertook to improve their housing and transport technologies. The "Housing and Transport" community development project commenced in 1990 and includes in its list of objectives the design, development and installation of technologies which relate to waste management and environmental health. Existing block houses and yard areas have been modified to include wind protection and improved water drainage.

A new bin design has been introduced by CAT and is being monitored. Its design is aimed at overcoming the current problems of waste separation, weight and manoeuvrability. The new bin design has successfully stimulated waste separation practices since its installation in

October 1990. Only aluminium cans are placed in the new bin. This feedback suggests the new bin has not only been accepted in the cultural context of the community but that it has in a short period of approximately 2-3 months provided a means for improved waste management practices. The community council has expressed interest to CAT for more of the new bin designs.

### 3.4 EDUCATION, TRAINING AND WASTE: CELLS 4A TO 4G

This section of the project investigated the education and training requirements for the effective implementation of waste management practices across the community.

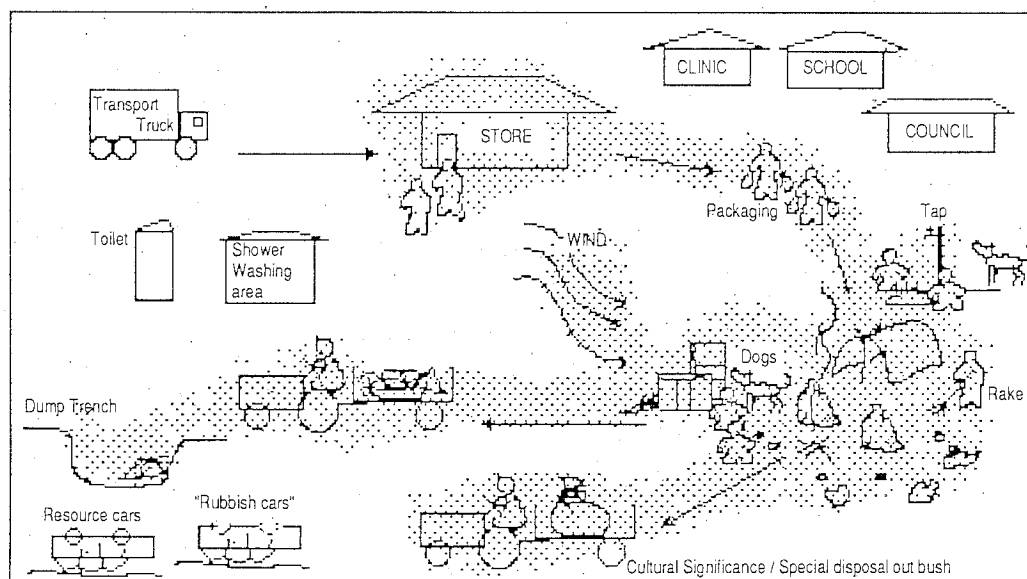


Diagram 5: The Rubbish Story (from the AEDP Technology Workshop at CAT, 1989)

In short, the level of technacy in Kintore is low and/or inadequate to cope with the rate of change occurring in the community. The evidence suggests that people have limited access to hardware resources. People are unable to access adequate maintenance networks and produce or maintain most hardware and structures in the community: particularly those that impact on the environment and health of the community and therefore the production and control of waste.

#### 3.4.1 Education and the Aboriginal Employment Development Program (AEDP) technology workshop on waste

During a technology workshop for remote Aboriginal communities and outstation groups conducted by the CAT, Aboriginal participants were asked to develop and draw their story of why and how rubbish and waste generally accumulates in the community. Their combined story is shown as the grey area in diagram (5). It is significant to note that the initial perception of the origin of waste did not include the health clinic, school, council office, derelict cars in the community, grey water from the shower and washing areas, toilets and ultimately the transport truck bringing goods in from Alice Springs. This limited perception or avoidance of the sources of waste can restrict the effectiveness of waste management strategies in communities. These perceptions can produce inadequate judgements and so inadequate waste management strategies.

The study recommends that public awareness programs that highlight the many types of waste and their sources would improve the capacity of community councils and family groups to develop more comprehensive and informed waste management practices provided that they coincide with hardware that is affordable, accessible and manageable by all.

• Description of the Waste Management Education Strand being developed for the ATWORK program in TAFE - (A National Co-operative Curriculum Project of the Australian Conference of TAFE Directors.)

All people produce waste. All living and man made things represent potential waste material. In the family environment, waste material may be organic, liquid, material or toxic. In the general community environment waste may be produced by the health clinic or by people gathering at cultural events. The store produces waste as well as the local workshop, power house, school, clinic, toilets, showers, clothes washing areas and council office. Even animals produce waste. All structures are potentially waste materials if permanently abandoned and resources such as vehicles, when all the parts are exploited, also become a source of waste and a potential health problem.

When people gather to live in a larger community the accumulation rate of waste increases dramatically and can be seen to be produced across all individual, family and community functions. Some of this waste can be re-used or re-cycled and some need special disposal for technical or cultural reasons. When waste accumulates too rapidly and people do not compensate their behaviour, health problems often develop and resources such as houses and yards dramatically reduce in their health value. It becomes important to not only identify waste management problems but also to control and manipulate the waste or where possible to prevent it from entering the family and community environment.

The Waste Management strand is concerned with:

1. Practical problem solving and the choice of hardware, fixtures and amenities for effectively managing a variety of waste material and liquid;
2. Waste management values and community lifestyle that influence the production, prevention and control of waste;
3. Energy, natural environment and waste management;
4. Traditional, contemporary and future waste management needs and hardware;
5. Health hazards; work safety and waste materials and liquids;
6. Options in materials, tools and methods useful for preventing or managing waste effectively; and,
7. The repair, purchase and replacement skills useful for maintaining or improving waste management technologies.

The fieldwork studies conducted in Kintore stimulated preliminary discussions initiated by the Kintore "School Action Committee" (SAC)<sup>3</sup>. The SAC suggested that healthy playing themes for children implemented across the curriculum could provide a basis for a general education in waste management. The SAC also suggested that these themes should introduce skills and awareness in traditional and contemporary technologies to provide a basis for children to learn how they can improve the quality of their physical environment.

### 3.5 COUNCIL ADMINISTRATION PROGRAMS AND WASTE: CELLS 5A TO 5G

Unlike urban expectations of the functions of a community council, field observations suggest that the people of Kintore perceive the role of their council as a forum for information dissemination rather than a hierarchical framework for executive decisions to be made and enforced on behalf of the broader community. The latter can be described as essentially an urban ideal that has evolved through the increasing need to manage a large cash economy in a larger population community where consensus style management has become impracticable. The small and remote community lifestyle is also reflected in the manner in which living spaces (and therefore waste accumulation areas) are demographically organised into skin and visitor groups.

