USE OF THESES

This copy is supplied for purposes of private study and research only. Passages from the thesis may not be copied or closely paraphrased without the written consent of the author.
Aboriginal gardening: Plant resource management in three Central Australian communities.

Daphne Nash.

All the material which is presented in this thesis is my own work, unless otherwise stated.

Daphne Nash.
ACKNOWLEDGEMENTS

Many people have contributed to the completion of this thesis in various ways. I would like to thank the Australian Institute of Aboriginal and Torres Strait Islander Studies for funding which together with an Australian National University Masters Degree scholarship enabled me to carry out two periods of fieldwork in Central Australia.

I would like to thank the following people who provided friendship and support during fieldwork: Jeff Hulcombe and Pamela Napaltjarri for their generous assistance in living at Kintore; Sharyn King, the late Jane Goodall and Alan Randell who shared their houses at Kintore; Peter Bartlett and Arpad Kalotas for expert advice; and also Bill Peachy for accommodation at Papunya. In Alice Springs, Elizabeth Verstappen and Warren Snowden shared their house and gave welcome support.

There are many other people whom I would like to thank, particularly Kevin Keeffe for his patience and continued encouragement, as well as for late night proof-reading, and to Jane Simpson, David Nash and Susette Cooke for their enthusiasm towards an end product.

I am especially grateful for the continued support, advice and friendship of my supervisor, Ian Farrington, who has helped me to hold the threads of my ideas together over what seems like a very long time. I also thank Ian Hughes for his encouragement, comments on drafts and administrative support. Many thanks to Val Lyons, Geography Department, ANU, for her drawings of the gardens.

Finally I wish to express my gratitude to the Aboriginal people of Kintore, Papunya, New Bore and Mt Liebig, who generously assisted my work and accepted my family into their communities allowing us to continue our relationship with them.
## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Figures</td>
<td>iv</td>
</tr>
<tr>
<td>List of Plates</td>
<td>v</td>
</tr>
<tr>
<td>List of Tables</td>
<td>vi</td>
</tr>
<tr>
<td>Notes</td>
<td>viii</td>
</tr>
<tr>
<td>Abstract</td>
<td>ix</td>
</tr>
</tbody>
</table>

### CHAPTER 1  NOT JUST HUNTER-GATHERERS

1

### CHAPTER 2  CULTURAL SIGNIFICANCE AND GARDENING

8

- Cultural significance                              10
- Management                                         18
- Are Aboriginal people gardening?                  22

### CHAPTER 3

25

3.1 PEOPLE, RESOURCES AND DIET IN CENTRAL AUSTRALIA

2.5

- People and resources
- History of food in Pintupi diet

3.2 THE CULTURAL SIGNIFICANCE OF BUSH FOODS IN MODERN DIETS

4.6

- Demise of the seed cake
- Cultural factors behind modern food choice
### CHAPTER 4 THE CULTURAL SIGNIFICANCE OF HUNTING AND GATHERING  

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patterns of hunting and gathering trips</td>
<td>75</td>
</tr>
<tr>
<td><em>Rumiyaku</em> (Hunting for goanna)</td>
<td>79</td>
</tr>
<tr>
<td>Modern bush resources</td>
<td>84</td>
</tr>
<tr>
<td>Technology of management</td>
<td>92</td>
</tr>
<tr>
<td>Women and resources</td>
<td>98</td>
</tr>
<tr>
<td>Significance of hunting and gathering today</td>
<td>110</td>
</tr>
</tbody>
</table>

### CHAPTER 5 PLANT RESOURCE MANAGEMENT  

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant management around the world</td>
<td>114</td>
</tr>
<tr>
<td>Plant management in Aboriginal Australia</td>
<td>118</td>
</tr>
</tbody>
</table>

### CHAPTER 6 ABORIGINAL GARDENING IN CENTRAL AUSTRALIA  

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historical context</td>
<td>136</td>
</tr>
<tr>
<td>Tree planting projects</td>
<td>144</td>
</tr>
<tr>
<td>Aboriginal gardening</td>
<td>148</td>
</tr>
</tbody>
</table>

### CHAPTER 7 GARDENS IN THREE ABORIGINAL COMMUNITIES IN CENTRAL AUSTRALIA  

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project gardens and home-gardens</td>
<td>158</td>
</tr>
<tr>
<td>The home-gardens</td>
<td>161</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

Figure 1: Communities and major landforms in the field area 26
Figure 2: The principal vegetational formations in the field area 27
Figure 3: New Bore home-garden 164
Figure 4: Home-garden, ML 179
Figure 5: Home-garden, A2 184
Figure 6: Home-garden, A3 186
Figure 7: Home-garden, A4 192
Figure 8: Home-garden, A9 197
Figure 9: Home-garden, C1 203
LIST OF PLATES

<table>
<thead>
<tr>
<th>Plate</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate 1</td>
<td>Vine-covered verandah at New Bore</td>
<td>165</td>
</tr>
<tr>
<td>Plate 2</td>
<td>Bough shade covered by <em>M. balsamina</em>, New Bore, 1987</td>
<td>166</td>
</tr>
<tr>
<td>Plate 3</td>
<td>Bough shade in 1991</td>
<td>166</td>
</tr>
<tr>
<td>Plate 4</td>
<td><em>Solanum chippendalei</em> in New Bore home-garden</td>
<td>168</td>
</tr>
<tr>
<td>Plate 5</td>
<td>'Nursery' of <em>Ricinus</em> sp. seedlings in New Bore home-garden</td>
<td>168</td>
</tr>
<tr>
<td>Plate 6</td>
<td>The front garden, A3 at Kintore showing watermelon vines, <em>M. balsamina</em> and <em>Cassia</em> sp.</td>
<td>187</td>
</tr>
<tr>
<td>Plate 7</td>
<td>'Lilies' (<em>Canna</em> sp.) in home-garden A4 at Kintore</td>
<td>193</td>
</tr>
<tr>
<td>Plate 8</td>
<td><em>E. camaldulensis</em> in home-garden A9 at Kintore</td>
<td>198</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 1: Significant dietary components of some bush foods 46
Table 2: Central Australian food plants occurring in Arnhem Land 51
Table 3: Seed ground to make cakes 58
Table 4: Seeds eaten as a wet paste 64
Table 5: Kuka, animal food resources 84
Table 6: Mayi, vegetable food resources 85
Table 7: Other important bush foods 87
Table 8: Non-food plant resources 89
Table 9: Techniques of management 93
Table 10: Agricultural/horticultural techniques used in Aboriginal plant resource management 128
Table 11: Project gardens and home-gardens compared 159
Table 12: Plants in New Bore home-garden 171
Table 13: Plants in home-garden, ML 180
Table 14: Plants in home-garden, A1 182
Table 15: Plants in home-garden, A2 183
Table 16: Plants in home-garden, A3 190
Table 17: Plants in home-garden, A4(a) 191
Table 18: Plants in home-garden, A4(b) 194
<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Plants in home-garden, A9</td>
<td>195</td>
</tr>
<tr>
<td>20</td>
<td>Plants in home-garden, C1</td>
<td>204</td>
</tr>
<tr>
<td>21</td>
<td>Plants in home-garden, C2</td>
<td>205</td>
</tr>
<tr>
<td>22</td>
<td>Techniques of management</td>
<td>208</td>
</tr>
<tr>
<td>23</td>
<td>Species planted for environmental modification</td>
<td>214</td>
</tr>
<tr>
<td>24</td>
<td>Species planted for edible parts</td>
<td>216</td>
</tr>
<tr>
<td>25</td>
<td>Traditional culturally significant plants in the gardens</td>
<td>218</td>
</tr>
<tr>
<td>26</td>
<td>Comparison of traditional plant management and modern gardening techniques</td>
<td>231</td>
</tr>
</tbody>
</table>
NOTES

Personal names:

Throughout the text I have not given the full names of Aboriginal informants. Instead, I have used the initials of first names followed by people's 'skin' (i.e. sub-section) names. All women's 'skin' names begin with 'N' and men's names with 'Tj'.

Place names:

Generally, places are named in the way they are most commonly known. For places which are known by both an English and an Aboriginal name, the two names are given in the first instance, for example, Kintore (Walungurru) and only one form is used thereafter.

Orthography:

In transcription of Pintupi language, I have followed the orthography developed by Hansen and Hansen (1992).


I have used the following language names: Alyawarr, Anmatyerre, Arrente, Kukatja, Luritja, Ngaatjatjarra, Pintupi, Pitjantjatjara and Warlpiri.
This study examines modern Aboriginal plant resource management in three Central Australian communities. Reappraisal of continuing traditional practices identifies the usage of techniques which are more often associated with other forms of plant management, including gardening. Continuity of ideas and practices are reflected in people's food choices. The field studies demonstrate that in hunting and gathering trips, as well as in domestic gardening, people dealt with plants and other resources for social and cultural reasons. They were not solely motivated by biological survival. Cultural preferences influenced the choice of species that were tended in both domestic and non-domestic locations. In the home-gardens, plants were used not only for food and shade but to maintain connection with traditional country and culture. In the bush-gardens, people continued to manage their favoured traditional resources. In both locations, culturally significant species were planted, protected and encouraged in ways that are readily recognised by observers as gardening techniques when used by other cultural groups, but rarely recognised as such in Aboriginal Australia. There are strong social and cultural motivations for people to maintain their relationship with their traditional resources. For the people of Kintore, New Bore and Mt Liebig, gardening represents one aspect in this complex system of resource use.
CHAPTER 1.
NOT JUST HUNTER-GATHERERS.

In the nineteenth century, Europeans generally believed that Australian Aborigines were survivors of a 'primitive' stage in the evolution of mankind. The evidence was manifested in travellers' records of a simple technology and no evidence of agriculture, which together with other factors, confirmed the belief in European biological and cultural superiority. Following the linear idea of progress (Kramer, 1967), societies are said to move through stages, from primitive savagery to hunting and herding, culminating in agricultural life. Many groups do not proceed past certain steps in the sequence. The Australian Aborigines, who were thought to merely appropriate their food and other resources from the environment were deemed to be on the bottom step of cultural development. This attitude has continued in various forms despite the volumes of research produced on the complexity of Australian groups.

Within this evolution-oriented approach, Aborigines were classified as hunter-gatherers, along with other groups, such as the !Kung bushmen of Africa. Their hunting and foraging activities were recorded but other aspects of their lives, such as social organisation, kinship and totemism were deemed more theoretically interesting and important to anthropology. Consequently, there has been an under-recognition of the complex nature of people's relationship to their resources.

Although more recent literature contains many descriptions of people's practices involving their plant resources, such as firing the landscape, the interpretations of these actions have been bound by the attitudes of the researchers. It seems that they continue to view the presence of agriculture as a yardstick for assessing motivation and success in relation to human-plant interactions. There exists a dichotomy: agriculturalists are civilised and non-agriculturalists are barbaric. Furthermore the observers do not allow themselves to be dissuaded by any evidence to the contrary.
Instead of describing what Aboriginal people actually did, their actions were viewed in terms of the similarities to and differences from agriculture. This strategy highlights the differences and accentuates the perceived 'primitiveness' of the observed. The terminology used to describe how people interact with their plant resources is illuminating in this regard. Researchers have used the following:

- plant husbandry
- semi-cultivation
- limited cultivation
- natural cultivation
- primitive agriculture
- incidental cultivation
- accidental farming
- proto-cultivation
- semi-domestication
- domiculture
- fire-stick farming
- agronomy
- near-horticulture
- elementary food production
- incipient gardens
- pre-adaptation to cultivation and domestication of the environment.

The resistance to admitting any active, thoughtful management of resources on the part of Aborigines, is evident in the use of these terms.

It is now understood that most groups do not subsist by one means only and this can be demonstrated equally for Australian Aborigines. Agriculturalists use a variety of production strategies which imitate the natural environment or which alter it completely. This diversified resource use may include hunting and gathering. For Aboriginal people, the label of hunter-gatherer has meant that all the evidence relating to their subsistence activities has been viewed in the light of that definition. So, Aborigines are described as hunter-gatherers, even though they are involved in forms of resource management and food production which are characteristic of other groups. It can be argued, for example, that Australian Aborigines' use of fire as a strategy for resource production is no less manipulative than those found with farming (Lewis, 1981:45).

The hunter-gatherer categorisation is misleading on other accounts. It obscures the changes that a group may undergo, especially as a result of modern social, economic and cultural adaptations. Aborigines living in traditional lifestyles are sometimes labelled as modern day hunter-gatherers to accommodate the changes in their lifestyles. This explains little
about the real nature of their activities, past or present. Although observers admit that people do still hunt and gather, using modern equipment, such as guns, Toyotas and billy cans, there have been few comprehensive analyses of their diversified resource use.

People living in remote communities in Central Australia today are both 'traditional' and 'modern', in the sense that they are living in the ways derived from their Aboriginal past as well as being newcomers to settled lifestyles.

Traditional influence on their lives is most obvious in two areas:

(1) The continuation of hunting and gathering practices.

Hunting and gathering is performed today in 'traditional' ways but there are many differences between the old and new activities. The cultural significance of various plant and animal species and the activities which were associated with them have changed. Although many bush food resources are exploited, very few are highly significant for physical survival today. Some are important for cultural survival. The excursions into the bush remain socially important and the most highly desired resources are keenly sought after. Hunting and gathering of plant and animal species are some ways in which people relate to these resources.

(2) Religious beliefs.

People's lives today are strongly influenced by their traditional religious beliefs and to some extent, Christianity. Traditional attitudes to plant and animal species are derived from a complex system of beliefs which link all aspects of the living and non-living world. People have responsibilities to the environment which they share with each other and other living things based on their relationships with the ancestral beings, the creators of the world. These responsibilities involve ritual and resource exploitation activities.

Modern influences have had an impact on every aspect of their lives. Dietary preferences, for example, are based on past choices. This applies to introduced foods as well as those previously available. Preferences for foods available in the community stores
demonstrate people's continuing desires for meat and sweet foods. The stores also provide the main carbohydrate staples in the form of white flour and sugar and other staples, such as tea and salt. Preferences for certain store items, especially the staples, influence hunting and gathering goals. Since survival does not depend on these activities, the most highly desired bush resources can be pursued. People's desire for bush meat, such as kangaroo, emu, bush turkey, perentie and goanna is greatest of all. A much reduced range of plant resources is exploited today compared to the traditional past. In a study of Aboriginal gardening, it is therefore essential to note the dietary changes which have occurred in the last 60 - 70 years as a result of European contact and broader social and cultural change.

The role of plants and other natural resources are important beyond their practical use value and this continues to be the case. A large majority of former plant resources are no longer significant in the ways they were in the past. Contact with these resources through trips into the bush is maintained and the children learn that the seeds of *wangunu*, woollybutt (*Eragrostis eriopoda*) for example were an "olden time tucker". Resources are associated with people and places and while people are living on their country, this relationship is culturally important. Women in Central Australia demonstrate their knowledge of traditional plant gathering and processing and are also able to describe the role of plant resources in their modern lifestyle.

Modern plant resource use is a combination of past practices which were designed to effect the entire landscape, as well as management activities directed to individual plants, which I have incorporated into a definition of gardening. As part of modern plant exploitation, people continue to deal with plants on an individual level in ways which result in desirable changes in the plants. For various parts of Australia, there are many examples of this which include traditionally tended resources, notably pituri (native tobacco), *Duboisia* and *Nicotiana*. In the modern settlement lifestyle in Central Australia, people have been involved in exotic and indigenous species plantings around their houses. The cultural significance of exotic species is generally
restricted to their usefulness, such as shade or food. Indigenous species, however, have a wide range of importance. Plantings are done with a purpose.

Empirical knowledge of Aborigines has often been unacknowledged by Europeans in their interpretation of people's actions. We now know, for example that all groups were involved in complex processing activities for various plant resources, such as the leaching of toxins from *Dioscorea* spp. and *Cycas media*; that they used water to increase the productivity of other food plants; that people planted and transplanted yams, such as *Dioscorea* and *Ipomoea*. Their knowledge of the natural environment is now understood to be extremely detailed.

Elsewhere it is argued that garden failure is attributable to "a lack of sufficient horticultural knowledge" by Aboriginal people (Griffin and Lendon, 1979:7). Included in this body of knowledge is the notion that plants require water to survive. People nowadays understand that this is true, and furthermore, there is evidence that traditionally people understood that plants need water. Peile (forthcoming) demonstrates this for the Kukatja people, whose language is closely related to their southern neighbours, the Pintupi people in this study. The Kukatja understand that water is the life source of plants, "the vehicle by which the life principle (*kurrunpa*) is spread and is present throughout the plant".

Lack of recognition of Aboriginal people's knowledge and understanding of their actions on the environment continues. A recent government publication refers to some aspects of Aboriginal plant resource use as "accidental gardening" (ATSIC, 1992:11). This is the usual interpretation in which observers have viewed planting successes, particularly involving native species, as fortuitous and the inspirations for such activities have been seen to stem from a desire to copy European gardens. In other words, the observers believe either that any activity that results in future plant growth is not planned that way, or, that if it is intentional then the people must be blindly following the examples of gardens outside their own traditions. Close examination of the contents of the gardens demonstrate clearly
that Aboriginal gardens have very few characteristics in common with European gardens.

Modern plant use and the techniques of plant management seem to be derived from traditions of Aboriginal plant use. There is evidence that many plant-related actions practised in the past have modern horticultural equivalents. Although Aboriginal people were not involved in fixed-plot horticulture, culturally significant species were planted, protected and encouraged in various ways. These techniques continue to be practised in bush locations. As well as such 'bush-gardens', people have concentrated activities around their dwellings in 'home-gardens' where they are living a more settled lifestyle.

In the current debate following the High Court Mabo decision, there is a great deal of importance placed on the differences between the land use practices of the Meriam Island people and mainland Aborigines. As part of that decision, Justice Brennan "implicitly rejected the notion that the Court should inquire whether the people were higher in the scale of social organisation than the Australian Aborigines" because "it would seriously offend the values of justice and human rights, such as equality before the law" (Lumb, 1993:4). Nevertheless, conservative critics argue that while native title may apply to the Meriam people who are village-dwelling gardeners, it should never have been applied equally to the mainlanders who are merely nomadic hunter-gatherers. The evidence and conclusions presented in this study add weight to the argument that in the past, Aboriginal people had knowledge of gardening as well as hunting and gathering, just as they do today. This is probably also true of the Meriam Islanders, although in this case, outsiders have placed emphasis on their gardening strategies.

The literature abounds with references to failed attempts at European horticulture in all parts of Australia where Aborigines have been persuaded to garden in this way. It is the consensus of many observers that horticulture may still be a viable alternative for some communities. Invariably, however, the people's other plant-related activities are ignored or misinterpreted. At the communities of New Bore, Kintore and Mt. Liebig, the distinction
between Aboriginal and non-Aboriginal motivations and actions is clear. From this viewpoint, it is possible to establish that Aboriginal people are not merely hunter-gatherers of the past or the present and furthermore, that their modern plant-related activities are consistent with their traditions.
My previous work on Aboriginal plant resources emphasised the importance of cultural factors in relation to plant resource use. Firstly, I concluded that people continue to hunt and gather the resources which they desire most, despite the fact that they are not necessarily needed for survival reasons and secondly, that the people's interaction with their environment changes it in desirable ways and they are motivated to do this by their traditional religious beliefs.

Based on the literature relating to management, as well as my own field studies in Central Australia, I argued that there are aspects of environmental manipulation and resource management which suggest that food supply is not their only motivation (Nash, 1984:69-81). There are many social, economic, environmental and cultural parameters operating to influence choice of food resources. For example, cultural preferences appear to be operating in the continued use of *Solanum* spp. where preferred taste and ease of gathering and processing are also supported by traditional religious beliefs.

My aims in this study are to extend the findings of my previous work. This is not simply an ethnobotanical study which is restricted to the kind of information provided by a list of plant resources and their usefulness. More specifically, the field studies aim to establish the cultural significance of plant resource management today and its relationship to traditional management practices. This task can be made easier by removing some uncertainty in the literature surrounding the meaning and application of terms, such as 'traditional' and 'cultural significance' and by defining the aspects of management relating to gardening.

The term 'traditional' is generally used to refer to the practices of Aboriginal groups before the arrival and occupation of non-Aboriginal people in Australia more than two hundred years ago. In its broadest use, 'traditional' encompasses many different
lifestyles and the changes to them over many thousands of years; and in its narrower sense, the term refers to the kind of lives people led immediately prior to colonisation and is a reference point for change that has occurred since.

Unfortunately, detailed documentation of Aboriginal lifestyles did not begin until after many changes had come about in these societies. Researchers, therefore rely on many sources for information to build-up a picture of the past:

(1) Accounts by early observers, such as explorers, surveyors and missionaries;

(2) Anthropological and archaeological records; and

(3) Verbal descriptions and demonstrations of past practices by Aboriginal people.

Even the fine-grained studies based on all available information, provide only partial reconstructions of the many different ways in which people lived off the land. Such research cannot be regarded as conclusive.

There has been no long term study of people living a totally traditional hunting and gathering lifestyle and so there are many aspects of the lifestyle not known. Gould's study (1969) of the Ngaatjatjarra, a Western Desert group, suggested that these people relied on three main foods for survival in dry times. In the case of the Martujarra, another Western Desert group, recent research has shown that they exploited a wide range of resources and that their decisions to exploit certain resources at any given time were based on a complex array of seasonal factors which have not previously been taken into account in descriptions of their lifestyle (Veth & Walsh, 1988). The Martutjarra exploit 14 species of Acacia which "respond differently to various aspects of the rainfall and temperature pattern" resulting in seasonal variability in seeding patterns. This suggests that Acacia seeds may have been available "throughout the summer months, with dry unharvested seeds being available for longer periods of time" (Veth and Walsh, 1988:20-21). So, it seems that the people expanded their dietary breadth during dry times rather than reducing the number of foods used as was previously thought.
Therefore, researchers must be cautious in their claims about traditional practices made largely on the basis of modern short term studies. New data undermines the certainty of accepted theories about past lifestyles.

Modern groups are sometimes referred to as 'traditional' because they are in some sense living traditional lifestyles, often on their traditional lands. Many groups, such as the Arrente, Pintupi, Warlpiri and Pitjantjatjara in Central Australia, who have been contacted much more recently than other groups, continue to practise some ritual and subsistence activities consistent with or derived from past practices. Cultures change, and even though some groups have been able to continue their traditions in a modern context, their traditions have evolved.

More specifically, no modern group is practising traditional plant use in the same way that it was done in the past. People's reasons for decisions about their resources are modern ones. However, modern plant resource use can be described as 'traditional' if the use of a particular resource fits closely with what is known of the past uses of that resource. In other words, modern practices can be traditional on the basis that "new ideas and techniques may be incorporated into a given tradition, but only if they fit into the complex fabric of existing traditional practices and understandings" (Hunn, 1993:13).

My argument does not rely on reconstructing past practices. Instead modern practices are examined to establish the cultural significance of traditional and modern plant resources today.

**Cultural significance.**

Following Sauer (1952: 2-3), if natural resources are indeed cultural appraisals, then every resource of a group is necessarily culturally significant for that group.

Studies which have aimed to evaluate the cultural significance of plant and animal resources for various groups have concentrated on the practical importance of these items. In most cases, lists of scientific species are recorded alongside a gloss in the language of
that group, together with a summary of uses. For plants, the range of uses is typically broad, including food, medicine, shelter, ritual and other applications. These lists provide much ethnobotanical information which contributes to our understanding of each cultural group's plant-related concepts. More recently, there have been lists of plants produced which incorporate detailed descriptions of uses by the native speakers themselves, for example Goddard and Kalotas (1988).

Researchers have attempted to categorise the cultural significance of plants. Berlin and others (1973:153) listed "four analytic categories of cultural significance: cultivated plants, protected plants, wild - useful plants and wild - insignificant plants". These categories do not fully explore the use of relatively unimportant plants. Even those judged to be culturally insignificant can be shown to have some significance, such as firewood, or as "look-alike" plants that may be confused with edible species (Hunn, 1982; Turner, 1988:274).

Hunn (1982) argued for some other way to assess the importance of individual taxa in folk biological knowledge and proposed the "activity signature". By describing, for example where, when and by whom a certain plant resource was gathered, the activity signature for that plant can be given. Research of this kind is most appropriate for recording the knowledge of a group who may be living a lifestyle in which this kind of knowledge is relevant. In such instances, traditional knowledge is culturally significant in their modern lifestyle. For example, traditional beliefs, values and practices of people living in the Western desert region of Central Australia are to a large extent significant today. For groups who are living a modern lifestyle which has little in common with the past, traditional knowledge is not as significant.

Furthermore, Hunn (1982:840) citing Hays (1974), believes that it is essential to specify practical significance from "the native point of view". This is extremely difficult to achieve when the activities under question largely belong to the past. Turner (1988:274) also citing Hays (1974), agrees in theory but claims that "it would be neither practical nor meaningful to attempt such a detailed evaluation by native consultants" in her ethnobotanical study of
the Thompson and Lilooet. In this study, Turner presents an alternative detailed technique to measure the relative importance of plants traditionally used by these two indigenous groups in British Columbia.

Turner (1988) created a formula to calculate an Index of Cultural Significance (ICS) where values for quality, intensity and exclusivity of 'use' (defined in its broadest sense) are assigned to a plant. Quality of use refers to the nature of a plant's contribution to survival and plants are scored on a scale 1-5: 1 (merely recognised) and 5 (primary food). Intensity refers to the impact on daily lives of the people, scaled 1 - 5, and exclusivity is the relative predominance of the plant in the culture, with values ranging from 0.5 - 2. These three values are multiplied together for each use of the plant, and the sum of these use values equals the ICS. Two contrasting examples of the many examples given are:

(1) Western blue clematis, ICS=3, reflecting its relatively unimportant single use; and

(2) "Indian celery", ICS=100, having eight relatively important uses. (Turner, 1988:282)

In this way, an Index of Cultural Significance was given to over 500 species. Turner concluded that although the index has limitations "it seems to provide a consistent, easily derived and valid assessment of a plant's role within a culture" (1988:287).

Stoffle and others (1990:422-423) have opposed Turner's definition and formula for assessing cultural significance on the grounds that it relates only to biological survival and does not take into account the role of plants in the social and cultural persistence of a group. This is an important distinction which has particular relevance for the study of plant use by Australian Aboriginal groups. Aboriginal people do not rely on traditional plant and animal resources for survival as they once did. Although many people continue to use their traditional resources, modern social and cultural factors can be seen to greatly influence this usage. The degree to which these factors influenced traditional usage patterns is not known but my data suggests that cultural
and social influences have been important in people's interaction with plants in the past as well as in present lifestyles.

Turner's formula for calculating the ICS is seriously lacking because it does not include a factor for the modern cultural significance of plants to her informants. Turner (1988:275) citing Hunn (1982) defined the cultural significance of a plant as "the importance of the role that it plays within a particular culture" but her technique was designed to measure traditional and not modern cultural significance. Consequently, she found Hunn's notion of an activity signature inapplicable. The people with whom she was working were no longer living a traditional lifestyle and their information comes largely from memories of past practices. Turner's notion of traditional fits closely with the narrow use of the term described above. The implication is that the cultural significance of a plant is bound to its importance in the past despite the fact that it is difficult to establish clearly its full range of significance at that time.

The traditional importance of a plant may be relevant to its modern significance in the culture. The role of a plant can change for a group over time and vary between individuals. Whether a plant is used for food, medicine, ritual, tools or artefacts, its significance will change in response to the people's change in lifestyles and values and different people will often have different knowledge. For Aboriginal people in Central Australia there are many examples:

(1) Some plants, such as pituri (native tobacco), are used in the same ways but their significance has broadened. Locally available *Nicotiana* species are highly desired for chewing tobacco because of taste but generally require more time and effort to acquire than store tobacco. Plants used to make ashes for chewing with the pituri are still used in the same way whether for chewing with native tobacco or store tobacco. There are no store substitutes for the accompanying ashes and many native tree species can be used for this purpose. Preferred species include the twigs and leaves of *Acacia pruinocarpa* (Nash, 1984:46).

To chew native tobacco together with ashes is a way of asserting the Aboriginal identity of the chewer. Young girls at secondary
boarding school in the predominantly non-Aboriginal town, Alice Springs can be seen carrying a small tin of ashes (usually a disused tobacco tin) and chewing a quid of tobacco or with the quid stored behind an ear. This behaviour demonstrates not only their desire for the drug but also their desire to identify with Aboriginal values and lifestyle.

(2) In some instances, plants which are no longer used traditionally have become objects of cultural significance in different ways. Some trees, such as *Brachychiton gregorii*, exploited traditionally for its edible seeds, are not used in the same way now. *B. gregorii* is a significant tree in the newly prepared gardens of some people in the field communities because of its social and cultural associations. It has been transplanted to locations near their houses because it reminds them of their relationship with the Dreaming\(^1\) and associated tracts of land, and furthermore, it provides good shade, which is very important to their outdoor living including cultural activities.

(3) There are plant species which are no longer used in traditional ways but nevertheless are culturally significant because of their traditional uses.

Many species which were exploited for edible seeds but have been abandoned as food, now assume increasing cultural significance as features of past lifestyles. Information about these species is being taught to school children by older people. These women value their knowledge and want to pass it on to the younger generation and to visitors who show an interest in their culture. Seed necklaces, mats and other artefacts are important community exports and the women derive social as well as financial benefits from this work. It is useful for them to be able to perform in ways which are valued outside their social group.

Some women are engaged in bulk seed collection for sale and eventual distribution to other countries involved in reafforestation programs and have been sporadically selling seeds

---

\(^1\) 'The Dreaming' refers here to the period of time when the earth was being formed by the journeys of the Ancestral Beings.
through the Yuendumu Mining Company (Young and others, 1991:152). This activity broadens the contemporary cultural significance of seed resources. For women particularly, the gathering, processing and associated knowledge of seeds is very important in asserting their cultural and gender identities. Edible seeds will continue to be culturally significant as long as this information is passed on.

(4) Exotic plant species which have no traditional role appear to be gaining cultural significance. Various species of fruits and vegetables as well as shade producing species, have been planted by Aboriginal people in many contexts and some are more favoured and successfully grown than others. The easily picked, fresh, sweet fruits, such as watermelons are most popular.

(5) Knowledge of traditional practices can have cultural significance long after it has ceased to apply to biological survival. Aboriginal people often hold important practices which they no longer perform. Their view of the past is a significant way in which groups establish and maintain their identity. By referring to the persistence of their way of life they are able to feel strong connections with the past, sometimes in a nostalgic way. People often talked about how healthy their grandparents were living off bush foods compared to the poor health of most adults today (for whatever reasons). Their knowledge that traditional lifestyles were healthy, is important to them.

In a curriculum project, Aboriginal teachers at Kintore School listed some items and ideas of significance for them. From a list of 23 items, eight relate to their traditional resource use: mayi, plant food; wilinyi yankupayi, to go out bush for food; tjintu, sun; pira, moon; kapi nintintjaku, to learn where water can be found; puujtingka, in the bush; tjurratja, sweet bush plants, wine; mingkulpa, bush tobacco (Keeffe, 1992:125). These teachers are less than forty years old and have never lived a lifestyle in which they were totally dependent on traditional resources. Nevertheless, some values of the traditional lifestyle persist and are incorporated into their modern lives.

These examples highlight the cultural significance of plants in modern patterns of use, unlike Turner's study, in which
traditional usage is the prime concern. It seems obvious that a plant which is being used in some way, is more culturally significant than one which is no longer exploited. While knowledge of a former practice may continue to be relevant, my observations concerning the use of plants are an important component of the cultural significance of that plant. More importantly, the people themselves are able to contribute their understanding of the importance of plants in their lives.

Turner (1988:274) points out that ideally native people living in a traditional culture should evaluate the cultural significance of their own resources but because she adopted a traditional time frame for her study, this does not apply. Living people cannot provide the information required, although there are plants which people continue to use (Stoffel and others, 1990:425). Turner's study is largely based on Western scientific concepts and values. Without the people themselves contributing to the process of unravelling the cultural significance of their own resources, her data must be limited.

In studies of modern plant use, this can be overcome to some extent. Hays' study of the Ndumba (1974) is often cited as an example of ethnobotanical research which documents the native people's plant-related concepts by drawing on information from the accounts of people in their own language. In other words, the people themselves decide on the cultural significance of their plant resources.

This methodology is appropriate for people who still speak their own language and live in a traditional way, but what applies when a group is not living in a traditional way and the language has been lost? It seems that a focus on traditional usage and cultural significance in these cases can lead to a dismissal of modern plant-related activities. Tradition becomes confused with culture and when people do not act in traditional ways and do not conform to any other recognised pattern of behaviour, then their activities will go unrecognised. As a consequence, the cultural significance of their plant resources is trivialised.

Cultural significance of plants is related to many aspects of culture and is subject to change. Whatever the relationship of modern
activities to the past, modern plant-related activities are also culturally significant. This can be demonstrated by identifying those plants which are now in use in three Central Australian communities and the ways in which they are relevant to people's lives. The traditional use of plants is included where relevant especially since modern and past usages often conform or are related, as far as we know. The new data on gardening reveals that modern plant-related practices to a large extent have their derivations in the past.

Researchers have been slow to recognise both the extent of plant resources used and the management activities involved in the use of resources. Less than twenty years ago the resources of the Pintupi people were largely unknown and little understood; "few plants of known economic value" (Thomson, 1975:4). Botanical research and knowledge from Aboriginal people in Central Australia has revealed since, that there are over 140 food plant species (Latz, 1982:40) and many other 'useful' plants.

The role of fire for people managing the landscape has been recognised for some tropical and desert areas of Australia within the last twenty years. It is now understood that Aboriginal people employ strictly controlled methods of burning, tailored for different microenvironments with an aim of increasing and/or maintaining a supply of their resources (Jones, 1969; Lewis, 1981; Latz, 1982). Its role in the past and for other parts of the continent is still under investigation.

Whether it was daisy yam management in Victoria (Gott, 1983), the yam diggings in southwest Western Australia (Hallam, 1989) or seed grinding practices in the grassland areas (Tindale, 1977), researchers did not seem to recognise the level of knowledge or planning which was implied by these activities. They suggested that the actions were non-deliberate or accidental implying the Aborigines were hunter-gatherers and nothing else, that the use of a particular resource is distinguishable from management of that resource.

Aboriginal people did not practice horticulture or agriculture but the technology and knowledge required to adopt these strategies were probably present in the past. Gott (1993:196) compares
agriculture (and horticulture) and Aboriginal land management. Cultivation, fertilising, thinning of perennials, sowing, care of seedlings and spread of cultivars all have equivalents, leading to the conclusion that "the distinction between 'gathering' and 'cultivation' seems less sharp when Aboriginal land use is closely examined".

Management.

Management, cultivation, domestication and gardening are important concepts needed for examining the broad application of traditional plant resource knowledge discussed in this study. The evidence about past activities has been interpreted in a very tentative way in the literature and the following definitions provide the groundwork for more forceful interpretations.

Management of plant resources refers to the deliberate human activities which encourage or enhance a resource (or resources), those actions which control the quantity and increase the probability of the availability of plant resources (Farrington, 1987). These acts may be either intentionally or unintentionally designed to benefit the useful part of the plant. This definition includes Aboriginal people's widespread practices, such as the controlled uses of fire and water; planting and digging of roots and tubers; storage; the selection of parts of plants, such as the young leaves of pituri, native tobacco and the transportation of plants or plant parts back to camp where the seeds grow.

Cultivation includes many aspects of management and refers to the deliberate care involved in the propagation of the species (Ford, 1985:3), through a sequence of actions, such as tending, tilling, transplanting, sowing, harvesting and the selection of the seed, root or stem stock for the following planting. It is acceptable to include in this definition the techniques, such as transplanting of yams and the seed gathering of the Bagundji, discussed more fully in Chapter 5.

Domestication is generally used to denote "plants that have been genetically and/or phenotypically modified by human intervention in their reproductive systems" (Harris and Hillman,
Domestication occurs within cultivation but is not synonymous, since wild species can be cultivated also. There are many examples being researched in other parts of the world, such as the genetic change in Devil's claw in the south-west of the United States (Nabhan and Amadeo, 1987:58-59). This plant has a history of use for basketry fibres and is still cultivated today. There is evidence to suggest that "the domesticate produces longer, darker, smoother, more pliant fiber splints that make the work of preparing and weaving basketry materials for a high-quality product much easier". Researchers acknowledge that it is difficult to assess the level of domestication of a particular plant (Harris, 1989:19), but it is possible to observe people's behaviour which could have these results. Kimber (1978:10) defines "the selection of seed or vegetative parts for the planting of the next crop" as 'folk domestication' to distinguish the people's actions.

Davis and Bye (1982: 233-234) use the term "progressive domestication" to describe the changes which a member of the Solanaceae family is undergoing in Central America. They emphasise that there is "a progression from wild plant phase through weed plant phase (with stages of recognised, tolerated, encouraged and cultivated weeds) to the domesticated plant phase". The plant is deliberately left in the fields when the main crops are harvested and is most abundant in disturbed areas near human activity. Rather than being a native colonizer in the wild plant phase, the plant is seen as an encouraged weed in the weed plant phase.

There are instances, described herein for Australia today where people are involved in the kind of activity that appears equivalent to folk domestication or the weed plant phase of domestication, and perhaps domestication of some wild species is occurring there. Meehan and others (1979) have raised the question in relation to
the use of *Pandanus* in Arnhem Land in comparison with known domestication of other species of *Pandanus* in New Guinea. Further discussion on this subject, however, is beyond the scope of this study.

Gardening is an activity related to the creation of a culturally defined spatial area where plant production occurs (Ford, 1985:6). It incorporates management techniques, such as protection and planting of both domesticated and undomesticated species which are present because of their "usefulness". This is meant in the broadest sense and refers to any culturally significant role played by a plant resource, that is food, medicine, tools and religious or any other social significance.