The different perceptions of the functions of the council are an example of conflicting lifestyle expectations between small remote and larger urban communities. They are also examples of the internal conflict of expectations experienced by individuals (including community administrators) who participate in council forums. This situation can produce significant limitations, delays, inconsistencies and frustration in conventional waste management strategies. These are symptoms

of inappropriate waste management practices and should signal the need for change to waste management planners, service deliverers and the general community.

An appropriate change in waste management structures in Kintore and other remote communities may depend on the level of awareness and skills of individuals and the general community with respect to waste management technology and lifestyle options. To a large extent the choice of waste management technology determines the skills and lifestyle required to maintain effective waste management practices. The value and effectiveness of short and long term waste management strategies in Kintore will also depend to a significant extent on the appropriateness of the choice and design of technology and technical skill resources introduced to or created within the community. The effectiveness of waste management technologies in Kintore will be influenced by the degree they integrate with technologies at the source and/or nearest node that is best equipped to reduce much of the waste before it enters the community.

In the general case of central desert communities it is suggested that an improved waste management strategy would begin with the establishment and/or refurbishment of a "one stop re-packaging and pre-processing waste management centre" in Alice Springs. The one stop waste centre could provide an enterprise training and employment base for Aboriginal communities. The schematic in diagram (4) outlines the role of the one-stop waste management centre and enterprise.

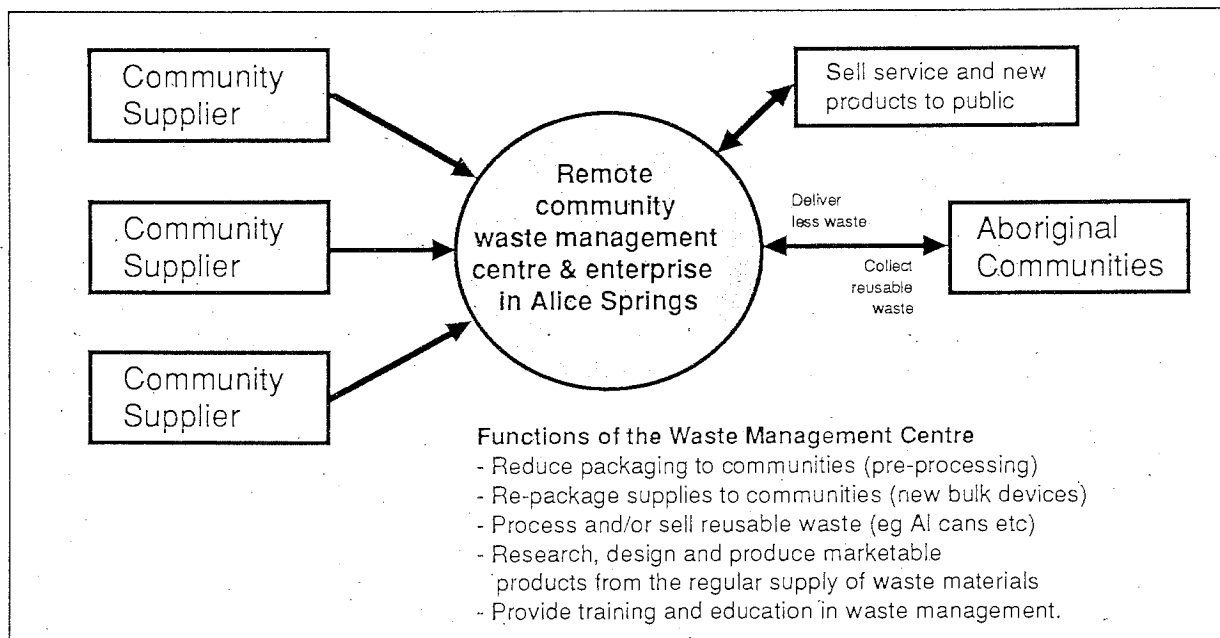


Diagram 6: Schematic showing the role of the 'one stop' Aboriginal communities waste management enterprise and training centre proposed for Alice Springs

## FOOTNOTES

<sup>1</sup>The term "non-conventional" refers to the logistic difficulties of living in a remote community as well as the lifestyle expectations of this environment.

<sup>2</sup>Performance drop may also include the adoption of crisis management techniques. When too many and/or chronic demands are made on staff, opportunities for planning can dramatically decrease. Certain duties and activities are prioritised at the expense of others. During such moments the desire to be "professional" and be seen to perform across all activities and duties conflicts with the lifestyle realities of the community. Staff may respond to this by adjusting their perception of work and goals in ways which visitors may not understand or see as adequate. It is possible for a compounding cycle of conflicting expectations to develop during these times both within Aboriginal and non-Aboriginal people in the community. To add unsustainable or work intensive waste management expectations in this environment suggests that the waste management strategy was ill-conceived. Consequently, one would expect staff performance to drop if unsustainable waste management strategies are implemented.

<sup>3</sup> The Kintore School Action Committee (SAC) is comprised of Aboriginal Remote Area Teacher Education trainees. On two occasions during the initial fieldwork phase of the waste project, the principal field officer to the project was invited to discuss and "brain-storm" waste management education ideas with the SAC in late 1989. "Healthy Playing Themes" and a basic education in traditional and contemporary technology emerged as the two main initiatives considered relevant by the SAC at the end of the discussions and brain-storming sessions.



# SUMMARY AND MAJOR FINDINGS

## PART FOUR



The Kintore Council waste management crew and equipment. Waste and heavy 200 litre drums have to be lifted from the trailer and thrown to the side into the trench. The trailer design is unnecessarily labour and capital intensive and was assessed as inadequate for meeting the Council's waste management needs.

## 4 PART FOUR - SUMMARY AND MAJOR FINDINGS: CELLS 1F TO 5F

### 4.1 SUMMARY OF KEY ISSUES

Part one of the report sought to find answers to the question;

“To what extent are existent waste management problems and practices in remote Aboriginal communities unique to these communities ?”

#### 4.1.1 Answers to the question of uniqueness

There is evidence to suggest that the logistic problems of waste management in remote Aboriginal communities are not endemic to these communities and therefore cannot be generalised as an “Aboriginal problem”. However, the remote semi-traditional lifestyle and physical environment of Aboriginal communities are factors which can significantly limit the effectiveness of existing and proposed waste management practices and technologies.

Waste management issues and problems in remote Aboriginal communities are generally not well understood by both non-Aboriginal and Aboriginal Australians. This is due to a number of non-technical as well as technical factors. There is for example, a significant lack of research and development material available or underway which examines the assumptions of mainstream waste management ideologies, cross-cultural waste management and appropriate technology design issues.

Two factors emerged as fundamental for improving the practice and understanding of waste management in remote communities;

- i) Sustainable waste management requires peer support based on informed judgements for communities and individuals to adopt appropriate value-shifts in lifestyle.
- ii) Sustainable waste management strategies require innovative technologies which are themselves sustainable.

### 4.2 SUMMARY OF RESEARCH FRAMEWORK

An integrated research framework was developed for the Kintore case study. The framework linked settlement functions with five specific factors that influence the appropriateness of waste management practices.

#### Settlement Functions (activities)

1. Transportation networks
2. Water networks
3. Communication networks
4. Domestic shelter and space activities
5. Community shelter and space activities
6. Waste management activities
7. Enterprise activities

#### Waste Management Factors

1. Values, roles and lifestyle factors
2. Environment and health factors
3. Technology design factors
4. Education and training factors
5. Council administration and program factors



## 4.3 CASE STUDY FINDINGS

### 4.3.1 Community values, roles and lifestyle factors

It was found that:

- (i) **Technologies and training programs are value-laden.**

New technologies often introduce new lifestyle and behavioural expectations. These new expectations are often significantly at odds with existing ones. Technologies and training programs which introduce these conflicting expectations generally rely on external maintenance providers and supervisors whose values and expectations least conflict with those implied in the design of the new technology or training program. This reliance means that the introduced technology has failed to transfer successfully to its' new socio-settlement context. The Kintore waste collection trailer, dump, domestic bins and flush toilets are examples of technologies which have failed to transfer their full potential successfully.

- (ii) **Staff burn-out affects the value of community waste management programs.**

Inappropriate waste management technologies place unnecessary pressures on the community staff expected to carry the values and behavioural changes that accompany introduced technologies. This is compounded by the lack of quality support groups or mechanisms readily available for community staff such as the essential services officer, teachers, nurses and the adviser/administrator.

- (iii) **Some waste materials have significant cultural value at different times and require special disposal methods.**

Some waste material is culturally significant such as clothing and personal possessions. If these items are associated with the death of their owner, culturally appropriate methods of their disposal are expected and practiced.

Dogs and particularly pups which are weak, sick or demand food and care beyond the capacity of the owner, are disposed of in culturally acceptable ways (see cover photograph and notes to this report).

- (iv) **Women play a more significant role in waste management practice than men.**

Women are in constant contact with organic, liquid and solid waste. This contact relates to the expectations of their role in the community environment. Despite this, women are rarely involved in waste management negotiations, technology choice, design or installation.

### 4.3.2 Community environment and health factors

It was found that:

- (i) **Most of the visual waste in the community is dispersed via the community store.**

While packaging material from the Kintore store represented the majority of the visual waste in the community the school and clinic also produced significant amounts of waste. The paper waste produced by the school is sufficiently regular in volume to warrant its use in a recycling program. The waste produced by the clinic extended beyond used needles and bandages to include washing detergent cartons. The clinic does not operate an effective incinerator. Burning of medical waste is often done in 200 litre drums.

- (ii) **Climate and weather can significantly influence both the timing and effectiveness of waste management projects. This factor is not adequately incorporated in the current council service at Kintore.**

- (iii) **Water pooling from inappropriately designed and located taps present a potential health hazard.**

Wet areas such as bathrooms are inadequately lit. The floors and walls of these wet areas are also inadequately sealed in most houses.

- (iv) **The potential for trauma from solid waste is minimal in Kintore.**

However, during periods of warm wet weather micro-environments created by excessive litter provide a haven for vectors and bacteria to breed.

- (v) **Flush toilets in Kintore are a potential health hazard.**

The majority of flush toilets in Kintore were blocked during the fieldwork phase of this project.

- (vi) **Environmental health and education programs .**

See "4.3.4 Community education and training factors" this report.

### 4.3.3 Community technology and design factors

It was found that:

- (i) **The design and choice of current technologies for managing domestic and community waste in Kintore is highly inadequate.**

200 litre drums are too heavy for council workers to manoeuvre. Though used to burn rubbish the drums do not function effectively as domestic incinerators. The drums do not integrate well with the council pick-up system and do not encourage waste separation practices.

The council waste trailer is too high. The rear tipping action does not integrate well with the lifestyle, skills and trench-dump design at Kintore. The trailer's rear tipping hydraulic action was not operational before, during and since the fieldwork phase of this project.

The council crew do not usually allow the tyres of the tractor and trailer to come long side of the dump trenches closer than a distance of 1500mm. From this position waste is pushed or thrown over the side of the trailer into the trenches. If the waste is heavy or awkward to move it may be pushed off the back edge of the trailer and at a latter date pushed into the trench. The size and design of the trailer precludes it from being towed by conventional vehicles such as sedans or utilities. During times when the tractor is unserviceable waste is not able to be collected.

- (ii) **The personal hardware available at the store is generally inadequate for managing domestic waste.**

For example, plastic leaf rakes sold by the community store did not work well as devices for organising heavy and sand ridden litter which represents a significant proportion of domestic waste.

- (iii) **Mesh fence lines show signs of dune and native flora formation.**

The dune formation process is facilitated by wind and the accumulation of light solid waste against mesh fence lines. This phenomenon could be used to assist waste management in the community.

#### 4.3.4 Community education and training factors

It was found that,

- (i) **Kintore and other Aboriginal communities are developing a general raised awareness of waste management issues.**

However, awareness and understanding of specific waste management technologies and sources of waste is less evident. The relative lack of awareness about specific technologies and sources of waste has placed limits on the options known to individuals for initiating personal waste management practices. These limits affect the quality of judgements made by individuals about appropriate solutions for waste management problems.

- (ii) **The general level of technacy in the community is low.**

A low level of technacy limits the capacity of individuals to choose and/or utilise waste management hardware effectively. Without a significant improvement in the general level of technacy health promotion and education programs are largely impotent. While technacy is not integrated in health promotion programs the quality of the message presented may not be adequate. Judgements made about improving health are dependent on technologies which are appropriate to the cultural and settlement context of the end user. Hence, practical technacy skills and technacy concepts need to be integrated in all waste management and health promotion programs.

- (iii) **The school action committee was motivated, during the fieldwork phase of the current project, to introduce educational activities which enhance student awareness as well as practical skills in technology and environmental health.**

There is no core curriculum in Aboriginal and non-Aboriginal schools in technacy.

#### 4.3.5 Community administration and program factors

It was found that,

- (i) **The Kintore community council is perceived as a forum for information dissemination rather than a hierarchical framework which may enforce, represent or manage executive decisions made for the community.**

The current waste management service at Kintore works through a council workforce. The workforce is expected to run regularly: both in terms of the technical need to collect waste and cover the trenches and in terms of the work ethic expected by the Office of Local Government and the Department of Transport and Works who provide financial support for the council's waste management functions.

However, the community council is not perceived to be an enforcer nor manager of its' function to regularly maintain a waste collection service: including the equipment used by the service. It is often the administrator who is expected to absorb the values-shift and supervisory duties of the council's waste management work force.