Harris (1989:19) distinguishes two types of gardening, small and large, where small-scale horticulture can be regarded as a distinctive type of agroecosystem, which is characterised by a high proportion of "wild" and "weedy" species. This compares with large-scale field horticulture, which can be equated with agriculture. The main point of separation is that large-scale horticulture deals predominantly with domesticated species. The relationship between aspects of plant resource management in Australia which to a large degree fit the definition of small-scale gardening is discussed herein. Anderson (1952) and Kimber (1978) have examined these kinds of gardens for groups in other parts of the world, and speculated on their possible role in the domestication of plant species. These will be discussed in conjunction with the garden field studies which emphasise the cultural significance of gardening for Aboriginal people.

While there appears to be little recorded evidence for traditional Aboriginal gardening in Australia, the term "garden" occurs in the literature for comparative purposes. Some observers have interpreted the landscapes created by transplanting and also gathering of some resources, as "garden-like".

Areas where yams (*Dioscorea* spp) are harvested in Cape York have been described as gardens. On the mainland, Hynes and Chase (1982:40) record the creole, "garden for yam" and on one Torres Strait Island "gurrikoop" is the word used for garden (Moore, 1979:90). Observations of a visitor to the islands in 1848-
1850, documented many yam plantations and described the sticks used to support the yam shoots (Moore, 1979:114). The Torres Strait Islanders and mainlanders in this region, appear to have been using these yams in a similar way. In other parts of Australia, observers have been less sure about people's motivations and reported "accidental gardening". As Gott (1983:11) points out, the people in south-eastern Australia were aware of the benefit of loosening and turning over the soil as they gathered yam daisy (*Microseris scapigera*) and other plant foods. In that case, it seems that it is not totally appropriate to describe their actions as "accidental".

Hallam (1989:137, 139) quotes Sir George Grey, who visited the Swan River area in 1839, concerning Aboriginal activities with yams (*Dioscorea hastifolia*):

"... 'fields' of yams, 'warran' diggings, where the soil was overrun with 'warran' plants (*Dioscorea* sp.) ... over an extensive area five or six kilometres by perhaps two kilometres wide, approached by permanent paths, and serviced by deliberately constructed deep soaks". Elements of cultivation have been recognised where the process of digging for yams turned over the soil.

Jones (1975:24) recorded an Aboriginal man from Arnhem Land who commented on the growth of fruit trees at his camp site describing it as "all the same gardeny". This man recognised the similarity between European style gardening that he had become familiar with, and the growth of a native food plant. Jones claimed that there was nothing more than a symbiotic relationship operating there and later stressed that "gardening ... was the way of life of other people - Balanda (whites) or Mankatjarra (Macassans)" (Jones and Meehan, 1989:129). This may have to be reassessed.

Aboriginal people today sometimes refer to an area of bush using the word "garden" to emphasise lush growth. I visited an area south west of Tennant Creek where Warlpiri people regularly go at appropriate times to dig for *Ipomoea*. They manage the area using fire and maintain a flourishing crop of yams which one man described to me as "just like a garden". There are a number of similarities, but are these people gardening?
Are Aboriginal people involved in gardening?

As these examples demonstrate, observers have likened the effects of the gathering activities to their own concept of a garden, which varies between individuals although there are culturally accepted forms. European gardens have very recognisable characteristics, such as rows of vegetables, fruit trees and very orderly beds of flowers and bushes. To a large degree, these criteria were not met and it was straightforward for European observers to conclude that there was no Aboriginal gardening.

It seems that the observers are reluctant to attribute gardening knowledge to Aborigines because of a narrow interpretation of the role of Aborigines as hunter-gatherers and what this implies for their use of resources. However, if it is accepted that the people had the knowledge and technology for various forms of plant management and cultivation, then it is not a huge conceptual leap to allow that the Aborigines had the ability to garden. There are many elements in common between traditional Aboriginal management and horticulture or agriculture.

For modern Aboriginal lifestyles, the main difficulty in coming to this conclusion is that Aboriginal gardens are not recognisably European gardens. As a consequence of people's reluctance to recognise and apply a known term to a new situation, the real similarities and differences between Aboriginal gardening and European gardening are obscured. It can be argued that gardening is another way in which Aboriginal people are using plant resources.

We now know that Aborigines in other parts of Australia relied on very complex techniques of processing some plant resources and that these resources were not necessarily required for survival. The knowledge and cultural significance of (1) cycads (Cycas media) (Jones and Meehan, 1989) and (2) pituri or native tobacco (Duboisia) (Watson, 1983) suggest that the techniques involved in their use are deliberately carried out to ensure maximum availability of highly desired resources.
Ignoring the cultural significance of plants can lead to narrow interpretations of available information. It has been suggested that lack of technology prevented people from storing edible seeds. Jones (1979:147) argues that the Aborigines of the Cooper Basin did not know how to dry out seeds for storage. It seems improbable to imagine that people with complex methods of processing these seeds, for example did not understand the connection between storage and the need to dry out seeds, especially since they carried out both processes. In other words, the reason that they did not store seeds was more probably cultural rather than lack of knowledge.

To cite a modern example, it is not lack of knowledge or technology which prevents people in Cape York from practising agriculture or horticulture. As Chase (1989:52) points out, the people believe that these practices are wasteful and illegitimate activities in the landscape because: "It is not our way; ... We get our food from the bush". In fact, most of their food comes from the store but acknowledgement of their resources is part of their "traditional legitimacy in their homelands".

People in Central Australia continue to use traditionally significant resources today for many reasons:

(1) To enjoy the taste of the foods they want to eat. In some cases bush plants are chosen instead of, or as well as bought vegetable food;

(2) To use in ways for which there is no commercial counterpart (e.g. spinifex wax for glueing artefacts; ashes for chewing tobacco);

(3) To demonstrate people's connection with the past; and

(4) To establish their identity as, for example, Pintupi people from Walungurru (Kintore).

These are important considerations for identifying the significance of and the motivation for new styles of plant use in Aboriginal communities, namely 'home-gardens'. Aboriginal gardening is culturally significant, having a long history in terms of traditional plant resource management. Two kinds of modern Aboriginal
gardening can be identified and their cultural significance explored (see Chapters 6, 7 and 8):

(1) 'Home-gardens' are the areas around people's dwellings where they have planted, protected and/or encouraged culturally significant species; and

(2) 'Bush-gardens' can be defined as the non-domestic locations where people have planted, protected and/or encouraged culturally significant species. These gardens are generally in locations remote from settled areas and may or may not have included naturally occurring species.

Gardening is one expression of the cultural significance of traditional plant resources which may include the appropriation of new resources. It is not my contention that the primary aim of these strategies is food production. Aborigines are not and most probably were not on a 'progression' towards agriculture, or even horticulture, as a means of food production. Instead, they are committed to a broad range of resource use strategies based on traditional beliefs and developed in response to their changing social and cultural circumstances. Modern plant resource use, including gardening is both a cultural and economic response to settled living and is significant for reasons other than food production.
CHAPTER 3.

3.1: PEOPLE, RESOURCES AND DIET IN CENTRAL AUSTRALIA.

Researchers have generally presented a one-dimensional view of the importance of hunting and gathering and the cultural significance of plant and animal resources. For both traditional and modern groups, their resources from the bush have been described in terms of usefulness as food, clothing, shelter, tools and ritual items. There are, however, many social and cultural reasons for hunting and gathering. Resources are chosen for reasons other than the fact that they are available in the environment. The information presented here on diet suggests that cultural preferences strongly influence choices of food resources.

People and resources.

Aboriginal people have lived in the arid region of Australia for at least twenty thousand years (Smith, 1989:312). Within that region there is marked ecological diversity and so various social groups have exploited a broad range of plant and animal species. Some groups, such as the Arrente lived in well-watered and resource rich parts of Central Australia, whereas the Pintupi people occupied extremely arid areas. Traditional Pintupi land is "bounded by the Ehrenburg Range on the east, the gravel plains west of Jupiter Well on the west, Lake Mackay on the north and the Walter James Range in the south" (Myers, 1986:28).

Those who identify as Pintupi today live in communities and outstations on their traditional land, such as Kintore in the Northern Territory. Others live in communities bordering their traditional areas but which are historically significant, such as Papunya, Docker River, Balgo Hills and Warburton, along with people from other areas. All of the Northern Territory communities in which they live are on Aboriginal land. These people have been granted statutory freehold title under the Aboriginal Land Rights (Northern Territory) Act 1976.
Figure 1: Communities and major landforms in the field area.
Figure 2: The principal vegetational formations in the field area.
The field area is wholly within Central Australia (as shown in Figure 1) and is centred on two large Aboriginal communities, Papunya and Kintore and outstations near-by. Papunya served as my base for the first period of fieldwork at New Bore in the Mt Liebig area. During the second period, I was based at Kintore. Hunting and gathering trips proceeded from New Bore, Papunya and Kintore and plant use in home-gardens was researched primarily at New Bore and Kintore.

Climate, landforms and vegetation in the field area are typical of the arid regions of Australia. The major climatic factors influencing vegetation are the variables, rainfall and temperature. Annual rainfall varies between 250-500 mm with most falls occurring between October and March, and the total rainfall being largely dependent on the influence of the northern monsoons. Although some years have higher than average rainfall, droughts are common and can last for seven to eight years (Wilson and others, 1990:4). Poor seasons outweigh good ones in this region (Latz, 1982:135). During drought periods the Pintupi lived on the margins of their country, taking advantage of their relationships with neighbouring groups. In drier times, their resource base broadened and they were able to subsist by exploiting a wider range of plant and animal resources.

The annual temperature regime in the arid region is characterised by marked seasonal and diurnal fluctuations (Slayter, 1962:117). From November to March, day time temperatures are high and also dust haze is more marked in this season (Slayter, 1962:109). Dew is relatively unimportant and occurs rarely in the region (Slayter, 1962:117). Frosts occur seasonally, June-August, in the area south of Alice Springs (Wilson and others, 1990:4). Following the summer rains, vegetation flourishes while the weather remains warm. This is a particularly resource-rich time of year, especially for seed bearing plant resources.

The four principal vegetational formations in Central Australia are:

Low woodland (commonly Acacia aneura);
Bunch grassland;
Hummock grassland;
Succulent steppe (Beard, 1981:xxi).

The southern region, below the Tropic of Capricorn, is characterised by low woodland and succulent steppe and the northern region, by the grasslands where rain falls mainly in summer. Zones are not clear cut and vegetation is influenced by climatic factors, soils types and fire.

Principal formations for the field area are illustrated in Figure 2. The two most widespread formations are the hummock grasslands and low woodland. Vegetation is extremely variable within the generalised categories, however, and what may seem to be an identifiable plant community may actually have many different variations (Latz, 1982:19).

Pintupi people use the following terms when describing where a particular plant species is typically found. Based on my field work, the five different locations combined with their common resources are given below:

(1) Puli, hill country

The Macdonnell Ranges traverse the centre of the region from east to west and although there are no permanent rivers, there are seven river systems into which the hills provide run-off. Depending on the fertility of the soil, the hills landscape supports spinifex (Triodia spp) communities in the less fertile areas and Acacia shrubs and woodland communities on the more nutrient-rich soils (Latz, 1982:33).

The major hills in the field area are the Western Macdonnell Ranges featuring Mt. Liebig, the second highest peak in the Northern Territory, the Ehrenburg Range to the west and the Winnecke Hills further west near the Western Australian border. Dominated by spinifex (Triodia spp), the hills themselves are rarely exploited for plant resources, apart from some species of native tobacco, such as Nicotiana gossei. Traditionally, however, they were important locations of permanent water and the source for foods, such as Ficus platypoda.
(2) Pila, plains country

The woodland communities, such as Acacia and Hakea are found on the plains along with annual and some perennial grasses. Depending on the soil quality, Cassia Eremophila and various Acacias dominate.

There is a variety of vegetation formations on the plains country which is the most important resource zone.

The scrubland dominated by mulga (Acacia aneura) with Eragrostis eriopoda open grassland understorey is an important zone. Honey ants (Melophorus sp.) are dug from the ground under the mulga, after the rains.

In the areas dominated by Eucalyptus or Acacia low open woodland, there is Grevillea juncifolia, much sought after for its honey flowers, witchetty bush (Acacia kempeana) and desert poplar (Codonocarpus cotinifolius) which contain edible grubs in their roots.

In the sand plains dominated by spinifex (Triodia spp) with desert oak (Casuarina decaisneana) over-storey, there are important food plants which come after the rains, such as Solanum spp.

(3) Tali, sandhill country

The major part of the field area is sandhill country which is important for food and other resources (Latz, 1982:20). Much of this area is dominated by hummock grasslands (Triodia spp. and Plectrachne spp) associated with various tall open shrubland species (Acacia spp., Eucalyptus spp. and Casuarina ). The drier and less fertile dune areas carry spinifex vegetation.

Favoured locations in this zone are frequently visited for hunting small animal food species, particularly goannas (Varanus sp.) but also lizards, snakes and feral cats.

"Surface water does not occur in this landscape" (Perry, 1978:73). This is an important consideration today as in the past and people generally carry large amounts of water when they are travelling through this country.
(4) *Karru*, creek, gully; *maluri*, watercourse, swamp.

For most of the year the creeks are dry, but after the rains the run-off from the hills is taken out into the plains country. The creek beds closer to the hills are often lined with River red gum (*Eucalyptus camaldulensis*) or Bat's wing coral bean tree (*Erythrina vespertilio*) which is an important source of coloured beans for artefact-making. An important food, *Cyperus bulbosus* grows prolifically in the wet banks.

(5) *Yapunu*, Salt lake clay pans (also referred to as *maluri* when flooded).

The lakes are dry except after heavy rains and are mostly bare of vegetation. Their surrounds are dominated by various grasses, which give way to *Melaleuca* and *Triodia pungens* as sand cover increases (Latz, 1982:31). This area supports traditionally important food resources, such as the samphire, *Tecticornia verrucosa*.

The availability of resources in each of these zones is dependent on seasonal rain and even today decisions about where and when to hunt and gather certain species are based on the knowledge of the effects of rain. In the past, when survival depended on natural resources, people travelled between permanent water holes, moving out towards the less reliable supplies after the summer rains.

**History of food in Pintupi diet.**

"Before walkabout everywhere. Now we sit down mostly one place - and canteen" (M. Napanangka, 17th February, 1987 at Papunya).

There are many cultural factors operating in the choice of food by any group. People do not simply eat what is available. Diet is the product of the interplay between social, economic and environmental parameters which together reflect the people's particular knowledge and resource opportunities at any given time in their cultural development. The cultural significance of food is explored here through an examination of these factors at various points in the recent history of the Pintupi people.
Traditions of Pintupi resource use were influenced by the presence of missions and later, government settlements in the area about fifty years ago. Total dependence on bush foods was gradually eroded by forced settlement to the extent that some children in Papunya during the 1960s had little experience of bush foods for the first ten years of their lives. Changing government policy towards self-determination has allowed people the choice to resume traditional ways resulting in the continued consumption of bush foods as people desire.

There are four main periods of Aboriginal resource exploitation in the history of Central Australia, reflecting the nature, range and intensity of non-Aboriginal influence on people's lives. Although the Pintupi were contacted more recently than other groups in the region, the same stages occurred:

1. Traditional resource use.
2. Government rations, missions and traditional bush foods.
3. Community kitchens and some rations supplemented by bush foods.
4. Bought foodstuffs from community stores; bush food on irregular basis, weekend/holiday hunting.

The relationships between people, place and their resources changed over these periods while a strong tradition of hunting and gathering persisted throughout the changes. However, traditional resource management practices were restricted in various ways. People were not able to continue their patterns of interaction and country became neglected. The movement of people back to their country has resulted in a resurgence of use and therefore management of resources.

1. Traditional resource use.

The traditional economy of the Pintupi people has not been studied in detail despite the fact that unlike most other regions of Australia, these people lived a traditional lifestyle until the late nineteenth century. Information on past lifestyles has been gathered from two main sources:
(a) The records which generally supplied limited information on lifestyles and resources were made by early observers, such as explorers, missionaries or surveyors to the area; and

(b) Ethnographic research carried out on present populations in the Western Desert region.

Together these are the basis of reconstructions of the past lifestyles.

Travelling on the eastern end of Pintupi country, Gosse (1874) came to Mt. Liebig from the north, continued to the south-west and recorded very brief descriptions of the vegetation and extent of water supplies. During 1889, Tietkins (1891) led an expedition on the southern side of the Macdonnell Ranges across to Western Australia in a quest for new species of plants as part of a broad-ranging scientific exploration of the area. In writing up his list of plants collected on this expedition, Mueller (1889) made very few references to Aborigines, occasionally noting plant resource use, for example, *Vigna lanceolata*, "Roots eaten by Aboriginals" (Mueller, 1889:100). Tate (1896) compiled a plant list based on the work in various expeditions of von Mueller, Gosse, Rev. Kempe of Hermannsburg and Teitkins, together with his own work on the Horn Scientific Expedition. These expeditions came through the edges of the western desert region and generally there was little attention given to Aboriginal plant use. Carnegie (1898:226-227), who is remembered in more recent literature for forcing Aborigines to lead him to water, crossed the Gibson Desert twice. He recorded the contents of a camp site in use and other isolated details of resource use, which give some indication of the people’s life style at that time.

More recently, there have been many attempts to reconstruct the traditional lifestyle of Western Desert people in order to more fully understand their successful adaptation to such a harsh environment. Important insights concerning the nature and use of water and food resources have been gained from work done many years after lifestyles began to change. Even though many groups have significantly reduced their reliance on bush foods, much knowledge of resource management has been recorded. The
following description of traditional practices draws on this information.

The traditional subsistence pattern is strongly influenced by water. In addition to the "ephemeral sources" such as, hollows in trees, water bearing plants and animals and even dew (Peterson, 1978: 26), five ground water supplies have been identified:

(a) Large, shallow and transient pools, *pinangu*; 
(b) Claypans, *maluri*; 
(c) Rock reservoirs in the hills, *walu*; 
(d) Soakage wells, *tjurnu*; and 
(e) "Wells" in the sand or rock between sand ridges, *yinta* (Myers, 1986:26).

There is general agreement that during resource-lean or dry periods, people retreat to more permanent water supplies, either surface or ground water. After periods of significant rain, they spread out to take advantage of other resources in locations further from the main water sources (Gould, 1969:102; Peterson, 1978:26). There is no permanent surface water in the area (Long, 1971: 266), and when the rains provided surface water, the Pintupi were able to exploit many resource areas away from permanent water.

Many have observed that the bush food of the Pintupi and other desert dwellers is gained by hunting and gathering, where the men hunt for larger game, such as kangaroos and other large marsupials, emus, bush turkeys and monitor lizards and the women forage for fruits, honey ants, tubers, seeds, grubs and also hunt for smaller game, such as sand goannas (*Varanus* sp.). Lists which have been compiled on the flora and fauna of the region provide varying levels of information on the foods consumed by Aboriginal people.