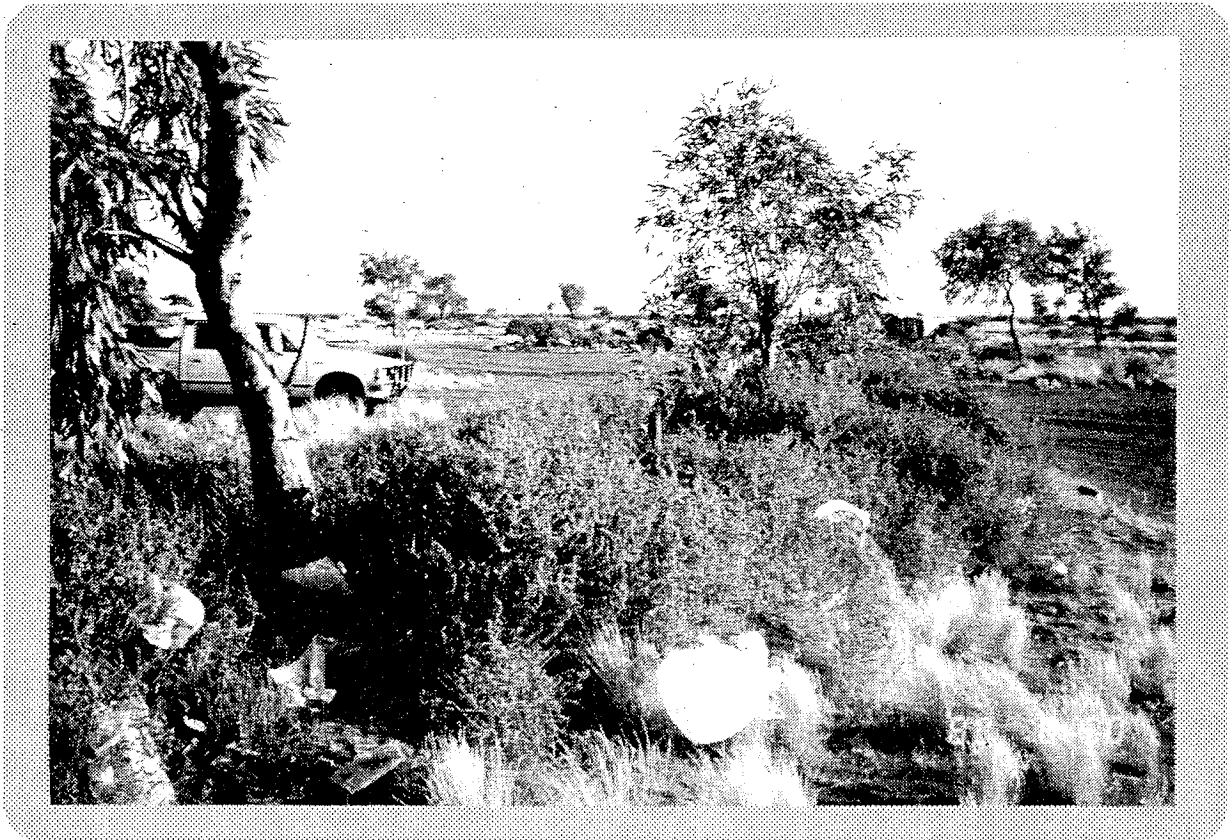
- (ii) **There does not exist a waste management facility in Alice Springs for remote Aboriginal communities. Similar facilities/strategies do exist for remote Australian Antarctic bases. Their main function is to reduce the logistic/environment problems of managing waste before they manifest themselves in Antarctic bases.**

A waste management facility for central Australian Aboriginal communities located in Alice Springs would significantly reduce the volume of waste to be managed in these communities. The reduced waste would provide a means for communities to re-assert controls over their waste management functions and its' affect on the quality of Aboriginal life and lifestyle goals in these communities.



# CONCLUSIONS AND RECOMMENDATIONS

## PART FIVE



Evidence of plant regeneration due to the combined effect of wind, litter and sand against a section of meshed fencing.

## 5 PART FIVE - CONCLUSIONS AND RECOMMENDATIONS

The management of waste in remote Aboriginal communities is influenced by specific settlement, technological and cultural factors. These factors constantly interact and are interdependent. An appropriate and effective cross-cultural waste management strategy integrates these factors in tangible ways.

The management of waste in remote Aboriginal communities presents logistic parameters similar to those of non-Aboriginal remote communities. However, Aboriginal communities contend with the additional parameters of cross-cultural technacy and related issues. The waste management technologies and systems currently operating in most central Australian Aboriginal communities are inappropriate and often ineffectual when assessed against the logistic and cross-cultural technacy parameters described in the report. Logistically, the store, school and clinic produce more waste than most remote communities are enabled to manage. Technately, the design of technologies introduced to communities have in many cases significantly altered traditional Aboriginal culture while simultaneously placing pressure on these communities to adopt mainstream Australian ideals and lifestyle norms for managing waste. The "old traditional ways" have been under pressure to change to the "new ways" of the mainstream. The questions are whether following the mainstream has always been preferable and have communities been appropriately and adequately empowered to make informed judgements about choices of their technological ideals?

The report advanced the case that all technologies are value laden. It was suggested that the majority of technologies transferred to remote communities carried with them an expectation to replicate mainstream Australian culture and solutions to waste management problems. Many of these solutions, practices and technologies have also, for many years, been regarded as suspect for non-Aboriginal urban and rural communities. Consequently, the majority of waste management technologies and training programs transferred to Aboriginal communities continue to perpetuate assimilation expectations. The catalyst for this assimilation process is technology design. These designs are usually based on mainstream standard practices, resources, lifestyles and ideals.

Many Aboriginal communities have been led/channelled into a difficult situation of having to contend with introduced technologies as well as the mismatch of lifestyle expectations which these technologies have imposed. The cost of wanting the same technologies as used in mainstream Australian society is often a change of cultural values and increased pressure to live by the social and economic demands of a cash economy: the economy from which these technologies have emerged.

The cost of wanting to maintain "Aboriginal ways" while operating existent technologies in communities is often that the choice, management and maintenance controls are either held by non-Aboriginal people in the community or region or by external maintenance providers. A "more of the same" or "two ways" approach to community technology, education and training has often ensured that non-Aboriginal community residents and external providers continue to be the major beneficiaries of Aboriginal affairs and community development funding. While these approaches persevere the quality of life and cultural values and practices in Aboriginal communities are at risk. They may undergo changes which place communities at an even greater quality of life disadvantage than before. The values change imposed by the transfer of inappropriate technologies may be perceived by many communities and individuals as a deterioration of "traditional culture". The same change of values may also be perceived as an enhancement or new phase of Aboriginal cultural development: that is, a new phase of 'cultural evolution'. Thus, the method of achieving an enhanced quality of life does not necessary mean following and using the same technologies and practices as mainstream Australia.

A major difficulty of breaking the abovementioned "technology norms/quality of life and culture" paradox is that a change in one aspect of waste technology may only produce significant improvements to the management of waste if changes are also made to the entire waste management chain. For example, potential waste may need to be reduced with appropriate technologies before it enters the community. Appropriate waste technologies may need to be installed in all waste dispersal nodes within communities. Design changes may need to be negotiated and introduced to domestic

dwellings and their outdoor spaces. Personal waste management technology, education and training options may need to be re-designed to ensure maximum integration with the service and equipment used by the community council. The community council service and equipment may need to be re-designed to integrate with the skills of its' operators and so on.

Another difficulty of breaking the above paradox is that the decision processes involved in technology choice and design are influenced by the limits imposed by known options, practical skills and self-confidence. The paradox in this instance is that there have not existed and do not as yet exist educational programs in cross-cultural technacy offered in either mainstream or remote Aboriginal education programs: particularly for the formative years of learning and personal development. For these reasons the Aboriginal Technical Worker program noted in this report has been proposed to provide an appropriate course option in the education and training of cross-cultural technacy for the adult Aboriginal education sector of remote communities.

The report identified tangible links with domestic and community functions and activities, lifestyles and expectations and waste management technologies and nodes of waste dispersal. Waste management technologies and strategies link interdependently with the potential waste delivered from Alice Springs (the major inter-settlement node for waste dispersal) and from the store, school, workshop, building projects and clinic (the major intra-settlement nodes for waste dispersal). While domestic and community shelters and spaces were not assessed in this report to be significant waste dispersal nodes, their design and facilities were assessed as either inadequate, inappropriate or in some cases non-existent.

The report concludes that the waste management situation in remote Aboriginal communities is highly inadequate and would benefit from a new approach if significant improvements in self-determination and general quality of Aboriginal life and lifestyles are desired. Two general and interdependent waste management strategies are listed below. They represent an integrated waste management philosophy.

## 5.1 LIST OF STRATEGIES AND RECOMMENDATIONS

### 5.1.1 Strategy (1)

#### **Establish a waste management centre in Alice Springs for Aboriginal communities in central Australia.**

The waste centre will collect excess packaging and potential waste materials and liquids from all Aboriginal community suppliers prior to their delivery to communities: including potential waste sent to and collected from the community school, store, clinic, workshop and projects. Waste will also be regularly collected from all participating communities. In some cases new reusable bulk devices may need to be designed and developed to assist the reduction of packaging materials sent to communities.

#### • Recommendations

It is recommended that;

- 1.0 The primary functions and activities of the Aboriginal communities waste management centre will be to;
  - .1 reduce packaging sent to communities;
  - .2 repackage supplies sent to communities;
  - .3 collect excess waste from all participating communities;
  - .4 process and sell re-usable waste and waste by-products to communities and the general public;
  - .5 research, design and manufacture marketable products from the regular supply of waste collected; and,
  - .6 provide and promote employment, education and training in cross-cultural waste

management technacy.

### 5.1.2 Strategy (2)

**Design and negotiate with communities the development of appropriate waste management technology, education and training strategies within the community, skin group (domestic) and personal hardware context.**

This strategy may require the phasing out or modification of existing waste management technologies and practices. It will generally include the introduction of new and appropriate technologies and practices for personal usage and domestic and council functions. Maximum Aboriginal participation is assumed in the design, installation, modification and manufacture of all proposed waste hardware, management and techniques.

#### • Recommendations

It is recommended that;

2.0 New and appropriate waste management technologies are developed as options for Kintore and other remote communities;

##### .1 Trailer design

A low profile trailer (edge height < ~800mm) which safely dispenses or tips solid waste more than 1500mm to its side and which may be manoeuvred by conventional as well as heavy duty vehicles would improve the effectiveness of the council's waste disposal system. The tipping/dispensing mechanism should be robust and not dependent on maintenance providers external to the community. The trailer should also be designed so that it may be used to collect firewood. The design should anticipate that it may be used, from time to time, as a personnel carrier.

The CAT has commenced design work for a new trailer option and expects a prototype to be developed as soon as resources become available.

##### .3 Dwelling receptacle design

The design of dwelling receptacles should be integrate with the council waste collection service. The user criteria are that the receptacles are easy to manoeuvre by one person; burn waste effectively; maintain minimum gross weight at all times; restrict content spillage caused by dogs or infants; appropriately safe from potential trauma; require no or minimal maintenance; and, are economically feasible to manufacture and maintain.

The CAT has commenced design work for a new waste receptacle option for domestic dwellings. A prototype design was installed in Kintore in November 1990. Feedback has been encouraging. CAT expects to respond to the community's request for more of the new receptacle designs as resources become available.

##### .4 Domestic wet area design

The design of wet areas in public and domestic shelters and spaces should remove waste water quickly and effectively under a variety of conditions. Washing and shower recesses should be made of non-porous walls and floors. The same wet areas should be modified to permit maximum sunlight access to improve hygiene conditions. Tap outlets should be relocated away from the dwelling structure and the ground around dwellings should be raised and landscaped for maximum drainage and water absorption.



The CAT commenced in October 1990, a major two year housing and transport technical services upgrade program for Kintore in response to a request from the Kintore council. The program includes individually negotiated improvements to the design features of houses and their external living spaces.

#### .5 Appropriate landscaping design

In addition to improving drainage, it is suggested that the appropriate use and placement of native flora and fence design can provide an effective means of reducing dust hazard and establishing vigorous plant growth. This option is perceived as sustainable, low cost and requiring minimal or no maintenance. The option provides a means for recycling anonymous light weight litter. Light visual waste may be used to facilitate plant growth when mixed into the soil. The soil-litter mix is also naturally generated when wind blown litter is trapped against mesh fences in the community.

#### .6 Community incinerator(s) option

The incinerator(s) should be designed and located for general use as well as for burning waste from the clinic. The design should be protected from flooding and utilise surrounding resources where possible.

#### .7 Paper mulching device option

It is suggested that a simple, small scale, self-contained and robust paper mulching device is designed and shared between the major nodes in the community. The mulch product would be used to facilitate plant regeneration and other products useful to the community.

### 2.1.0 Awareness of technology choice and technacy education

It is recommended that:

#### .1 Aboriginal women should be approached as the principal negotiators of all waste management enhancement proposals

The profile of Aboriginal women and their involvement in waste management negotiations, education, technology choice, design or installation needs to be significantly upgraded and promoted.

#### .2 An extensive and ongoing awareness and education program in environmental health and technacy should be implemented from primary to Adult education. For the primary sector in Kintore the Aboriginal School Action Committee should be directly negotiated with. If the option is assessed as feasible to the committee their involvement should be seen as central in the development of all primary and post-primary technacy education programs in waste management and environmental technology.