From all accounts it seems that meat is the preferred food but was much more unpredictable to ensure as part of the diet. Lizards and snakes seem to have been the main meat staples (Peterson, 1978:27; Meggitt, 1957:143). Kangaroo and other large game were
hunted when available in certain areas, most typically in the period after heavy rainfall (Gould, 1969:32). Gould (1969:37) claimed that the supply of meat rather than vegetable food sustained large gatherings for ceremonies, but there are also accounts of plentiful vegetable food being the major source of food for Pintupi ceremonial gatherings. Myers (1976:268,335) was told of large groups meeting in places where mungilpa (Tecticornia verrucosa) seed was in season and in abundant supply. In a similar pattern of exploitation, Pintupi people used to come together when they knew pitjara (Ipomoea ) were available in the Buck Hills (Myers, 1986:96).

There is disagreement concerning the relative importance of plant and animal foods in traditional diets, mainly because information was collected after traditional lifestyles had changed and also because the researchers were unaware of the full range of influences on people's subsistence patterns. Gould (1969:16) described the subsistence behaviour for a group of Ngaatatjarra living in the desert region of Western Australia. He claimed that "over 50% of the diet of these people is regularly made up of vegetable foods drawn mainly from a list of at least 8 staples", such as Solanum chippendalei and Solanum centrale. Meggitt (1964:33) was convinced that the traditional diet of the Warlpiri, north-eastern neighbours of the Pintupi, was primarily vegetarian and that fruits, roots and most importantly, seeds, formed in the order of 70%-80% of the total food supplies. As Peterson (1978:27) pointed out, this is probably too high and ignores the relative contribution by weight, of foods hunted and gathered by both men and women.

Some further doubt has been cast on the claims concerning seeds in the diet as a result of research in the area north of Pintupi country. Cane (1989:110-111) concluded that edible seeds formed a very important part of traditional diet in the Great Sandy Desert, but were difficult and time-consuming to process. During the coldest periods, when there was no other food available, seeds were eaten in large quantities but at other times they were not taken. Cane's conclusions are drawn from details provided by people who remember past subsistence activities, as well as
information from the archaeological record. This kind of study provides a most comprehensive view of possible past practices.

Storage of plant foods have been documented in so few cases that researchers generally have discounted storage as anything but a minor aspect of plant management in this region. Some seeds and fruits stored in small quantities were observed in early reports. Carnegie (1898:230) described several sticks of the dried fruit of *Solanum sodomenum* (left in bushes for later use and Thomson (1975:24) observed *Solanum* fruits which were dried and stored. Seeds used by the Pintupi are known to have been stored for later use by other groups in Central Australia (O'Connell and Hawkes, 1981:101; Tindale, 1974:100; Kimber, 1984:20; Cane, 1989:104) and perhaps also were stored by the Pintupi in small quantities. It would be fair to assume that, given the unpredictable rains and the general lack of resources during the latter cold months, stored food could have been economically important. However, no large caches of stored food have been found in the region. Similarly, there is no ethnographic evidence that Aboriginal people stored food on a large scale for future use. In the desert region, long term storage would not have been a feasible strategy because as Gould (1991:19) points out, "the traditional pattern of group mobility in this region effectively precluded planned return visits to campsites where such processed foods were stored".

On the other hand, storage may have been very important at certain resource-lean times in some areas. According to Cane (1984:288), this was the case for the storage of seeds in the margins of the Tanami and Great Sandy Deserts: "the Aborigines took conscious steps to store *Acacia, Eucalyptus, Stylobasium* seeds and *Solanum* fruits for the periods of food shortages", namely November - December. Apart from its survival value, storage would have been useful in providing variety in the diet for this period.

It seems likely that storage may have been an influencing factor in the time and location of ceremonies for some groups. The fact that "gathered surpluses were stored in caves for several months [by the Iliaural] so that women did not have to go food gathering every day" (Tindale, 1974:104), meant that their time was
available for other activities. More research needs to be done to provide details for other groups in the region. Most probably, storage was used as one technique in a whole range of strategies which were aimed at ensuring a broadly based subsistence lifestyle.

It has become increasingly evident that interpretations based on the research data relating to traditional subsistence of the various groups, may not be conclusive. There has been no long term study of people living a totally hunting and gathering lifestyle and there are many aspects of the lifestyle not known. There are many cultural factors to be taken into account in order to understand people's food-getting strategies. For the Pintupi, Myers (1986:97) emphasised the importance of social relations. Although "the state of resources determines where people may be" [my emphasis], it cannot predict where they actually are or who is there. Although it is understood that the people followed an optimal pattern of resource scheduling, they were also concerned to visit certain people and particular sacred sites. Moves from one resource area to another were not always based on maximising certain food resources; there were other cultural factors to be considered. So any information about the past has to be cautiously interpreted given the broad range of influences acting on people's behaviour.

(2) Rations and traditional bush foods.

The Pintupi did not have to contend with settlers moving on to their land and so disruption came more slowly than to other groups. Their migration from traditional country to the east started slowly, but by the 1930s they began to find their way to Hermannsburg which had been established in Arrente country in 1877. Brief visits were made to trade dingo scalps and in return for which they received flour, jam, clothing, knives and axes (Myers, 1986:31).

During the 1930s the Pintupi were living in Luritja country east of their traditional country. They had been able to move eastwards because many former residents had already migrated onto cattle stations in the James and Macdonnell Ranges. A great number of
the former residents had died from an epidemic in the 1930s (Tindale, 1974:138). The movement of Pintupi into Luritja country led the mission to set up a ration depot at Haasts Bluff in 1940. Limited rations were provided. Women, children, the aged and infirm each received $3/8d per week as well as "8lbs flour, 1.5lbs sugar, 3ozs tea and some baking powder" (Davis and others, 1977:13). Apart from the government rations the mission provided other foods, such as tins of jam, dried fruit, butter, fruit juice, cheese and vegetables.

Rations were freely available to all except able-bodied men and single women, who were not rationed as an incentive for them "to hunt for dingo scalps or kangaroo hides which the mission traded, at a separate cash store " (Davis and others, 1977:13). In the account of a nurse at the mission: "Meat is not distributed to the camps because it would encourage the natives to become idle. They must hunt their own meat. Before he collects his rations, each able-bodied man must produce 'roo ears to show that he has been doing his job, otherwise his rations are cut accordingly" (Gatrell, 1957:97).

In 1953 the system of rationing was expanded to provide rations for work. A cattle project began and involved the men in stock work, as well as building fences and yards. With some Aboriginal labour, the mission staff planted a large garden and built roads and an airstrip, particularly useful for medical evacuations. A few men and women were employed to help with the garden and to staff the hospital. As well as fresh garden produce becoming available, fresh meat was issued twice weekly to those eligible for rations, supplemented with a lunchtime stew for the workers (Davis and others, 1977:15). The men talked about those times and unanimously enjoyed working with the cattle and getting the fresh meat. This must have been some inducement for them to stay on at the mission.

Droughts at various times meant that food and water resources were scarce for the duration. This gave people an incentive to come in to the ration stations for food and after they received some rations, they could leave again to live in the bush. Some stayed and visited their relatives until the nearby accessible
resources were totally exploited and then they returned west for a period. In the early 1950s, Gatrell (1957:97-100) estimated that there were about 500 people living in a number of camps in the vicinity of the mission at Haasts Bluff. On regular visits to the camps she observed bush food, such as grass-seed cakes, yams, goannas, kangaroos, birds and dampers being prepared. There were times, however, when bush food was scarce.

As the camps became more permanent around the mission, the consistently high numbers brought a decrease in hunting and gathering. Bush foods and other resources were quickly depleted in the vicinity of the settlement and so people would have to walk further to hunt and gather. Also the cattle played a role in reducing the availability of food plants and competed with the native animals for food and water. Moreover, they competed with people for water holes. It seems that while the mission was keen to provide food, especially fresh meat, people were satisfied to take advantage of it and so they had less reason to go bush for food.

Not only the missions but also the cattle stations provided work and food, which made them attractive destinations when survival elsewhere was threatened by violence or being starved of food and water (Davis and others, 1977:9). Pintupi people did not have to compete with cattle stations for their land but could choose to work on stations to the north, south or east. Some men worked for periods at neighbouring cattle stations, such as Glen Helen, which were owned and managed by non-Aborigines. The payment for work was not standardised and depended on the individual employer to a large degree. In the early days of station living in the Northern Territory, the 1918 Aboriginals Ordinance required "country employers to supply food, clothing and tobacco but no wages or housing. Wages for work could be paid into a trust fund but there are many cases of Aborigines never being paid what they were owed. As the regulations were not enforced laissez faire prevailed" (McGrath, 1987:124).

Since very few records of the supplies given to Aborigines were kept, there are few details of exactly what people were fed. Tea, sugar, meat, bread or damper and tobacco were the items
commonly provided. McGrath (1987: 126-127) found that the station rations were fairly basic and contributed to an unbalanced diet unless supplemented by bush food. Those stations which had gardens were able to provide fresh fruit and vegetables generally using Aboriginal labour to maintain the gardens.

(3) Community kitchens.

The decision to establish Papunya settlement 50 km north of Haasts Bluff in 1959 followed when the water was proclaimed unfit to drink. The majority of the people at Haasts Bluff were moved to Papunya with only the families involved in the cattle project remaining.

Papunya, like other settlements, was set up as a "training institution" (Davis and others, 1977:9) in which the people's lives were much more regulated than at Haasts Bluff. In keeping with the government's policy of assimilation, the people were taught to live in buildings, sleep in beds indoors and to eat western-style foods in a dining room. They were expected to work, go to church and attend school. In fact, they were forced to do so; a notable example of coercion being that they were locked into dormitories at night.

There were no rations handed out for people to cook themselves. The settlement kitchen served three meals each day in the dining room to 600 people (in two shifts). The menu and portions were based on dietitians' advice, but there were times when the meals were very poor (Davis and others, 1977:49). As the population increased, the pressure on the kitchen facilities gradually caused equipment to fail and a new kitchen came into operation in 1969. At this time also a training allowance scheme was introduced. People generally chose to spend their money at the store buying food which they then cooked at home, thereby demonstrating "that they had never liked the dining room" (Davis and others, 1977:78) or the food provided.

The role of the kitchen and dining room had changed in practice to serve nutritious food to children and others in particular need,
such as nursing mothers. A sample menu is included in the Papunya report:

**Breakfast**  
Porridge with honey, milk; bread with vegemite

**Dinner**  
Meat, vegetables, bread, fruit; Aktavite with iron supplements or iron and Pentavite.

**Supper**  
Egg-dish, fruit, milk, bread, cheese.

From the official reports it seems that the kitchen dining room was the principal source of food for most people at Papunya for a period of ten years. Children were provided with food for many years afterwards to ensure a continuation of good nutrition. Various social, physical and nutritional problems were associated with this program. Some younger mothers were reluctant to accept the closure of the infant meals programs, probably because they had known no other way of feeding their children (Harrison, 1991:133).

For the new arrivals in the mid-sixties, the compulsory dining room was difficult to accept - "In the first place we been frightened of kitchen" (Nathan and Japanangka, 1983:92). Supervised feeding via the kitchen dining room was aimed to monitor and maintain healthy nutritional practices but there also is some indication given that the food itself was not popular. Perhaps this contributed to a certain lack of good nutrition. "Mothers were reluctant to press food on their children if they found it disagreeable" (Davis and others, 1977:50). A District Officer at the time observed that some people apparently refused to eat and were hand fed to try to induce them to eat. Others "merely took whatever meat there was off the plate and emptied the rest in rubbish bins" (Nathan and Japanangka, 1983:81).

A teacher at Papunya observed that the people "were herded into the kitchen and given food they had never seen before. They threw the vegetables on the floor. No one thought to get kangaroo for them" (Davis and others, 1977:58).

Provision of food which was familiar to the Pintupi would not have necessarily been acceptable to them. There are many kinship-based rules relating to appropriate preparation and
distribution of food, especially large game (Gould, 1967:53-56). A more satisfactory solution was presented by Long who was "convinced that it would be in the best interests of the whole group to offer them the opportunity to live in the bush ... where they could find abundant food palatable to them" (Nathan and Japanangka, 1983: 81). In fact, the Pintupi began a series of gradual moves west towards their own country in pursuit of their old lifestyle, almost as soon as they had left it behind.

Although it is difficult to determine the effects that ten years of compulsory dining room eating had on the residents of Papunya, the experience certainly broadened people's acceptance of different tastes, appearance and smells of food. Some foods and methods of preparation became popular, such as stews. Furthermore, the experience of relative deprivation of bush foods did not diminish the people's desire for those foods which they liked most, especially fresh bush meat.

(4) Community stores and restricted hunting.

In some ways the presence of government institutions, missions and cattle stations enabled people to shift from a subsistence base in which they were dependent on rainwater and indigenous flora and fauna, to a broader and more secure one in which bore water and introduced foods were the means of survival. However, the early stages of this transition were largely rejected by the people and eventually abandoned by the institutions. Instead people in places outside the major centres now have access to supermarket items in community stores which are supplemented by hunting and gathering. This lifestyle is characteristic of 'outstations' which were set up by small groups of people who preferred to live away from the larger settlements. The Pintupi began moving to outstations west of Papunya in 1970s and continue to set up small communities further and further west in their traditional country.

Patterns of movement were no longer dictated by the presence of water at various places during particular times of the year. People were able to resume their more traditional lifestyles because of the increased availability of permanent water on their land. Bores
which have been sunk over many years for various official reasons, such as geological surveys, provide permanent supplies. For this reason these locations often have become the focus of a community. Some groups have requested bores in certain areas so that they could return there. The type of pumping system fitted to the bore governs the way in which water is obtained. With a view to avoiding many maintenance problems, bores at outstations were fitted with hand pumps, which were considered to be the most appropriate technology. Some groups found that this kind of supply greatly restricted their community's development until they were given a windmill and tank. It is possible with this level of technology to have reticulated water for domestic use in the camp. Gardens, too are developed more easily.

By 1970, the great majority of the people in the Western Desert settlements were subsisting almost entirely on food purchased from settlement stores (Peterson, 1978:30). Incomes based on the training allowance and later unemployment benefits were the major source of cash. Food was the major item of expenditure with the remaining funds going on clothes, alcohol and consumer items such as, blankets and billy cans. From my own observations, it seems that although larger stores have a greater variety of goods, the type, availability and quality of foodstuffs vary greatly.

There are many items of food which are available in most stores. Young (1984:52-53) created a list of basic food items which were continuously in demand and compared this to the range of foods available in selected stores throughout the Northern Territory. She found that about half the stores had more than 80% of these basic items. The list included the following items, grouped according to my categories:

**Dry foods**: flour, weetbix, oats, rice, sugar, powder milk, soup, dried fruit, spaghetti, tea, coffee, milo, baking powder, crisps.

**Tinned or preserved foods**: corned beef, corned beef/cereal, camp pie, meat/veg. (tinned), steak pie, frankfurters, tuna, long life milk, spaghetti/tomato sauce, baked beans, green beans, green peas, jam, honey, tinned fruit, rice cream, fruit juice, cordial, soft drink, sweets, baby food.
Fresh foods: fresh meat, chicken, potatoes, onions, oranges, apples, eggs.

Other perishables: margarine, ice cream, cheese, bread.

Although the items listed are similar to the kinds of foods contained in other modern western diets, the meals composed from these foods are not based on a large quantity or variety of fresh food. Furthermore, there is a difference in the quantity of food eaten and the frequency and regularity with which it is eaten. So, although many stores provide a wide variety of satisfactory foodstuffs, there are many social and cultural reasons why people do not have good overall diets. The main reasons are:

(a) Availability of food depends on the type of store and the way in which it is run, combined with local transport possibilities. At most stores there is more often frozen meat rather than fresh meat and commonly no fresh vegetables;

(b) People receive fortnightly payments and do not budget. They tend to buy what they need on a day-to-day basis until their money runs out which generally happens a few days before the next pay day; and

(c) Apart from financial constraints, the next most important influence on diet is storage and cooking of perishable foods.

In a survey of meals of thirty people at Papunya in 1977 (Cutter, 1978:67), it is clear that diet was influenced greatly by the fortnightly system of payment. Most people living in the camps would have a satisfactory diet for a few days after pay day, but for the period between then and the next pay, the diet narrowed down to bread or damper plus sweet tea; "the usual pattern was for bread or damper and sweet tea every meal, meat two to three times per week and vegetables or fruit two to three times per fortnight."

Ten years later, it is my impression that dietary patterns are much the same for people living in the larger settlements. On outstations, people tend to eat more bush food, although this is not the major part of their diet. Cane and Stanley (1985:73) had the impression for small communities in the study area, "that bush
foods contribute about 20%, perhaps a third of the food eaten at outstations", and furthermore, that "more bush food was collected in off-pay weeks when the supplies of store food were running out" (Cane and Stanley, 1985:93). However, there have been no relevant quantitative studies undertaken in this area.
3.2: THE CULTURAL SIGNIFICANCE OF BUSH FOODS IN MODERN DIETS.

The nutritional value of many bush foods has been fairly well established over the last decade. Brand and Cherikoff (1985:41) concluded that many food plants are richer sources of nutrients than expected. Some Central Australian plants have been recorded as having high vitamin content, e.g. wild orange (*Capparis mitchellii*) and others are rich sources of thiamine, e.g. bush banana (*Leichhardtia australis*). The seeds from several species of *Acacia* are shown to be rich in protein and fat (Brand and Cherikoff, 1985:39) and some of these are still exploited today.

Table 1 shows some traditionally important food plants, which have high levels of important dietary components. The information has been adapted from Brand and Cherikoff, 1985. Species marked with an asterisk (*) are commonly exploited in the field area today.

Table 1: Significant dietary components of some food plants.

<table>
<thead>
<tr>
<th>Botanical name</th>
<th>Common name</th>
<th>Nutritional features</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Solanum centrale</em></td>
<td>bush raisin</td>
<td>68% carbohydrate in dried fruit; 17 mg/100 gm Vit. C, none in dried form</td>
</tr>
<tr>
<td><em>Solanum chippendalei</em></td>
<td>bush tomato</td>
<td>Vit. C: 12-49 mg/100 gm (Rec. Daily Allowance=30mg)</td>
</tr>
</tbody>
</table>
**Ipomoea costata**  
*bush potato*  
Thiamine:  
1 mg/100 gm;  
nutrients similar to potato.

**Leichhardtia australis***  
*bush banana*  
Thiamine:  
2.9 mg/100 gm

**Cyperus bulbosus** *  
*bush onion*  
Potassium:  
1000mg/100 gm

**Ficus platypoda** *  
*native fig*  
Calcium: 4000 mg/100 gm, "extraordinarily high";  
High protein and fat compared to normal fruits.

**Acacia coriacea** *  
*dog wood*  
Protein 24%

**Portulaca oleracea**  
*pigweed*  
Protein 20%, fat 16%;  
"Exceptionally nutritious".

Although it is clear that such traditional foods are sources for essential dietary requirements, their significance in the overall diet is not fully known.

Bush meats have been shown to be very low in fat. However, it is the quantity of animal food consumed rather than its nutritional components which have been cause for comment. Gould (1991:19) estimated that the Ngaatjatjarra of the Western Desert ate about 10.6 gm meat per person/day at the time of his research in the late 1960s. All of this meat was derived from hunting and the people went to great lengths to obtain every bit of meat from the animal, including pounding the bones (Gould, 1980:195). Much more recently, the residents of Oak Valley, an outstation in northern South Australia have been estimated to consume roughly 900 gm per person per day, compared to the Australian daily...
average meat intake for men and women of 192 gm (Palmer and Brady, 1991:56). The people hunt fresh meat (approx. 600 gm/person/day) in the form of kangaroo, bush turkeys, goannas and rabbits, because they like it (Palmer and Brady, 1991:54). Fresh bush meat is supplemented by a variety from the store, including tinned and frozen meats. The overall consumption rate is probably similar to other Aboriginal people in that region of Australia and is an important part of their modern diet.

Aboriginal people's view of what constitutes a 'balanced diet' is significant in determining overall consumption of meat and vegetable foods. There is considerable ethnographic evidence that a diet lacking in either meat or vegetables for a considerable period of time is undesirable. Peterson (1976:269) argues that there are "strong biocultural constraints on the composition of the diet". He reports that "a high value is placed on a mixed diet", referring to other groups researched in Northern Australia, who complain if they have either too much meat or too much vegetable food. Meehan (1982a:114-115) explains that "the Anbarra prefer a diet that contains ample quantities of all the different food categories" which they identify from their plant and animal food resources.

For the desert region, Gould (1969:18) comments that there is "a tendency towards an unbalanced diet" because of the preponderance of vegetable foods over meat foods for the group he researched. He implies that this is not the intention of the people but rather a consequence of their geographic location and its ecological implications. They can rely on vegetable foods but the supply of animal resources are less plentiful in this region.

Many questions have been raised about diet in terms of the role of meat and vegetable foods both in the past and today, following the increased use of bought foods over bush foods. Despite the fact that Aboriginal people in Central Australia are keen to get bush food, there has generally been a marked decline in the amount eaten following the substitution of flour. In the late 1960s, Silberbauer (1971:25-26) observed that at Ernabella "there is a component of indigenous foods periodically and fairly regularly added to the diet of store-bought foodstuffs" on which the people
are dependent for all but short periods. Since that time, there
have been some regional studies done which attempt to quantify
the amounts of store food and bush foods eaten by various groups.

Meehan (1982b:149-151) in her study of the Anbarra in Arnhem
Land, found that "traditional foods continue to be gathered,
sometimes in large quantities, but the choice of species is limited
to those that are highly prized and require little processing". In
comparing the amount of store food eaten in relation to bush food,
she found reason to believe "that the structure of the Anbarra diet
in 1972-73 resembled fairly closely that of traditional times,
bought goods replacing gathered vegetables but providing more or
less the same order of energy". In both cases, animal and
vegetable foods are of approximately equal importance but the
modern diet also includes flour and sugar.

Altman (1987:41) demonstrated that for the Gunwinngu of
Northern Arnhem Land, bush meat provides an important part of
the diet (both energy and protein), whereas bush fruit, vegetables,
and nuts have minimal significance in the modern economy.
Dampers made from white flour are the main source of
carbohydrate and have replaced the vegetable staples. The
fortnightly cycle had its effect on diet of this group also. There
was no store at the outstation and the fortnightly payments
coincided with the visit of a store truck. Staples, such as flour,
sugar, tea, salt and rice were bought in large quantities and
generally lasted until the next truck visit but other items, such as
fruit and tinned meat, were consumed almost immediately
(Altman, 1987:182). The reason for this is that most highly
desired foods are eaten while they last and would always be eaten
in preference to the "staples". Although tinned meat was easily
stored, people were keen to eat it, although not in preference to
fresh meat.

Similarly Devitt (1988:80-88) found for two Central Australian
outstation communities that the diet is a combination of bought
and bush foods where bush foods have remained an essential
element of the total diet. For one community, "the store food
component contributed the bulk of energy (61.1%) while bush
foods provided the greatest proportions of protein (73.5%)". Devitt
emphasised the continuing intensive use of animal foods and honey, both in their fresh (bush or other fresh meat) and processed (tinned meats and treacle) forms. According to Devitt (1988:129) women gathered plant food on more occasions than any other resource. My observations of Pintupi women do not support this. However, there are many factors to consider in relation to trends in contemporary women's hunting and gathering.

While there has been no detailed study done for a Pintupi community, Devitt's main conclusions concerning the role of bush foods in the diet are recognisable in those communities. In summary, the diet is meat-oriented and both men and women hunt for meat. There is no fresh meat available from the store and so people are keen to hunt for meat. Honey is most eagerly sought after in the form of honey ants. Some bush plant foods continue to be gathered but only a very restricted range of those traditionally known to the group. The most highly desired plant foods are easy to gather and require little or no processing.

What are the cultural factors which determine modern diet and resource use?

Research on cultural influences relating to food choice have centred mainly on socially sanctioned food avoidance. There has been very little work done in Australia which analyses any particular group's culture of food. Data relating to the food resources of different groups suggests that people's motivation to eat certain foods is not for survival only. Plant species which were considered as food by some Aboriginal groups were not recognised as such by others.

Further evidence that cultural choice is operating in the choice of food, is provided by the fact that food plant species present in both Arnhem Land and Central Australia are exploited in one region only. Golson (1971:203-205), found that two-thirds of the traditional food plants of Arnhem Land are absent from Central Australia, but over half the food plants of Central Australia do occur in Arnhem Land but are not used for food. Furthermore, of
the 45 seed-bearing species whose seeds are used in Central Australia, 40 occur in Arnhem Land but not one is recorded as food.

The five food species in Central Australia which occur in both regions but which are unexploited in Arnhem Land, according to Golson’s list, are given in Table 2.

Table 2: Central Australian food plants occurring in Arnhem Land.

<table>
<thead>
<tr>
<th>Botanical name</th>
<th>Common name</th>
<th>Seasonal availability</th>
<th>Gathering and processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cymbopogon exaltatus</td>
<td>scented grass</td>
<td>perennial, fire tolerant</td>
<td>decoction of roots and leaves drunk for medicine</td>
</tr>
<tr>
<td></td>
<td>(native lemon grass)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dactyloctenium radulans</td>
<td>button grass</td>
<td>&quot;can grow and set seed abundantly even after small rainfall events&quot;</td>
<td>difficult to gather; dehusking with feet is a &quot;tiresome and complicated procedure&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Latz, 1982:App.1,94-95)</td>
</tr>
<tr>
<td>Panicum decompositum</td>
<td>native millet</td>
<td>plentiful after rains and fire</td>
<td>easily gathered</td>
</tr>
<tr>
<td>Acacia holosericea</td>
<td>-</td>
<td>&quot;seeds do not mature all at once but are available on the bush for up to a month&quot; (Latz, 1982:App.1,29)</td>
<td>easily collected</td>
</tr>
</tbody>
</table>
Acacia salicina native willow a rare plant in Central Australia, restricted to clayey watercourses (Latz, 1982:App.1,44)

Possible reasons for this are the seasonal availability of these resources compared to other species. A. holosericea is produced in large amounts but the seeds do not mature all at once and are available on the bush for up to a month. The quantity in which they are produced could be significant as well as variety in the diet. For example, P. decompositum and D. radulans are also produced in abundance. At other times perhaps the difficulty in gathering and processing is a limiting factor on their use. It is not possible to fully explain why certain resources were exploited without a full understanding of the environmental and cultural parameters which effected each resource-getting decision of a group. This data is not available for past lifestyles.

Another reason for the above species not being exploited in Arnhem Land could relate to the widespread importance of wild rice (Oryza meridionalis) which people may have preferred to eat for many reasons, including taste.

Cultural preferences could be significant, according to O'Connell and Hawkes (1981:113-116) but they argue that regional variations in diet are due to choices made on economic grounds. In other words, the reason that the Warlpiri eat the processed seeds of Acacia estrophiolata and the Alyawarr do not identify them as edible, despite the fact that this species grows in both areas, is that this seed is "too expensive" to gather. In terms of the costs and benefits of exploiting seed resources, they suggest that "plants are included in or omitted from the list of species culturally designated as edible on the basis of ... net returns on handling time and the abundance and accessibility of higher ranked resources". So, using this hypothesis, the more abundant and more easily gathered items are more likely to be food than other items.
However, there are many other reasons for people’s choice of foods which have been down-played in that study.

Of the many factors which influence food choice, edibility is not necessarily the most important. "In terms of food, the most important considerations are often taste, colour, smell and texture" (Farrington and Urry, 1985:145). Meehan (1982a:108) argues that the Anbarra, who live in an area rich in resources, discriminate within categories of their food resources and take only the best in terms of their needs, tastes and desires:

"People prefer 'young' plants and animals to those that are 'old'; they also savour 'fat' characteristics, not 'thin' ones, and all display definite preference for 'fresh' food as opposed to that that has been procured a day, sometimes even only a few hours, before. They do not like food, especially fruits and nuts that is 'not ready' preferring that that is ripe and tasty. The most complimentary thing a person can say about any food is that it is 'molamola' ('good' or 'sweet')".

Aboriginal people generally value "fat" and "sweet" foods and they make lot of effort to obtain these food items, especially from the bush. Devitt (1988:123) found that for the women at Utopia outstations, the strongest taste preferences were for meat, fats and sugars and that the bush food resources selected today are those that rate highly in at least one of these three categories. Cane’s evidence for the northern neighbours of the Pintupi, implicitly supports this notion: "The Aborigines explained that they would always prefer to get large game, lizards, tubers and various fruits in preference to grass seeds" (Cane, 1989:111).

Meat, fat and blood are highly valued and fat is considered a delicacy among the Pintupi. Women would always comment on the fatness of goannas as they felt along the abdomen area after capturing them. When the meat is divided, having been cooked, the abdominal fat is eaten with great relish. Lean male goannas were often laughingly referred to as "lover boys", and considered much inferior catches. "Fat" or bone marrow is equally sought after for taste and because it is thought to be "good for you". Blood from animals, such as kangaroos, is drunk from the head after cooking for the taste and "goodness" it contains. From accounts of the practice, it seems that this is the prerogative of the hunter.
People eat a lot more fatty meat than they used to, now that different kinds of meat are for sale in the community stores. There is an effort by health authorities to make a distinction between the two kinds of fat available, where one is better for good health than the other. In "Fat: the video" (1991) Aboriginal health workers demonstrate the various sources of "light fat", obtained from bush animals, and "heavy fat" derived from introduced animals, such as beef, chicken and lamb. The results of nutritional analyses and traditional Aboriginal views about bush foods are brought together to encourage people to eat foods with "light fat" in preference to foods containing "heavy fat". There is some recognition that modern taste preferences for fat and meat are continuations of past preferences and that people eat all fatty meat because they enjoy it. As Devitt (1990:226) explains:

"Aboriginal people in the Sandover River region of Central Australia have a high regard for animal fats. Their view is grounded in traditionally derived notions linking animal fat with high-quality food, abundance and well-being. The associations are complex, multi-dimensional and often symbolic: fat is more than food."

It must be recognised, therefore that there are many cultural factors influencing people's choice of fat and meat. It is my impression that older people are adamant that bush meats are better in every way but they like other meat and will eat it when available. Young people, however, may be keen to adopt more western styles of behaviour, including choice of food. This applies to many different aspects of lifestyles. Further examples are given below.

Aboriginal people believe that fat is good to apply to the outside of the body, as well as to ingest. 'Fat' from witchetty grubs is rubbed over an area of soreness especially the eyes. Rubbing medicines are made traditionally by adding certain crushed or pounded leaves to animal fat, such as emu, goanna, kangaroo, but today various commercial products, such as vaseline, butter or margarine are readily available substitutes. During preparation for ceremonies, the women applied margarine to their upper bodies before body paint. The application of a lubricant allows the ochre 'paint' to be applied more easily and effectively, but
furthermore, the women's attention to massaging and oiling the body is central to the activity.

"Sweet" taste is attributed to many kinds of foods depending on the perceived quality of each particular example. Some bush meat, such as the tail meat of the ngintaka, monitor lizard was described in this way. When fruits, flowers, and nuts are gathered at their best they are considered sweet. Some roots and tubers also taste sweet and thus are highly valued. Honey ants are one of the most sought after bush foods. Women at New Bore sometimes spent many hours digging for a relatively small amount of honey in the form of honey ants, but it seemed that almost any amount of honey made the trip worthwhile.

Water, as well as food, is rated along taste lines. Fresh clean water is valued and care is taken to have clean containers for water. People have voiced dissatisfaction with their water supplies at different times. M. Napanangka states that the water piped to her house at Papunya is often not suitable for drinking or even watering a garden: "Water tastes like kumpu (urine) sometimes".

Away from modern water supply systems, some traditionally used wells, rockholes and soakages are still used and are important for survival in the bush. These rockholes and other sources of water are carefully cleaned of any foreign matter that may have polluted the water or obstructed the opening since the last visit. An old Pintupi woman, while reminiscing of the travels she made in her country, thought of a particular waterhole which she had not visited for many years: "I want to go back to Pitiŋku and taste the water again." The memory of good water is strong and lasting.

Water and all other kinds of beverages are much more readily available to people today. But do they drink more than in the past because it is available?

Early observers have provided much anecdotal evidence that Aboriginal people are able to go for long periods without water, even in very hot and dry conditions. There are three aspects of their physiology compared to Europeans which are relevant: Aborigines are able to take in large volumes of water rapidly,
excrete it rapidly through the kidneys and also have high rates of sweating with rapid sweat repression in humid conditions (Kirk, 1983:163). This means that they are able to go for long periods without drinking but they need to drink vast quantities when they do.

It is not clear that people drink more than they did in the past or that even if they do, it is because they need to. People's desire to drink soft drinks and sweet tea may be more a desire for sweet tastes than fluid. It may be the case that people are drinking more fluid or perhaps smaller amounts more frequently than in traditional times. The main reason is probably that they like the various drinks available.

Sweet store foods are also high on the list of priorities. From my observations, sugar and cool drinks are the most frequently purchased sweet items. Other popular sweet items are custard, sweetened tinned rice and fruit, lollies and icecreams. Custard powder which has a very high sugar content is a popular purchase with mothers of small children at Kintore. The custard is conveniently made in almost any container by adding hot water from the billy can to the powder and mixing to the desired consistency, usually very thin.

Sugar is primarily for use in tea, which has an important nutritional, social and cultural role. Along with flour and sugar, tea was the first and most consistently introduced food given to Aborigines. The taste and stimulant effect is enjoyed and it is consumed in large quantities daily by everyone except very small babies. There is always a billy of tea available in camp and the makings are generally taken on any bush trip. After the water is boiled, tea is added and following brewing time an almost equal amount of cold water is added. Because of the growing awareness of the link between a high sugar diet and diabetes, some people have changed to having black tea without sugar or with powdered milk added; but it seems that everyone prefers it sweet.

One of the appealing aspects of alcoholic beverages, apart from the intoxicating effects, is sweetness. Flagons of sweet drinks such as port and sherry are very popular for their taste as well as being relatively inexpensive. Traditionally, the Pintupi and other Central
Australian desert groups added sweet flowers, such as *kalinykalinypa* (*Grevillea eriostachya*) or *yultukunpa* (*Grevillea juncifolia*) to water, concocting a sweet beverage. There is no documented evidence that people knew about the conversion of sugars to alcohol, however, "there are minor indications that honey dew gathered from flowers, such as *Hakea* in the Western Desert ... became more pleasing to the palate if kept all day, for drinking in the evening" (Tindale, 1978:161).

So, there is some evidence that this desire for sweetness is not a result of introduction to new food items and overall changed diet. People now have more time to pursue the foods that they really like since they are able to choose when they want to go for bush food rather than always needing to for survival. Devitt (1988:124) found that all bush foods included in the modern diet offered sweetness or fat. She suggests that this is a significant reason that seeds were so readily dropped from the diet following the ready availability of flour.

**Demise of the seed cake.**

Traditionally, the Pintupi exploited many seed bearing species for food, but to what extent was it out of necessity or choice?

When the women spoke about their gathering activities in the past, they invariably listed the seeds of herbs, grasses, succulents, acacias and eucalypts, which they had gathered and described the methods of processing. There are four categories of these plant foods based on 'use' (adapted from Myers, 1976:48):

(1) **Nyuma.** Seeds are ground by stone mortar and made into cakes (*nyuma*) cooked in hot ashes, e.g. *Eragrostis eriopoda* and *Chenopodium rhadinostachyum*. A list of species prepared in this way appear in Table 3, followed by a detailed description of the gathering and processing of *Chenopodium*.

(2) **Lungkunpa.** Seeds are ground by mortar and made into a wet paste, by gradually adding water, e.g. *Acacia aneura* seeds are still prepared in this way. Other species are listed in Table 4.
(3) *Tiŋu*, e.g. *Solanum centrale*. Fruits pounded and pulverised into a thick paste, then rolled into a big ball for storage. Both Gould (1969:20) and Thomson (1975:24) have observed this practice.

(4) *Ngaru* (*Solanum chippendalei*). Fruits with inedible seed cores that must be removed. These can also be dried and skewered on sticks (Peterson, 1979:173).

Species which belong to the final category, require the least amount of processing and are still exploited today. Those requiring Category 3 processing are no longer dealt with in this way probably because people do not need to store food to ensure variation in their diet or for survival. Categories 1 and 2 relate to the major groups of plant foods traditionally used and generally are not exploited now.

In Central Australia, about 70 plant species were utilised for their edible seeds and the two most important were grasses and wattles (Latz, 1982:52). Many seeds were ground and mixed with water for making unleavened cakes, as in Category 1 described above.

Table 3: Seeds ground to make cakes.

<table>
<thead>
<tr>
<th>Language name</th>
<th>Common name</th>
<th>Botanical name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>lukarraṯa</em></td>
<td>a sedge</td>
<td><em>Fimbristylis sp.</em></td>
<td>(Importance rating 1-4)* 2-3</td>
</tr>
<tr>
<td><em>wanguŋu, ngulu, kalarrpa</em></td>
<td>woollybutt</td>
<td><em>Eragrostis eriopoda</em></td>
<td>1; grass</td>
</tr>
<tr>
<td><em>tjuṯu, kalpari, maṯura</em></td>
<td>crumbweed</td>
<td><em>Chenopodium rhadinostachyum</em></td>
<td>2; herb</td>
</tr>
<tr>
<td><em>mungilpa</em></td>
<td>a samphire</td>
<td><em>Tecticornia verrucosa</em></td>
<td>1-2; important for Pintupi</td>
</tr>
</tbody>
</table>
pulitira (seed heads), *tjanpi*, *nanpi*, *mankalpa*

*Triodia basedowii* hard spinifex grass not containing resin

purrunjari button grass *Dactyloctenium radulans* 3

wakati pigweed *Portulaca oleracea* 1; greens eaten; two forms, "man"-erect, "woman"-prostrate

wayali

wilypirrira (no specimen collected) - small black seed; plant grows in watercourses

yalkara, *mulyalkari* bunch panic *Panicum australiense* 2

yilytjuta native millet *Panicum decompositum* 1-2

*Includes Importance ratings (1-4) from Latz (1982: Table IV):

1 staple food
2 important food
3 less important
4 minor use

Various plant food processing techniques are described in the literature (Cane, 1989:104-110; Devitt, 1992:47-51; Latz, 1982:44-72; O'Connell and others, 1983:84-95; Tindale, 1974:99). The accounts are similar although differing in the amount of detail. Traditional seed processing consists of gathering, soaking, threshing, yandying², winnowing, grinding and cooking. The

² 'Yandying' is the process which separates seeds from dirt and other material by repeated rhythmic motions of a shallow wooden container.
The precise combination of techniques varies according to the seed type.