#### .3 For the Adult sector in Kintore, the proposed waste management centre and other communities the ATWORK programme is suggested. The ATWORK program aims to develop in trainees practical competence, self-confidence, awareness of technology options and responsibility in their interactions with a variety of technologies that support and influence their lifestyle and community functions: that is, to develop the general level of technacy of trainees and their community.

In addition to the waste management module outlined in this report the general aims of the ATWORK program are directed at:

- enriching the trainees view of themselves in relation to technology designs

and the natural, built and social environment of their community;

- furthering the trainees enthusiasm to create, innovate, modify and make judgements of the value of technologies supporting their lifestyle in the context of past, present and future situations.
- fostering the trainees cognitive, affective and psychomotor skills in terms of skill integration and application in technology problem solving.

**General program objectives**

- The compilation of practical skills, knowledge, problem solving skills and awareness of a variety of technologies that relate directly to private and community functions will provide a broad and fundamental basis for trainees



to develop their technical skills. Trainees will learn to recognise the strengths, limitations and implications of a variety of technologies in their lifestyle.

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## APPENDICES

## FLORA AND WASTE MANAGEMENT IN KINTORE

by  
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Editors - CAT

*Nigel Carrick has been working with vegetation on and off in Kintore for the past two and a half years. He has also spent six months doing the rubbish run with the Aboriginal workers. He has run a small Nursery for the past year and has been involved in collecting indigenous plant seeds for the last five years. Nigel was asked by CAT to provide information on how local flora, light wind blown waste and mesh fence lines interacted.*

### Introduction

Although the accumulation of rubbish in communities is seen to be an appalling mess and that the dumping of rubbish in towns/cities is somewhat destructive to the environment, it is evident that in Kintore, rubbish can aid the establishment of vegetation.

Kintore is situated between two ranges that often funnel low level winds of reasonable force through the community. Consequent wind erosion has been measured at 7cm loss/year.

The mud/clay soil is up to 60cm deep in some areas through the community but is mostly between 5cm and 30cm. Underlying this is a rock conglomerate of the very old creek beds. The establishment of trees in this windswept environment is difficult but is made almost impossible where the topsoil is very shallow. This consequently leads to greater loss of water due to run-off and a worsening of gullies and roads. To reverse this trend of soil degradation, mechanisms need to be introduced to (1) slow water run off; (2) allow small amounts of water to be held for the establishment of vegetation; (3) trap any wind blown soil; and (4), trap organic matter.

One such program to minimise the degradation has been piloted and the effect of direct seeding will clearly be felt as a success in the next 3 years. This involved sowing seed into contoured rip-lines of elevation (NT Conservation Commission project). However, the interplay between rubbish and soil build up has not yet been considered in the community as a controlled program of vegetation regeneration. In this report I will show that the mounding of rubbish is one way of attempting to slow the soil degradation in Kintore and finally suggest possible plans to tackle the problem of rubbish and soil conservation as a means of beautification. Fence lines will be discussed in relation to the trapping of rubbish and soil and will be compared to dune water conservation and re-vegetation. Rubbish will be looked at as a source of mulching and soil substrate that will absorb and retain water.

### Fences

All fence lines in Kintore show signs of sand dune formation and the main initiator of this soil trapping capability is the build up of wind blown rubbish. The surface area in contact with the wind and blown soil particles increases and this increases the rate of sand/dust deposition.

After the initial deposition of soil/rubbish mix a small rain will trigger the germination of wind blown seeds e.g. annual quick growing grasses and salt bushes. These will stabilise the soil and further increase the surface area of the soil/rubbish trap thus increasing the rate of deposition.

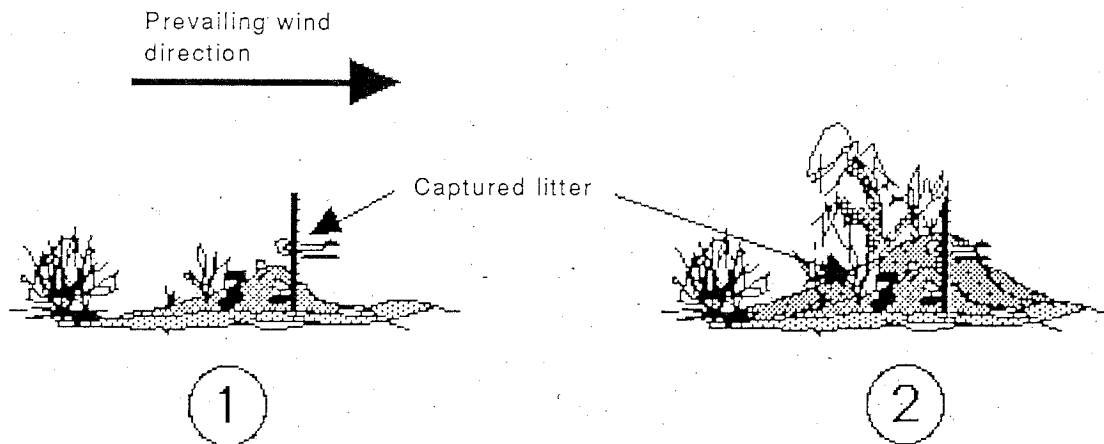
As the depth of the dune increases so does the ability of the topsoil to retain water for longer periods of time. This allows the establishment of other shrubs and bushes.

To discuss this formation further we must look at sand dune vegetation.

A dune without vegetation has a lot of sand movement. However as the first annuals germinate after rain the movement of sand decreases and sand tends to stabilise. Small mounds tend to flatten out behind vegetation allowing other seeds to germinate in successive years. As more long-term and hardy plants regenerate the dune is held in place and allows the establishment of the larger trees. Organic matter from the successive populations of annuals aids in moisture retention near the surface and usually collects in the small mounds behind current vegetation. These dunes then allow some of the bigger trees to grow and establish throughout sand dune country while between the dunes is

the more drought resistant and clay orientated vegetation. The accumulated rubbish in these heaps act as mulch and will shield pockets of moisture from drying out in much the same way as a combination of plastic, organic and rock mulches.

After a couple of years the resultant mound of 7-25cm will be covered with pioneer species (grasses and salt bush) commonly referred to as weeds. These are larger and thicker than those growing nearby due to less soil compaction and greater water retention capacity of the mound.



Schematic of plant regeneration due to the interaction of wind, litter and mesh fences

At this point *Cassia* species may be easily sown in the mound itself and later *Acacias* will regenerate from seed if sown in the slight mound on the uphill side.

If fences follow the contour of the land and do not span too great a distance it should be able to establish numerous small water traps that will then enable the larger trees to develop and penetrate the rock substrate with little maintenance. The end result will be an effective windbreak that needs absolutely no maintenance and continues to trap and slow water run-off by absorption and slight ponding. It would build up soil and protect the leeward side of the mound from any further soil erosion.