To begin with, seeds are gathered in different ways as well as requiring certain processing for consumption. The description of processing below demonstrates that this activity was indeed time-consuming and hard work. Reiterating Devitt (1992:51), "descriptions of seed being 'collected and ground' clearly belie the lengthy and repetitive character of the actual process". The women were very keen to describe the full process and demonstrate the traditional practices for more than one species so that I might appreciate their knowledge and the significance of their resources.

I observed the procedure for processing kalpari (*Chenopodium rhadinostachyum*), "an erect, odorous sticky herb ... growing in most habitats but more common in mulga communities" (Latz, 1982:79). It has small, black seeds which appear about a month after rain and are held on the plant for some time. Traditionally, it was an important food source as it was available later in the season than most other food plants. Although it produced only tiny seeds, the seed coating is relatively soft making processing easier than for species with very hard seed coats, such as most edible species of *Acacia*.

**Processing of seeds into seed cakes (Category 1).**

**Collection and processing of kalpari (*Chenopodium rhadinostachyum*).**

21/9/1987. At Kintore in the sandhill area north of the airstrip. Three women collected *kalpari* for 45 mins. by removing entire plants from the ground and placing them in billy cans. Each plant stood about 30 cm high and pulled out easily. Plants and loose seeds were then emptied out onto large scarf. The plants were then held in bunches over a billy can and rubbed clean of tiny black seeds and yellow/green seedcases (their colour depending on degree of dessication). Plants were discarded and the large billy can, about three-quarters full of uncleaned seeds was taken back to camp. The women also collected a couple of armfuls of dry
spinifex grass, *tjanpi* (*Triodia irritans*), for use in processing. On returning to the *yalukuru*, women's camp, two women prepared to process the *kalpari* in the following way, (Steps 1-7, separating the seed; Steps 8-12, grinding - baking):

1. A large enamel washing dish encrusted with the makings of a white flour damper was cleaned.

2. The contents of the billy can was emptied into this dish.

3. A handful of lighted spinifex was held down in a dish and the seed mixture was sprinkled through the flames. This process was repeated many times to ensure the entire mixture was treated.

   The mixture gradually appeared darker and darker in colour as the seeds became parched and the rubbish burnt. The enamel dish became very hot to touch.

4. The seeds were rubbed between hands and also rubbed in the dish using a hand-stone.

5. The mixture was winnowed. Handfuls were held high and as the seeds and sand grains fell to the dish, the wind carried the chaff away. This was repeated many times.

6. The mixture was sprinkled through the flames again, as in Step 3. Rubbish and vegetable material turned white.

7. The remaining fine-grained mixture was yandied in a curved dish, *kanilpa*. Traditionally this would have been made of wood but the item used had been fashioned from a vehicle hub-cap battered into roughly traditional dimensions. The yandying process, described in detail for other species (Cane, 1989:105; Devitt, 1992:49) separates the sand, seed and chaff. The same technique was used for *kalpari*. The black *kalpari* seeds congregated in the centre of the dish and the sand and chaff collected at opposite ends, from which they were periodically emptied. This process continued, adding handfuls of mixture, yandying, expelling the rubbish, until all that remained was a satisfactorily cleaned amount of seed. I estimated that there was about 750 gms, enough to make one seedcake. The process so far
Grinding:

The process of wet-grinding seeds requires a grindstone, *tjiwa*, a handstone, *tjungari* and a dish, *kanilpa* to collect the mixture. Traditionally, the grindstones were very important pieces of equipment for any group in this region, given the role of seeds in people's diets at various times in the past (Smith, 1986).

Today, the women and men use grindstones for many purposes, e.g. pounding the leaves of chewing tobacco, grinding various coloured (red, yellow, white) ochre stones and charcoal to powder for use in body painting and artefact decoration, and also for grinding seeds in food preparation. The materials used are no longer rocks which have been worked to become individually-owned grindstones. Instead, people improvise using items which are readily available, such as clay house bricks, concrete blocks/bricks, flat stones and even dis-used grindstones retrieved from the landscape. Any hand-shaped rock chosen from the ground nearby serves as an upper grinding stone or hand stone, although some are retained for re-use.

In processing the *kalpari*, the women used a grindstone showing considerable use-wear which they had brought back after a recent hunting trip, and a suitable handstone picked-up off the ground within a few metres of the camp area.

The processing continued:

8. A shallow depression was made in the ground to accommodate a dish (the battered hub cap, *kanilpa*) and the grind-stone was positioned to overlap the dish so that the mixture could drip from the stone into the dish.

9. Seeds were ground little by little (about two tablespoons at a time) on the grindstone. Holding the hand stone with two hands the woman rubbed the stone backwards and forwards over the seeds on the grindstone, sprinkling water on the seeds about every six rubs to maintain a moving
paste. The paste gradually dropped over the edge of the stone into the dish below. The mixture at this stage is \textit{lungkunpa} and is scooped up and eaten off the index finger. Some species are not processed beyond this stage (see below).

10. Meanwhile, a fire had been prepared and allowed to burn down to coals (\textit{pinyiri}) ready for cooking. A depression was dug into the coals and the hot sand below. Small amounts of paste were dropped into the hole in a line forming one long loaf shape.

11. A burning stick was held close to the exposed surface to seal the mixture.

12. Carefully the sand and coals were heaped over the cake from either side, covering it to a thickness of about 20 cm, and then some large coals were placed on the top.

This cake took about 10 mins to cook. The coals and hot sandy ashes were scraped away and the cake tapped, a hollow sound indicated the cooking was complete. It was removed and brushed free of sand and ashes, ready to be eaten.

The total time taken for the gathering and processing for one seed cake by two women was three hours and twenty five minutes. This is consistent with other reports of similar work, which include estimates of the processing time required to produce a kilogram of flour from various grass or \textit{Acacia} seeds range from two to four hours (Smith, 1989:313). While it is true that the women worked quite slowly and were probably not as efficient in their work as they would have been if it were an every day activity for them, there is obviously a lot of work involved in processing this species. Other species did not require such elaborate treatment.

\textbf{Processing of seeds into wet paste (Category 2).}

The other most common method of processing seeds as described above in Category 2, referred to as \textit{lungkunpa}, is to grind the
edible seeds to a paste. Most edible *Acacia* and some other species were treated in this way, as listed in Table 4. In the same way as for the preparation of seed cakes, various species prepared as an edible wet paste require different processing, e.g. some hard-cased *Acacia* seeds require soaking or parching before grinding. Although this process is less time-consuming than making seed cakes, it took considerable time, depending on the particular combinations of techniques used. Although these seeds were described primarily as *lungkunpa*, some women claimed that seed cakes could be made from these also:

Table 4: Seeds eaten as a wet paste.

<table>
<thead>
<tr>
<th>Language name</th>
<th>Common name</th>
<th>Botanical name</th>
<th>Notes*</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>kayurru</em>, <em>wintalka</em></td>
<td>mulga</td>
<td><em>Acacia aneura</em></td>
<td>1-2; available 4 weeks Oct.</td>
</tr>
<tr>
<td><em>kilykiti</em></td>
<td>-</td>
<td><em>A. cowleana, A. holosericea</em></td>
<td>2-3; available 4 weeks Sept.</td>
</tr>
<tr>
<td><em>minyina</em>, <em>watiyawanu</em></td>
<td>-</td>
<td><em>A. tenuissima</em></td>
<td>4;</td>
</tr>
<tr>
<td><em>mintjyu</em></td>
<td>-</td>
<td><em>A. dictyophelba</em></td>
<td>2-3</td>
</tr>
<tr>
<td><em>ngalta</em></td>
<td>native kurrajong</td>
<td><em>Brachychiton gregorii</em></td>
<td>3</td>
</tr>
<tr>
<td><em>pangkuna</em></td>
<td>dogwood</td>
<td><em>A. coriacea</em></td>
<td>2; green seeds cooked in pod and eaten (today)</td>
</tr>
<tr>
<td><em>wakalpuka</em></td>
<td>dead finish</td>
<td><em>A. tetragonophylloita</em></td>
<td>3-4</td>
</tr>
<tr>
<td><em>warrilyu</em>, <em>tjitulypurru</em></td>
<td>blue mallee</td>
<td><em>Eucalyptus gamophylla</em></td>
<td>3</td>
</tr>
</tbody>
</table>

*Includes Importance ratings (1-4) from Latz (1982: Table IV)
None of either of the above nyuma or lungkunpa were prepared on a regular basis although people claimed to occasionally make traditional seed cakes (e.g. from Eragrastis eriopoda) and paste (e.g. from Acacia aneura). Nevertheless, the amount and variety of seeds which were available in the community at any given time was surprising. I observed the processing of kayurru (Acacia aneura) twice and noted that the paste looked and tasted a lot like smokey peanut butter. The taste was clearly appealing to the children and also to the women processing the seeds.

Even in traditional times it appears that seeds were mostly exploited during the leanest times at the end of winter. For most edible seed species the women commented that they were used for food after rains at the "end of cold time" when there would have been a relative scarcity of food. In other words this suggests that people ate these foods when they were compelled to do so rather than that they liked to eat them. The time and effort needed for processing has most often been given as the reason for dropping them from the diet. Devitt (1988:159-160) estimates that the introduction of processed flour relieved the women of between 5 and 10 hours work per day. However, there is some evidence also, that taste may have played a role in people's rejection of seeds. Cane (1989:112) reported that for the people, who traditionally inhabited the Great Sandy Desert, "the edible seeds of shrubs, acacias, eucalypts, spinifex, and the succulent Tecticornia verrucosa were generally at the bottom of the list of preferences", although at times of food stress they can be important sources of food.

At Kintore, from my observations, it seemed that people did not particularly like the taste of certain seed cakes. The women demonstrated how to make two different cakes from the seeds of mungilpa (Tecticornia verrucosa) and kalpari (Chenopodium rhadinostachyum). We gathered and processed the seeds and then cooked and ate the cakes. The texture was the first quality which I noticed, more than the taste. Unlike bread made from highly processed flours combined with various leavenings, the seed cakes were very gritty and heavy. Admittedly some of the grit was the result of ash and sand grains inadvertently being combined in the
mixture during preparation on the ground, in quite windy conditions at Kintore. The women did not comment that it was unusual in its grittiness.

Old women were very familiar with this traditional food and volunteered that it was "good tucker" and that they liked to eat it. None of them, however, showed a great desire to try some, perhaps because it was a 'demonstration model'. Instead they suggested that some of their male relatives might like to try the two seed cakes. I offered them to various people to taste. Three middle-aged men tried small pieces of each cake. One man knew both and the other two men were reluctant to guess. They were adamant that it was good food but also added that it was "olden time tucker", and one bite was sufficient in every case. Younger men and women did not seem keen to try. One young man refused saying that he had never seen it before and that seeds were "tucker for all those old women".

As mentioned above, the other significant reason for dropping seeds from the diet is considered to be the amount of time and energy required to process them. O'Connell and Hawkes (1981:99) argued on the basis of the Optimal Foraging Theory that when the Alyawarr adopted flour in preference to seeds, they chose to maximise their returns from resources available to them. However, this is not necessarily the case. There is ethnographic evidence for groups elsewhere in the world, that some prefer root foods over seed foods, even when root foods require great energy expenditure in processing (Hillman, 1989:220). If the foods were not highly desired, then it is probably true that the time and energy needed to process the seeds was an important factor in their dismissal from the diet.

People's choice of seeds as a food resource can be summarised in the following way:

(1) Certain seeds were found to be edible following processing and in the past were eaten when survival depended on it;

(2) Seeds were readily replaced by white flour most probably because of its taste and relative ease of processing; and
The seeds and roots which continue to be exploited require minimal processing and are desired for their taste, at least, and possibly other cultural reasons.

**Cultural factors behind modern food choice.**

Tastes have certainly broadened to include new foods. There are many anecdotes of Pintupi people who remember what it was like when they first tasted the white man's food. One woman living at Papunya recalls early visits by "whitefellas" (Europeans) who brought rations to Ilypili, a place further west. "We'd get all sorts of tucker - oranges, raisins, bananas, plums, rice and cool drink. We'd collect them and take them, along with meat, to the creek. But we wouldn't eat that tucker; we didn't know about it - so we'd pour it into a hole in the ground. We put them in there - the oranges, bananas, plums, and everything. Then we covered them with dirt. We'd cover them right up and leave them and return to camp ... . We couldn't eat the whitefella's food." (Napurrula, 1987:14). Gradually they became more familiar with the whitefella's food. People have now accommodated new foods into their beliefs of what is good to eat and today some of these foods, especially fruits, are highly desired and people have grown certain exotic fruit species in their gardens.

Temperature is another important element in people's appreciation of their food. Tea is never drunk straight after the water has boiled without the addition of an equal amount of cold water (and generally lots of sugar). Food cooked in the fire is left to cool for easy handling and seems to be preferred that way. "Cool drinks" can be bought from the store where they have been refrigerated. If they are consumed straight away, it is not because they must be drunk cold. They are often kept and drunk when desired without too much concern about their temperature. Generally, very cold and very hot beverages and foods are not preferred.

Colour is a significant element in the acceptance of food in any culture. Although I have not formally investigated people's concept of colour or use of colour terms in their languages, I
observed the significance of colour in relation to food on a few occasions.

On an overnight bush trip with Aboriginal parents and school children from Papunya the non-Aboriginal teachers found that water was running low and decided to mix the damper with water from the vehicle water tanks. The water was slightly discoloured producing a healthy brown, wholemeal complexion in the dampers. The children at first did not want to eat it and the parents laughed about when they had to eat wholemeal bread from the settlement kitchens at one time. Everyone was happy to eat once they realised it was only dusty water which caused the difference and not "that rough flour". In the wider Australian society, the opposite trend for bread colouring is true, where there has been an increase in the amount of wholemeal and unbleached flours used for bread-making. Some brands are being made of brown-coloured white flour in an attempt to meet the growing demand for non-white bread.

Colour of traditional bush fruits is a one guide to their readiness for eating. One Pintupi man, when confronted with an avocado for the first time would not eat it saying it was green and therefore unripe. We showed him that the test for ripeness in this fruit is softness and so he was satisfied to try it: his verdict: "Tastes same like maku (witchetty grub)". This man has since attempted to grow avocado from seed in his garden because he liked the taste.

Modern diets include many foods which require processing. Bush foods continue to be processed in traditional ways. Bush meats are prepared by gutting in the appropriate fashion and then roasting in a ground oven. Plant foods which require cooking are generally lightly roasted in the coals for example, *Leichhardtia australis* and *Acacia coriacea*. In general, the plant foods that continue to be exploited require minimal processing. Store food is generally processed using methods borrowed from European culture. Most commonly meat and vegetables are prepared by boiling in a pot or billy can. Fresh meat is often fried or grilled on the coals. Processing of bush foods is not yet significantly altered by introduced methods of food processing and people show some concern if foods are not collected and prepared in the proper
manner. However, in Central Australia there are examples of introduced processing methods being applied to traditional foods: "people regularly re-fried kangaroo meat with onion and ate it garnished with salt and occasionally sauce" (Devitt, 1988:128).

Presentation of food for eating is also traditionally based. Animal foods are presented in joints which are ripped or cut from the main body of cooked meat in appropriate sections. People have strong aversion to skinning animals. All animals are cooked in their skin but meat can be torn or cut off a joint for consumption. Plant foods are also distributed when ready for consumption which for some species means after processing. Others, such as the fruit of *Solanum chippendalei*, which are processed prior to eating each fruit, are distributed whole and in bulk, for example, a billy can full of fruit.

Meehan (1982a:114) comments on the "simple but attractive" presentation of food by the people with whom she worked in Northern Australia. The Anbarra firstly clean the food and then place it on a platter of green grass or paperbark. My observations of the Pintupi suggest that presentation of traditional foods is evident only in the act of presenting the food into another person's hand. Food items may require some division, such as sectioning an animal or breaking a damper, but there is generally no superfluous packaging involved. Non-traditional foods are generally prepared and presented in whatever clean containers are available, for example, soups and stews are placed in pannikans or enamel bowls for immediate consumption. Tea is often drunk directly from the shared billy can.

There are standards about the appropriate amount of cooking required for various foods and this is clear at the time of presentation. Dampers are taken whole from the fire and tapped to be sure that they are cooked. They must be cleaned of sand, coals and ashes after being removed from the fire. Traditional seed cakes, too, should be taken whole from the fire to cool and then broken to be shared. If they break accidentally when being dusted after removal from the fire, then they are not perfect. W. Napaltjarri was not happy about presenting me with a broken seed cake made from *mungilpa* and said it would taste all
right but it was not good to be broken. Perhaps the consistency
was not ideal and she felt that this reflected negatively on her
skills.

People have adopted some styles of food presentation from non-
Aboriginal culture. At a fishing picnic by a creek near
Kowanyama, an Aboriginal community in far north Queensland, I
was offered tinned fish sandwiches wrapped in glad wrap and
placed on a paper bark 'plate'. This is the most elaborate
accommodation of styles in food presentation that I have seen!

The role of older people, particularly women, is generally
recognised as a conservative force in relation to a group's food
choices. The women were much happier eating bush foods when
they could get them. Older people are "more thoroughly
indoctrinated in the foodways of the group and tend to resist
changes" and furthermore "the general pattern is that women side
with the forces of tradition in resisting change" (Simoons,
1961:123-125). By contrast, children are more ready to accept
new foods.

It seems that some traditional foods are perceived to be important
only by old people. Younger people denied the continuance of
some traditional practices which are actually still followed. In
Central Australia, I was told on a couple of occasions that people
did not eat snakes or snake eggs anymore and that it was an olden
time practice of the "bush mob". Even after one hunting trip when
there was considerable effort made to kill a snake, the woman
who bundled the snake into her bag claimed that it would be
taken to the old people in camp. Later that day I observed the
cooked snake being shared around the camp fire by the woman
who collected it and her relatives while they were playing cards.

It seems there is a perception that certain traditional food is
unacceptable to non-Aboriginal people. Although the reason
behind such behaviour is not totally clear it probably stems from
earlier days when some Europeans may have shown fear and
disgust at the thought of consuming an animal which is not
considered food in their culture, such as snakes and feral or native
cats. Furthermore, in some places efforts were made by white
people to prevent Aboriginal people from eating this food and
those who did eat it were identified as inferior and ignorant by their more acculturated relatives. Now, when there is much more freedom to hunt freely, some people would still rather deny their food customs, than be classed as myalls.

Some foods are prohibited for certain people at certain times and this varies between groups. Altman (1987:175-180) describes the taboos on food which govern the patterns of consumption of the Eastern Gunwinggu of Arnhem Land. Effectively, the elders restrict the range of foods available for others, (especially pregnant, menstruating or lactating women and young initiates) but their power in this regard has significantly declined in recent times. Whatever the effect of the traditional restrictions it is claimed that in modern diets there is little nutritional effect from the few taboos which are followed. Store food is not subject to restrictions and so there are many alternatives to the restricted food. In a study of Tiwi food and nutrition, Harrison (1991:141) concluded that for women, giving up one or two fish (usually) is no hardship and does not have nutritional consequences. Central Australian groups, such as the Pintupi and Warlpiri, are thought to have no modern food taboos.

Aboriginal people's attitudes to both traditional food resources and introduced foods demonstrate that the cultural significance of traditional resources permeates modern lives in many ways. There are many factors operating in the choice of food, such as a group's concepts of taste (especially sweetness), texture, smell, colour and freshness, as well as what constitutes a 'balanced diet'. For the Pintupi groups, the major changes were brought about by the settlement process and Aboriginal people's gradual inclusion into the wider Australian economy. In some ways, their resource opportunities were enhanced through increased access to a wide range of consumer products, but in other ways their access to resources, especially traditional foods, was limited. Furthermore, people sometimes made choices in favour of introduced foods.

Concepts of good food are related to health and nutrition but also to other cultural values, such as pleasure, status and identity. In the process of adapting to changing lifestyles, traditionally oriented Aboriginal people have established modern cultural
preferences for food. Although Aboriginal diets in Central Australia are based on the typical fare of the Australian outback, tea and damper, they are peculiarly Aboriginal. Today, Aboriginal people's food derives from the bush and the store, despite the fact that bush foods are no longer essential for survival. There are strong influences to change in certain ways, but people have chosen along the lines of traditional likes and dislikes. The traditional preferences for sweetness and fat continues in the choice of foods today.
CHAPTER 4.
THE CULTURAL SIGNIFICANCE OF HUNTING AND GATHERING.

Aboriginal people in Central Australia continue to hunt and gather many traditional bush resources even though their biological survival does not depend on it. While they do exploit the bush for economic reasons, there are many social and cultural reasons for pursuing their resources. My observations of the present day hunting and gathering patterns at Kintore, Mt. Liebig and New Bore are presented below. An extensive range of bush products is recorded along with details of their cultural importance today. Techniques employed for the manipulation of these resources continue to be practised as part of the people's responsibilities for their country. In telling some of their histories, the women demonstrated continuing commitment to their country and its resources.

My main objectives in this area of fieldwork were to accompany people while they pursued hunting and gathering activities of their choice, in order to collect data on traditionally based plant resource management, and to analyse the cultural significance of hunting and gathering today.

Five months of field work in the Papunya and Kintore region of Central Australia extended over two periods: Field trip 1, February - May 1987 and Field trip 2, September - October 1987. During these periods, I accompanied small groups of women (primarily) on 35 hunting and gathering trips, as well as studying the people's gardens.

I went to the field with the knowledge that Aboriginal women living in the bush like to go hunting and that a non-Aboriginal equipped with a Toyota four-wheel drive vehicle is a useful means to their ends. During my earlier visits to the field area and when I worked as a teacher there, I had established contact with those women who wanted to be involved in my work. Through a gradual process of negotiation and mutual assessment, we defined our relationships. The links established during the early more
casual trips identified a core of informants for my later research trips to the area. Some of these women came on each hunting trip, as well as providing assistance and knowledge on all matters of life and culture particularly relating to plants. In each community there were one or two women who were my main informants and they took charge of me and acted as brokers in most interactions with the wider community.

People use every opportunity to hunt and gather the most desirable resources. While driving along the road there is always the chance of seeing tracks or the game itself. Whether in the day time or half light, especially in the case of kangaroos, most opportunities are taken. Men are involved in hunting kangaroos, emus, perentie, bush turkeys and goannas, while women concentrate on goannas and plant foods. There were times when the women saw a mob of kangaroos or bush turkeys and nothing was done to catch them because the women did not generally hunt these larger game. The information, however, was passed on as soon as we reached camp. In the case of recent sightings, some men would go immediately to the place described.

Women never hunt alone and generally travel with other women. Combined or family trips consisting of men and women are usual where the men drop the women (and children) at their chosen location, and then continue in the vehicle to another location to hunt larger game. Towards sunset the men return to the same location to collect the women, both groups having already cooked and eaten their fill of the day's catch.

Each hunting and foraging trip with the women lasted almost an entire day, including preparation time. Hunting also occurred at other times whenever an opportunity arose. Frequently, people hunt while travelling by motor vehicle between communities or while getting firewood, but generally in these circumstances hunting is restricted to game visible from the road.

On previous trips to the area, I was keen to take people hunting in my vehicle. The women assumed correctly that I would again participate in this way. Following an initial discussion concerning
my research interests and proposed length of stay in the area, the
typical hunting trip pattern emerged.

In general, people wanted to go driving in the bush as often as
they could, but there were certain types of events which would
often prevent this: work, arrival of the mailplane, "cheque day"
(day for Social Security payments), women's dancing performance
and instruction for the school and important social occasions, such
as ceremonial obligations, funerals and football matches.

Patterns of hunting and gathering trips.

The role of bush trips is closely related to the pattern of their
occurrence. Most of the bush trips on which I consistently
accompanied larger groups of women, occurred on Saturdays and
Sundays. It seems that people have become much more keen to
spend the whole day away from the settlement on the weekend.
One young woman commented that it was Aboriginal to go bush
on the weekends as opposed to the habit of white people living in
Aboriginal communities, who stay home, shut indoors.

The term that people use for hunting trips is *wilinyi*, which
means "walkabout; hunting trip; a food gathering or hunting trip"
(Hansen and Hansen, 1992:175). People go for "bush tucker"\(^3\) at all
times. However, there are many reasons for wanting to go bush on
the weekend, as opposed to week days because of employment
obligations, community business or school, which prevents
children being taken to the bush. These relate to past practices
and modern lifestyles, in particular, the structure of community
services, social relations and individual resources.

Community services: Aboriginal staff working in government or
local administration generally do not work on the weekend. Some
staff are rostered in the clinic/hospital and store, but whole day
weekend work is uncommon.

\(^3\) 'Bush tucker' is the Aboriginal English term most commonly used for
plant and animal resources derived from the natural environment.
Mail planes are mostly on week days. Official visitors and other events which require community participation, such as community meetings or meetings with government departments, are generally restricted to weekdays also.

There is no school on the weekends, which means that the children are not formally occupied during the day. Parents often take the opportunity to occupy their children out bush away from videos and the temptations of unhealthy practices, such as petrol sniffing.

Social relations: Alcohol is a problem in many communities in Central Australia and despite the law against drinking at the communities in the study area, drunkenness causes many problems in some of these places. Alcohol is brought to the community in greatest quantities after pay day. The women and children are often quite desperate to vacate their camps while the heavy drinking is going on. At such times they do not feel safe in the camps and try to keep away for at least the whole day.

Card games are a major form of entertainment in Aboriginal communities. Games for big money stakes occur on pay days and for the following days or for as long as the money lasts. The real card enthusiasts generally will not leave a card game to go hunting. Winners will often go straight off to Alice Springs to buy a car (and sometimes alcohol).

Resources: Money is an important resource in the community and is derived mainly from government pension and unemployment cheques. These arrive on alternate weeks and so there is one sort of pay-day each week in the community. Money seems to be spent and redistributed over the first few days and so towards the end of the fortnight, food resources are scarce and there is an increased incentive to go hunting.

Aboriginal people have always liked to travel in their country and motor vehicles have intensified that experience. Motor vehicles are a much sort-after resource and are required for most hunting trips. Women have less control over vehicles than men, who are generally the owner/drivers. Often when a woman is the owner of a car, one of her close male relatives is the driver and he will use
the car for his purposes most of the time. Sons and husbands are cajoled into taking women on bush trips.

**Historical influences:** The people now living in the study area experienced weekly timetables for many years while they were living at Haasts Bluff and Papunya. The regime at Papunya required people to eat all meals in the dining room and work on supervised projects during the week. So, in that period, the weekends were identified and memorable for the greater amount of free time. The women talked about going hunting for goanna on the weekend and at Christmas time and about how much they looked forward to those times.

**Preparing to go for bush tucker.**

The process of deciding the hunting location for a trip often began the day before and for an overnight trip may be talked of well in advance. Many possibilities would be canvassed, all with the promise of an exciting and productive time. Mostly the talk of the previous day would be forgotten and we would proceed to the usual hunting places. To begin with, I imagined that there would be preparations made before I arrived to collect people. However, this was generally not the case. Experience has shown that there are many contingencies which may destroy the best laid plan.

The women preferred to leave for hunting around the middle of the morning. Preparation time took approximately one hour and so I generally drove to the camps between 9 am and 10 am. This was convenient for a number of reasons: the store opens at 9 am and so the women had time to buy food needed for the day; school begins no later than 9 am and so school-aged children's needs are largely taken care of until the afternoon. It seemed to be the time when general domestic work was done. It was also time to visit, sit and talk with other women.

I would begin by visiting the camp of the women with whom I was most closely associated, to receive confirmation or otherwise of the day's proposed plans. Often there were events which occurred during the night that required a change of plan. Family obligations resulting from sickness, accident or death were the
circumstances which I encountered that prevented women from leaving the camp or settlement area. On most occasions after my arrival, a signal from the women (e.g. the hand sign for goanna) meant that we would soon be out bush.

Preparation for hunting and foraging trips involved many spheres of interaction.

At camp: The women collected their requirements for the day away: crowbar\(^4\), billy can, food, water, blankets, axe, tomahawk, dogs. Some women favoured taking their dogs, especially if we were going to camp overnight. There were also particular dogs which were taken for their hunting skills.

Food and other movable camp gear left behind was generally packed up or secured in some way to prevent scavenging by dogs and to discourage borrowing by other people. The women organised childcare for the children in their charge, often taking a grandchild with them.

Collecting other women: The women on board would often direct me to other camps to pick up women to accompany them, and this might involve visits to more than one place. We rarely left with less than eight women. There are benefits in hunting with a large group which are discussed below in a typical hunting day's activities.

At the store: The last scheduled stop was the store, for food and fuel. At this time of the morning a lot of people congregated outside the store before and after shopping for the day. This gave the women a last opportunity to give food and/or money to children staying behind, to stock up on supplies for themselves and to contend with requests for money by relatives as well as to publicly demonstrate their intentions. Generally, no more women were invited to come since the vehicle was loaded by then.

\(^4\) A 'crowbar' is a small iron rod with one flattened end for digging.
However, children sometimes jumped on with their mother's or grandmother's approval.

Rumiyaku (Hunting for goanna)

The most frequently stated purpose for bush trips was to hunt goanna, which is a very popular food. I accompanied people on 35 trips and 21 were primarily for goanna (Varanus gouldii). Although there are variations in seasonal abundance, I observed that there were successful goanna hunts in every month of the year. The goannas were most plentiful and fat outside the extreme hot and cold periods, i.e. March, April, May, and September, October, November. Extra effort is made to catch goannas at these times because the abdominal fat is highly valued for its taste and health benefits.

During my second field trip, the women favoured a region about 40 km to the northeast of Kintore, on the road towards Kalipinypa. The area is sandhill country, characteristically vegetated with spinifex hummocks (Triodia spp), scattered trees, such as mulga (Acacia aneura) and shrubs, such as Grevillea stenobotrya. Since the establishment of Kintore in 1981, the people have hunted there regularly. The areas between the sandhill ridges have been fired at various times and many stages of succession are clearly identifiable. The highly desired fruit, akatjirri (Solanum centrale), which benefit from regular and frequent firing, were also present in various stages of growth and were collected at most opportunities.

Having arrived in the general area for hunting, the procedure is to drive off the road for a distance. The main concern is that the vehicle and other gear is not left too conspicuously without people nearby. Dinner camp is made close to the vehicle and supplies, where women caring for young children set up a temporary camp. Most gear is removed from the vehicle and placed under or hung in the tree so that the women are then independent of the vehicle until they are ready to return. If no-one remains at this place
with the vehicle, then a fire is not made until the women return from hunting.

The women begin to walk off almost immediately, fanning out in ones, twos or threes. They each carry a crowbar and a billy can, which contained water in hot weather. Sometimes two women share a crowbar and a plastic bag, scarf or any kind of small container, to carry the plant and animal resources back to dinner camp. When the goannas are plentiful in a relatively small area, the women work alone but each time they move from one location to another, they call to each other.

Invariably, the dinner camp was made at one end of the area to be covered, so that the women would remain away from the road until back at dinner camp. In part, the reason is to move in less frequently hunted areas but also they wished to stay out of sight of passing vehicles. There are advantages to crossing a road if, for example, a bush fire had extended to both sides of the road and presented good hunting conditions on both sides.

Each hunter traversed a roughly circular route, beginning at dinner camp and returning to the same place; she never walked straight along in one direction and then straight back again. I obviously did not accompany all hunters at all times and so my conclusions are based on questioning as well as observation of outgoing and returning directions.

The hunt.

On a hunting trip early on in my stay at Kintore (18/4/1987), I was asked by W. Napaltjarri no.1 to accompany her while hunting in the Kalipinypa area. She was one of the two women who had taken charge of me (and my Toyota) in that community and was a senior woman and a very successful hunter. I participated in what I later realised was an excellent teaching demonstration of goanna hunting.
The other women went off in pairs. Generally no-one gives orders to the others, but sometimes I was told to accompany someone in particular if I wished to hunt. This day I walked with Napaltjarri (aged c. 60), her daughter Napurrula (in mid 30s) and two Napangatis, grand-daughters aged 15 and 4 years old. As we went eastwards between the sandhills, we saw camel dung and tracks of many different animals, such as goanna, feral cat, bush turkey and various small lizards.

After about ten minutes, Napaltjarri chose one goanna hole, having dismissed many which did not have as many recent tracks to them. Firstly, she walked in a circle about 2 m out from the main hole, prodding the ground with her crowbar at intervals and in all directions to detect any change in sound and therefore a change from solid ground to a goanna's tunnel. Having reckoned on the location of the main tunnel and also the position of a goanna inside, she began to dig at the outer extremity of a tunnel. Each of us took turns as instructed, digging and prodding. Napaltjarri rested at times although keen to do most of the work. Even though her daughter and also her elder granddaughter were experienced hunters for their respective ages, she constantly directed them and said that she was the only one of the group who had the knowledge needed to catch any goannas: "Ngayalu ninti kutju" (I'm the only one who knows). Napaltjarri's overall hunting successes were testimony to her knowledge and skills, and that day was no exception.

The first hole, about 2 m away from the main hole, was dug out to about 0.5 m and then along for about 1 m towards the main hole. We then dug the main hole to about 1 m and Napaltjarri took over, indicating that she would soon have the goanna. She dug towards the first hole along the tunnel and about half way along she felt the tail. Her granddaughter was told to be ready at the other end in case the goanna tried to escape and after a couple more very careful digs and hand scoops of sand, she grabbed the tail and quickly pulled out the goanna. Still holding the tail, she immediately swung the goanna down so that its head struck an iron crowbar lying on the ground. She then broke its legs to prevent it escaping, just in case it was not dead. After a short
pause, Napaltjarri was digging again. Using the same strategy, two more goannas were caught, lying together in another tunnel. Napaltjarri remarked that they were skinny ones and might be two lovers! Immediately afterwards, the three were gutted by piercing a hole under the right front leg with a small sharp stick with a heel, which was then pushed inside the body cavity to hook out the intestines. These were discarded into the sand. The entire activity of tracking, digging and gutting three goannas took one and a half hours.

Napaltjarri decided to continue further eastwards instructing us to return to dinner camp with the goannas. Napurrula would make a large fire in preparation for the other women's return and set the billy on to boil for tea, but on no account were the goannas to be cooked until Napaltjarri came back. From about mid-afternoon onwards, the women could be expected back but generally they returned in the last hour before sunset.

Napurrula buried the goannas, coiled separately in small round holes in the sand, quite close to the surface and smoothed over the sand. They would be kept relatively cool and protected from flies, as well as being hidden from sight and so unlikely to be taken by someone else. We then set about gathering firewood, firstly to make a fire to cook on but also to load onto the Toyota to take back to camp. Having set the fire alight, Napurrula and her elder daughter gathered, *akatjirri* (*Solanum centrale*), in close proximity to dinner camp while I wrote notes. They had collected several handfuls within half an hour and then sat down to wait for the others to return. Napurrula placed all the berries into the sand in front of her and rubbed them through the sand to "clean" them. This process is thought to prevent headaches which would otherwise result from eating them.

After approximately four hours hunting, all the women had returned very pleased with their success and keen to come back the next day. They had caught 23 goannas between 5 hunters. They were tired and hungry and began processing the food straight away.
Hunting success.

Goannas are the most hunted species because their meat and fat are highly desirable foods, and they are plentiful in the environment. The success of hunting does, however, depend on the season. During the dry winter months, the goannas spend more time underground, foraging less and therefore are less visible. Those which are caught during this period are also likely to have less fat.

Most people are very keen for goanna meat so they will work hard to get it. When digging is required the degree of difficulty is determined by the hardness of the ground, and digging in the sand is always easier following rain. These factors result in varying success of trips despite the number of women hunting and the number of hours spent hunting. On one full-day trip during the dry season, to a highly favoured location out of Kintore, 11 women made a combined catch of 24 goannas. This was considered to be a successful hunt, especially considering that they had been able to exploit other resources as well, such as smaller reptiles, feral cats, and some plant foods. Although success is not totally predictable at any preferred location, the women were confident of catching some goannas whenever they went hunting, as long as they could spend some time at the task.

The literature frequently documents men's role in hunting for meat compared to women's role of gathering vegetable foods, as well as some small game. It is not known how much hunting women did in their traditional subsistence lifestyles, but now, women concentrate on goannas and other meat resources. Additionally, many resources are foraged by the women, although generally not in the same quantities as goannas. The cultural significance of resources varies greatly and it is interesting to examine which items (particularly foods) are desired now and why, as well as the reasons for the lack of interest in other
previously important resources. From my fieldwork data, I have compiled a list of resources, indicating their level of exploitation.

Modern bush resources.

Resources which continue to be derived from the bush include both food and other items, such as medicine, firewood, narcotics, weapons, tools and artefacts.

The Pintupi, like other Western desert groups, classify food into two main categories: *kuka*, meat and *mayi*, vegetable food. *Mayi* refers to edible plant foods including seeds, fruits, roots, tubers, greens, insect galls and fungi. Other food categories are: *maku*, grubs; *tjala*, honey and other sweet substances, such as lerp. There are some items from each of these categories which continue to be exploited.