Similar fences of brush have been used to establish vegetation on foreshore plantings but rubbish has not been a planned component. In coastal situations the brush fence is used to protect seedlings from salt spray and sand.

Another technique has been to use brush as a horizontal barrier over eroding dunes. This protects the sand surface from wind and trampling and in a favourable season allows germination of native species and consequential regeneration and stabilization of the dune.

### Species suggested

All species used must be capable of seed regeneration and be from the local gene pool of genetic information. This will ensure survival and no need of maintenance by way of watering or fertilisation.

Species that will occur from seed in the initial stage are restricted to the grasses and salt bush families.

Ptilotus polystaheya	<u>Grasses</u>	<u>Saltbush</u>
	Aristata sp	Mariana sp
	Eragrostis sp	Chenopodium sp
	themedra australis	Salsola Kali

There are a wide variety of other plants that may or may not regenerate but the above are sure to present.

Cassias suitable for direct seeding after the second year will be; Cassias artemisiodes; Cassias notabilis; Cassias desolata; Cassias pleurocavpa; Cassias helmsil; Cassias venusta; and, Cassias nemophila.

Fences specifically for dust and rubbish traps must follow as much as possible to the contour of the land to prevent wash-outs. In Kintore, fences that are side on the wind direction may also trap soil and rubbish although they are better made in a crescent shape with a definite "lip" on each end.

In no traffic open community areas fences may be from 8-18m in length and should be staggered. To these fences in their third and fourth years the following Acacias (A) could be seeded: adsurgens murrayana; ancistrocarpa; pruinnocarpa; aneura; salicina; cutchbertsonii; unequilatera; dictylopl ba victoriae; and, ligulata. After 1 year these would all have attained an average height of about 45cm and will probably vary in height from 3m to 7m over the next 10 years.

Once an established mound is created Eucalypts may be planted in the mound bowl with little maintenance. Fences that surround houses may be arranged to allow access by foot in all directions but vehicles should be restricted in as many directions as possible.

However, in addition to assessing the effects of rubbish maintenance around houses as it is equally important to look at what Aboriginal people are doing about rubbish and how land use is perceived around their dwelling.

The list below provides some suggested guidelines for the design of fences around houses in Kintore. The fence should: be strong and sturdy; not restrict foot traffic; define an area that is looked after by the tenant; be ample size for gardens; and, restrict all other vehicle traffic except that of the tenant.

**Maintenance of gardens**

In the past two and half years I have noted that the people of Kintore have often asked for fencing around their houses. They find it impossible to police the continuous barrage of vehicles that crisscross through and around their houses. Many a tree-planting exercise has been frustrated by lack of vehicle barriers. Some people have even gone to lengths of dragging car engine blocks to block off popular roads close to their house. People need a defined and restricted area to have any real control over the maintenance of their gardens. However, the current fences built around houses have been so small that there has been no room for much of a garden at all. It would appear that planning authorities have given little thought to the garden area despite the many attempts people have made to cultivate their land.

The french drains (evaporation drains) around houses are ideal sites for trees but it is an impossibility without fencing. This lack of fencing has led to the compaction of soil in and around the drain resulting in a lack of drainage and consequently the sewerage overflows from the septic forming a pool close to the house. We are now trying out our second set of drains and they still haven't been fenced. Vegetation is still an impossibility around houses without the high cost of tree protectors which has to be met by the tenant. Couch grass is about the only thing growing on these drains and according to the Health Surveyor will lead to the blocking up of the septic system.

Fencing around housing is also an integral part of rubbish maintenance in that it provides a defined area to be kept clean. However if the fence restricts foot traffic it is sure to be severely weakened by constant climbing. Continuous fencing is inappropriate and any fence must be modified to suit access.



I have observed that, one effect of fencing seems to be the cultivation of pride in a family for cleanliness about the yard but constant winds continually frustrate efforts to clean the yard area as new rubbish is blown in.

To say Aboriginal people are not concerned about rubbish is erroneous. They go to extraordinary lengths to keep things clean but an over populated house often create confusion of responsibilities. This is one of the factors frustrating diligent clean-up efforts in "domestic shelters and spaces".

Any solution to appropriately deal with the problem must work with the mechanisms Aboriginal people have already developed or it is somewhat limited in its probable chances of success. Two such methods have developed that are used regularly within the community. Firstly, it is usually the women who laboriously rake away any accumulated rubbish from the night before but it is never just only their own rubbish they are contending with. There is rubbish from next door, from visitors and the rubbish that the wind just blew in. Still they rake away until the immediate usable camp area is spotless. These efforts produce 3 or more piles of stone mulch and assorted rubbish. Here lies one of the problems between community council and domestic waste management practices. Every body sees that it is the councils responsibility to clean up this rubbish, but the council can only clean up what is in the bin provided. People see that the bin is full and that the weight increase of the bin will make it impossible to lift and so the pile around its base is left. Council workers will only shovel this pile of useful mulch onto the trailer if an appropriate leader is standing present. These piles, however, are useful soil traps and would be best used incorporated into vehicle barriers or garden paths. Gibber plains show a very similar form of soil conservation by surface rocks. If the occupant continues to be concerned by the steady build up of the piles he then will arrange for the tractor to come by and push the whole lot a little further from the camp.

The second method of personal rubbish control responds to the problems of heavy bins. The ground is scraped clean around the raked area and pushed into sizable heaps. These heaps could be made into attractive gardens and shaped into the small ponding banks already described in the dune development. It wouldn't take too much topsoil to cover these with 10cm of dirt and then plant directly into the mound. Irrigation systems could easily be laid down over the initial mound before the top soil is spread over. Mounding such as this could surround garden beds protecting them from vehicles and wind. They would also slow water run-off and run-off from houses into usable areas. Other trees may be established in the water trap created by a rubbish-mulch mound such as the bowls for water catchment around trees.

## Mulches

Mulch is an essential medium in the creation of fertile soils. A forest takes 100 years to create 2.5cm of topsoil from the organic matter covering a forest floor. Australia is at present losing 27 tons/per acre of topsoil. Kintore is no different and probably a lot worse off with very little topsoil to lose.

Mulch is important to restricting water loss from evaporation - possibly the main cause of salination in arid areas. The other factor for increasing salination is quick run-off systems that fail to recharge the water table, resulting in a rise of the water table in the flat lands in conjunction with flooding. It is therefore important to have as much water absorption as possible before the water reaches the flat lands. This would assist the long-term potential of the water table.

When vegetation disappears soil erosion begins and water run-off is accelerated. This decreases the water catchment for vegetation and finally reduce recharge of the water table. In fact the water table at the point of final drainage would actually rise bringing salts to the surface that will be deposited upon evaporation. This is happening throughout most mainland states in Australia due to lack of sustainable forests trapping water in their systems and recreating rain for further rainfall elsewhere.

Rubbish is one of the most practical mulches in a community of little organic resources that can little afford the environment degradation that has ensued. Plastic, rock and cardboard mulches are used in Alice Springs on a regular basis in landscaping. A group from Kintore recently participated in setting up a permaculture garden using newspaper as the underlying mulch for a thick bed of manure, straw and sawdust. Tin cans would act in a similar way to rocks and crevices creating isolated moisture traps within the contents of a mound.

## Conclusion

Based on two and a half years of experience and observation in the area of indigenous vegetation in Kintore there appears to be a case for considering the positive effect of Waste on soil and vegetation.

Waste material in Kintore not only traps soil but aids in the water retention capacity of it. It has been and should be used for vehicle barriers more frequently that can be planned out as already described. Rubbish can be used to slow the water run-off and make more of our natural rainfall available to vegetation.



## KINTORE WASTE MANAGEMENT PROJECT AND HEALTH

by  
Dr David Scrimgeour  
Editors - CAT

*Dr Scrimgeour worked for two years as the resident medical Doctor in the Kintore Community during 1983/4. He was also research officer for the Menzies School of Health Research during the writing of this report.*

## HEALTH ASPECTS

The large amount of solid waste which lies around Kintore is immediately obvious to any visitor, particularly non-Aboriginal people who usually find it aesthetically displeasing. There are many reasons why the Kintore community should investigate ways of disposing of this waste, including the fact that a bad impression of the community on individuals from government departments and funding bodies can have an adverse effect on the community's efforts to obtain needed resources. It is important to realise, however, that the bulk of the solid waste does not have a direct impact on health. Many of the health problems of Kintore can be attributed to poor environmental hygiene, but it is not so much the rubbish which is responsible - it is inadequate water for personal hygiene, inadequate facilities for disposal of excreta, and crowded conditions in the home which result in diseases such as diarrhoea, respiratory infections, skin infections, eye and ear infections, rheumatic fever, meningitis, and hepatitis.

In the investigation of waste management at Kintore, the researchers defined waste in its broadest sense, to include faecal matter, organic waste, waste water, and solid waste. It is possible to categorise waste in order to of its impact on health, as follows.

### 1. Faecal matter

Inadequate facilities for disposal of human excreta is a distinct health hazard, resulting in the transmission of organisms causing diarrhoeal disease, intestinal parasitic infestation, and hepatitis A. Disposal of human excreta generally requires functional toilets and facilities for the removal of "disposable" nappies.

When offered a choice between pit toilets and flush toilets, most Kintore people opt for flush toilets. This is seen to be the most desirable option because people know that most non-Aboriginal people have flush toilets, they are considered more up-market, and pit toilets sometimes can have a mildly offensive odour in the close vicinity. Flush toilets are prone to breakdown and Kintore does not have the resources to effect major repairs. During our visits to Kintore nearly all flush toilets were blocked and thus represented a health hazard. Pit toilets have other advantages - they do not depend on a functional water supply, and they can be used for the disposal of "Kimbies".

Although there was not a great amount of dog faeces noticeable, this also represents a potential health hazard, particularly in the transmission of Campylobacter, a diarrhoea-causing

organism. A community-controlled program aimed at controlling the number of dogs should help alleviate this problem.

2. Waste water

Inadequate or blocked drainage from taps and water supplies results in water lying around in contaminated pools, which are attractive to toddlers, particularly in the summer months. This is largely a problem of inadequate resources for maintenance. This is something the community must take up with DAA and ADC in conjunction with other community organisations. Both DAA and ADC, however, have been notoriously resistant to meeting their obligations in this area.

3. Organic waste

Organic waste is not a large problem because dogs tend to act as scavengers and quickly remove any discarded organic matter (or at least convert it into dog excreta). When organic waste accumulates, it is a potential breeding ground for flies, which can contribute to diarrhoeal disease and trachoma.

4. Solid waste

Solid waste, which as already stated is the most obvious waste problem from an aesthetic and an ecological point of view, does not represent a great health hazard. While there is always the possibility of trauma resulting from sharp metal or glass, this does not appear to occur often.

Disposable nappies, or "Kimbies", could be considered a solid waste problem, but the health hazard is due to the faeces and has been considered above.

A potential hazard is represented by used needles, etc., from the clinic, but these appear to be adequately disposed of.

Spare tyres, containers and other objects capable of retaining water allow breeding of mosquitoes, with the potential for mosquito-borne diseases such as Ross River Fever.

## RECOMMENDATIONS

1. There needs to be further discussions within the community of the relative merits of pit toilets and flush toilets. If there is a continued preference for flush toilets and these are provided in houses, pit toilets should also be provided as a back-up for when the flush toilet fails, and for the disposal of "Kimbies".

When pit toilets are constructed, it is important that CAT guidelines are followed. There have been cases in other communities where pit toilets have been constructed ignoring the principles of ventilation and fly-avoidance.

There is a belief at Kintore that bad odours cause disease (this was also a widespread belief in Europe until relatively recently) and this probably contributes to the preference for flush toilets. It needs to be stressed that while a mild odour can be associated with a pit toilet, this is not in itself a health hazard.

2. In order to solve the problem of blocked drains, more resources for maintenance are required. The Kintore community should join forces with other communities and organisations and put pressure on DAA and ADC to provide the following commitments:
  - a) For all capital items funded, a maintenance component of 8% of the capital cost must be provided every year.
  - b) Training must be provided for community members to allow them to undertake minor repairs and maintenance.
  - c) All communities must have access to qualified plumbers for major repairs.

SOME IDEAS FOR THE DISPOSAL OF SOLID WASTE

1. Much of the garbage around Kintore is not in bins nor within the yards of houses. As such it is not seen as anyone's particular responsibility. The Council could make large garbage bags available to community members, and pay a sum of money (say \$10) for every bag of rubbish collected.
2. No plastic bags should be used in the store.
3. CAT could develop the design appropriate bins.
4. The South Australian National Parks and Wildlife Service has developed a design for a waste disposal unit which consists of a hole in the ground with a funnel entry and a hinged lid, which allows for efficient incineration of garbage. This design could be suitable for adaptation to Aboriginal communities.



# COMMUNITY NOTES

YOUR PRIORITY OF COMMUNITY EVENTS	WASTE MANAGEMENT PROVISIONS REQUIRED
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____
6. _____	6. _____
7. _____	7. _____
8. _____	8. _____
9. _____	9. _____
10. _____	10. _____
11. _____	11. _____
12. _____	12. _____



# COMMUNITY NOTES

YOUR AREAS TO IMPROVE	TOOLS, EQUIPMENT AND PEOPLE
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____
6. _____	6. _____
7. _____	7. _____
8. _____	8. _____
9. _____	9. _____
10. _____	10. _____
11. _____	11. _____
12. _____	12. _____