*Kuka.*

Table 5 lists the animal food resources exploited during all the bush trips on which I accompanied women in this field study.

Table 5: *Kuka*, animal food resources.

<table>
<thead>
<tr>
<th>Language name</th>
<th>Species*</th>
<th>Common names</th>
<th>Total no. of animals caught</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>rumiya</em></td>
<td><em>Varanus gouldii</em></td>
<td>sand goanna</td>
<td>170</td>
</tr>
<tr>
<td><em>ngintaka</em></td>
<td><em>Varanus giganteus</em></td>
<td>perentie, monitor lizard</td>
<td>1</td>
</tr>
<tr>
<td><em>lungata</em>, <em>nyalawurpa</em>, <em>tjalapa</em></td>
<td><em>Tiliqua sp.</em></td>
<td>blue-tongued lizard</td>
<td>9</td>
</tr>
<tr>
<td><em>kuniya</em></td>
<td><em>Aspidites ramsayi</em></td>
<td>carpet snake</td>
<td>4</td>
</tr>
</tbody>
</table>
The number of goannas caught and the enthusiasm for their meat and fat suggests that they are a highly desired resource and a small but significant contribution to the diet. Opportunities to catch the smaller reptiles are not wasted but generally goannas are pursued in favour of other smaller game. The largest reptile, the perentie, is hunted by both men and women but men generally used guns to kill them.

People, particularly the men, concentrate on the large game today. The range of bush meat eaten is probably much reduced compared to traditional times for two main reasons:

1. People choose not to hunt many of the smallest reptile species, such as mingari, thorny mountain devil and also nganyi, frogs, because they do not need to. Similarly, birds do not seem to be exploited now although some young boys caught several small, green parrots and a tawny frog-mouthed owl.

2. Some resources are not eaten today because they are largely unavailable, especially in the more populated areas, for example, ninu, the rabbit-bandicoot (*Macrotis lagotis*). It is understood that over the last forty years in the Tanami Desert, the adjacent area to the north of the study region, many of the most important medium-sized mammals species have become so rare that they would be unlikely to be encountered by most Aboriginal people (Gibson, 1986:68).

**Mavi:**

Plant foods which are collected today are listed in Table 6.
Table 6: *Mayi*, vegetable food resources.

<table>
<thead>
<tr>
<th>Language name</th>
<th>Botanical name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>akatjirri,</td>
<td>Solanum centrale</td>
<td>frequent casual foraging; eaten raw or dried on bush</td>
</tr>
<tr>
<td>kampurarra</td>
<td>Solanum chippendalei</td>
<td>frequent gathering; fruit cleaned of seeds and eaten raw or lightly roasted</td>
</tr>
<tr>
<td>akitjirri</td>
<td>Acacia coriacea</td>
<td>green seeds lightly roasted in pods</td>
</tr>
<tr>
<td>pura, ngaru,</td>
<td>Grevillea juncifolia</td>
<td>nectar sucked from yellow 'comb' flowers</td>
</tr>
<tr>
<td>wirrkala</td>
<td>Cyperus bulbosus</td>
<td>small bulbs husked and eaten raw</td>
</tr>
<tr>
<td>pangkuna,</td>
<td>Leichhardtia australis</td>
<td>immature fruit and ripe 'cob' eaten raw</td>
</tr>
<tr>
<td>mulupuka,</td>
<td>Canthium latifolium</td>
<td>small, sweet, dark fruit</td>
</tr>
<tr>
<td>taltja</td>
<td>Solanum ellipticum</td>
<td>picked and eaten when ripe from the plant</td>
</tr>
<tr>
<td>yuLtkunpa</td>
<td>Vigna lanceolata</td>
<td>root eaten raw or lightly roasted</td>
</tr>
</tbody>
</table>

All of the above are gathered frequently for food when available and in fairly large quantities. They represent a greatly reduced number of plant species compared to the traditional range of food plant resources. However, three of the five traditional fruit staples and two of the three staple tubers (Latz, 1982: 40, Table IV) are
represented. The seeds, fruits, flowers, bulbs and roots listed above are eaten following little or no processing. Plant foods which are gathered today are desired for their taste and because they are reasonably easy to locate and gather. Furthermore, gathering is an enjoyable and culturally significant activity (Nash, 1984:37-38).

Other foods.

Table 7 lists two other important bush foods which are frequently exploited, namely witchetty grubs and honey ants.

Table 7: Other important bush foods.

<table>
<thead>
<tr>
<th>Language name</th>
<th>Species</th>
<th>Common name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>maku</td>
<td>Xyleutes sp.</td>
<td>witchetty grubs</td>
<td>3 gathering trips</td>
</tr>
<tr>
<td>tjaLa</td>
<td>Melophorus sp.</td>
<td>honey ants</td>
<td>3 gathering trips; pale sacs indicate ant fed on <em>Acacia dictyophleba</em>, dark sacs fed on <em>Acacia aneura</em></td>
</tr>
</tbody>
</table>

*Maku.*

Different types of witchetty grubs are distinguished depending on host trees. For example, the most commonly gathered grubs reside in the roots of *Acacia kempeana*: "ilykuwarrangka piyanpa". Others are taken from the roots of *Acacia dictyophleba*, whitewood (*Atalaya hemiglauc*), and the native poplar (*Codonocarpus cotinifolius*). The grubs are either eaten raw or lightly roasted in the coals and eaten immediately. People say that this is really good food and the juice of the raw grub is also used medicinally to rub on the body like fat for good health.
Honey ants are an extremely popular food. On the three occasions, the women spent many hours digging for honey ants in the relatively heavy clay soil around *Acacia aneura*. The ground was relatively easy to dig after good rains and there were ants in abundance. Each woman dug alone in close vicinity of others and generally with children playing about in the shade (children playing their version of 'Nine-men Morris' using honey ants as 'men'!). The roughly circular holes are dug by scraping out earth with a billy can or some other sort of small container. The underground tunnels of the ants are exposed and using a flexible green twig, *winpi*, the women gently scrape out the bloated ants into their hands and then transfer them to a container at ground level. Most holes ended up being quite large, about 1 m diameter at the top but decreasing by steps, and about 2 m deep. The digging is hard work but in a good location the honey is a constant reward. No processing is required before eating. The ant is held between thumb and forefinger, the honey sac bitten off and the body of the ant discarded.

It seemed that there was a small amount collected for the time and energy put into the activity, although the amounts collected varied greatly each time. The women were satisfied with their collection and always had some (perhaps half a jam tin) to give to those eagerly waiting back at camp. It was obvious too that the women and children enjoyed themselves during this activity and were in high spirits returning to camp.

**Non-food plant resources.**

Non-food plant resources listed in Table 8 include: medicine, narcotics, tools, weapons, shelter, artefacts, body decoration, firewood.
Table 8: Non-food plant resources.

<table>
<thead>
<tr>
<th>Language name</th>
<th>Species</th>
<th>Frequency (total no. times observed)</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>mantala</td>
<td>Acacia pruinocarpa</td>
<td>several</td>
<td>ashes from leaves for chewing with tobacco; wood for fighting sticks</td>
</tr>
<tr>
<td>wanari</td>
<td>Acacia aneura</td>
<td>almost daily in colder months</td>
<td>firewood; branches for windbreaks; branches of juvenile trees used to make dancing spears</td>
</tr>
<tr>
<td>warriyu</td>
<td>Eucalyptus gamophylla</td>
<td>1</td>
<td>seeds for necklaces</td>
</tr>
<tr>
<td>ininti</td>
<td>Erythrina vespertilio</td>
<td>frequently</td>
<td>seeds for necklaces, artefact decoration; seeds/seedlings for transplanting</td>
</tr>
<tr>
<td>irrman kgara</td>
<td>Eremophila alternifolia</td>
<td>1</td>
<td>leaf infusion, wash for scabies</td>
</tr>
<tr>
<td>itara</td>
<td>Eucalyptus camaldulensis</td>
<td>twice at Mt. Liebig</td>
<td>seeds collected for sale in bulk</td>
</tr>
<tr>
<td>mingkulp a</td>
<td>Nicotiana gossei</td>
<td>1</td>
<td>native tobacco, leaves crushed and dried for chewing</td>
</tr>
</tbody>
</table>

Many of these resources are not available in close vicinity to the settlements, and so the women use every trip into the bush to meet their needs. They are aware of seasonal availability as well as the distribution and abundance of individual species. Some resources are more culturally significant at specific times and
trips are made for that purpose, such as to cut ceremonial spears. Other resources are taken when the opportunity arises, perhaps when hunting is not going so well.

**Medicine:** Very few traditional medicines are used regularly in the field area. The knowledge of many washes and rubbing medicines is still held but the convenience and effectiveness of the western medicines available from the clinics mean that they are often used instead. However, I have observed one demonstration of the preparation of a skin wash (see Table 8), and older women said that they prepared various washes when required. Some community health centres, such as the Urapuntja Health Service at Utopia in the Sandover region of Central Australia, have bush medicine programs in operation in which indigenous plants are prepared in the traditional ways.

**Narcotics:** Most men smoke commercially available cigarettes but women, old men and young girls prefer to chew tobacco. *Nicotiana gossei* is the most keenly sought after native tobacco or pituri because of its potency (Latz, 1982:88). Ashes are made from various trees and chewed with the tobacco. Leaves and twigs of *Acacia pruinocarpa* are particularly sought after and the ashes are mixed with either commercial or native tobaccos for chewing. Sometimes sugar is added. (For preparation details and ashes table of preferences, see Nash, 1984:46).

**Seeds for sale:** Grass and tree seeds are collected for sale on a commercial basis by agreements between communities and seed collecting companies, such as Yuendumu Mining Company and organisations, such as the Commonwealth Scientific and Industrial Research Organisation. The seeds are generally sold overseas but this activity is spasmodic in most communities (Young and others, 1991:152). I observed the following species being gathered at Mt. Liebig and Papunya for sale to the Yuendumu Mining Company: *Acacia pruinocarpa*, *Eucalyptus camaldulensis* and *Acacia aneura*.

**Weapons, tools and artefacts:** Various seeds, leaves and woods are collected for ritual use, to make artefacts for sale and for people's own use. On one occasion, when hunting was not going well, the women took time to prepare some wooden fighting sticks
from *Acacia aneura* and *Acacia pruinocarpa*, and dancing spears from juvenile *A. aneura*.

**Firewood:** During the colder months, hunting trips generally include fire-wood gathering. Towards the end of the day, dry logs and branches of *Acacia aneura* are loaded. Special stops are made on the return trip to camp, at the location of the best known supply, if it is still required. The second choice of firewood is *Acacia pruinocarpa*, which I saw gathered on one occasion only. The fire from this wood was described as "little bit not hot" and "smokey one". At that particular time, all roads from Kintore to the regularly exploited mulga stands were blocked because of men's ceremonial activities.

There are other resources used which are neither of plant or animal origin. They are mentioned here to emphasise the broad-ranging modern use of traditional resources.

**Stones and ochres:** These are collected for many reasons, particularly for use in ceremonies. Ochres are highly prized and reasonably scarce resources in the area. Red ochre, *karrku*, is sometimes brought from 'mines' near Yuendumu. Yellow ochre, *kantawarra* and white ochre, *kaltji*, were dug from a roadside cutting in the hills near Glenn Helen gorge. Ochre is still used as the primary paint for body decoration. It is ground, mixed with water and applied to the greased bodies of those who "paint-up" for participating in ceremonies.

There are many reasons for going on a bush trip but mostly only one reason needs to be stated. Each trip might result in a variety of plants and animals being hunted and collected, but would be referred to as a trip for goanna, or a trip for honey ants, or whatever was considered to be the most significant resource requirement at that particular time. Some one would say, "*Rumiyaku tjingaru*" (Maybe we go hunting for goanna?) or "*Makuku*" (Let's go and get witchetty grubs). The decision to look for something in particular largely determined the main location and time for hunting, such as a day trip into the sandhills for goanna hunting, or after rain, a day spent digging for honey ants.
under the mulga trees. Nevertheless, I do not recall any trip that resulted in only one kind of resource exploitation.

In general, people have a broad range of resources available to them, a combination of store foods and bush foods as well as other requirements. Furthermore, people very much enjoy going on bush trips and will do this in preference to many other activities.

The women's choice of bush foods reflects their likes and dislikes. As discussed in relation to changes in diet from traditional times, people prefer meats, fats and sweet foods and seek out the resources which can provide these, either bush or store items. They go to great effort to hunt and forage for highly desired items. In the case of goannas and honey ants, the greatest amounts of time and energy are taken to obtain them, unlike seeds for damper where the main effort goes into processing. Most plant foods collected now require little or no processing which suggests that people are looking for immediate satisfaction from their time spent foraging.

With their basic survival needs met by store food items, people can pursue the foods they like most. Most animal food from the bush has no store counterpart and so the desire for fresh meat and fat is a significant motivation to go hunting. Most plant food items which are collected have bought counterparts, however, these are not known and liked in the same way as people's own resources.

Technology of management.

Hunting and gathering activities incorporate a broad range of resource management techniques. Some of these are discussed elsewhere in relation to the women's practices in the Mt. Liebig area (Nash, 1984:62-81). Table 9 presents data for plant species from all my field work with people at Kintore, Mt. Liebig and New Bore. Deliberate actions, such as digging, sowing, replanting, thinning out and burning are the techniques involved in the regimes of care and manipulation of these species discussed below.
Table 9: Techniques of management.

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Management technique</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Solanum centrale</em></td>
<td>gathered at various stages of ripeness</td>
</tr>
<tr>
<td></td>
<td>some fruit left on plants</td>
</tr>
<tr>
<td></td>
<td>fruit transported back to camp as well as being consumed on site</td>
</tr>
<tr>
<td></td>
<td>encouraged by firing</td>
</tr>
<tr>
<td><em>Solanum chippendalei</em></td>
<td>fruit collected and brought back to camp (sometimes hundreds of kms)</td>
</tr>
<tr>
<td></td>
<td>seeds scattered at camp site</td>
</tr>
<tr>
<td></td>
<td>encouraged by fire</td>
</tr>
<tr>
<td><em>Nicotiana spp.</em></td>
<td>seeds spread around</td>
</tr>
<tr>
<td></td>
<td>encouraged by fire</td>
</tr>
<tr>
<td></td>
<td>stands thinned out by digging out whole plant</td>
</tr>
<tr>
<td></td>
<td>older leaves encouraged by continually picking new leaves</td>
</tr>
<tr>
<td><em>Ipomoea sp.</em></td>
<td>ground dug along trailers to obtain tuber</td>
</tr>
<tr>
<td></td>
<td>deep holes dug also</td>
</tr>
<tr>
<td></td>
<td>some tubers on plant left to recolonise area</td>
</tr>
<tr>
<td></td>
<td>encouraged by fire</td>
</tr>
</tbody>
</table>
Cyperus bulbosus  
gathered by digging and scraping the soil  
roots producing numerous bulbs were thinned out by digging  
large areas of ground turned over to depth of about 15 cm  
abundant after fire then rain  
women worked together on one patch  
sometimes stored traditionally

Vigna lanceolata  
roots dug, soil turned over in the process  
tops/trailers sometimes replanted  
roots eaten raw or more commonly cooked in ashes  
grows in floodplains and watercourses most abundant after rains  
encouraged by fire

Solanum centrale  is rated as the most important food plant in Central Australia, occurring on the spinifex sand plains and nearby mulga areas (Latz, 1982:App. 1,214). It is eaten when ripe and after it has partially dried out on the bush. People also collect fruit from the ground which is quite dessicated. Traditionally the fruits were ground to a paste or rolled into balls and sometimes stored to be eaten later. In terms of management, S. centrale must be regularly fired to maintain its abundance. Latz (1982:123) found that after five years without firing, some plants had no fruit and many plants were dead.

Solanum chippendalei is also an important food plant which has a high Vitamin C content. It occurs in profusion on spinifex sand plains and is strongly encouraged by fire. Traditionally, the fruits were cleaned and threaded on sticks for storage. The important aspect of cleaning the fruit meant that the inedible seeds were distributed near camp sites. Old camp sites are often marked by the abundance of this plant.
Nicotiana spp. continue to be gathered from known stands in the area. The favoured *N. gossei* grows in the rocky crevices on the hillsides around Mt. Liebig and in the Kintore region. I recorded whole plants being pulled out in the densely populated patches and at other times only the leaves were pulled from the smaller, scattered specimens in the rocky hillsides.

*Ipomoea* is not exploited today in the field area and has not been for many years. This area is on the southern limits of the distribution of *Ipomoea costata* (P.K. Latz, 1987:pers. comm.) which is still regularly gathered in areas to the north, such as Yuendumu. Nevertheless, the women in the Papunya and Kintore area know where the plant grows and remember eating the roasted tubers.

They went to an area on the northern foothills where they used to dig for yams and found very few plants. The ground was very hard and dry and digging was difficult. Eventually one woman dug up a dry tuber claiming it would not be good to eat, and that is what happens to them because no-one digs for them anymore.

*Ipomoea* generally requires frequent fires if it is to form healthy stands (Latz, 1982:App. 1,156) and this area had not been deliberately fired for a long time. It is not a regular hunting or gathering destination. Other more favoured resources occur on the sand plains and open woodlands, which in this region do not contain *Ipomoea*. It seems likely that the lack of firing and digging had resulted in that patch of yams becoming relatively sparse and unproductive.

*Cyperus bulbosus*, a sedge whose root produces numerous small bulbs, is a favourite food of children. They are able to eat their fill while the women dig and sift the tasty bulbs from the sandy soil. The bulbs are available almost all year round and were gathered mostly when they reproduce after rain.

Large areas of soil are turned over to a depth of about 15 cm as the women dig with their metal crowbars and scoop the loose soil into their hands to gather the bulbs. Digging of the soil would most likely promote productivity by creating a loose and aerated soil. The mixture of soil and bulbs is sometimes yandied to separate
the bulbs from the other material. The bulbs are then de-husked before eating. This plant is also favoured by fire.

_Vigna lanceolata_, a trailing creeper with a long edible taproot is generally found near watercourses and sometimes in spinifex communities. The above ground parts die off a month or so after rain which is around the time when the root is collected and "considerable skill is required to locate the underground portions of the plant" (Latz, 1982: App. 1, 241). The roots are dug up and sometimes the top of the root is replaced in the over-turned soil. It was traditionally an important food because it is available throughout the year and relatively easy to process. Although not a strong taste, the roots are still enjoyed and are eaten raw or lightly roasted. The women commented that it "grows strong" after burning followed by rains.

When Aboriginal people apply such management techniques to these species, they are doing so as deliberate actions in a complex plant resource management strategy. Similar techniques are easily recognised as part of the repertoire used in cultivation, horticulture, agriculture or gardening. The techniques are not readily recognised as elements of hunter-gatherer activities. However, it can be demonstrated that when people use these techniques they are establishing, maintaining and caring for bush-gardens.

**Firing the landscape.**

Fire is generally referred to as the main method of management for many important plant resources. In Central Australia, it is mandatory to burn the country before hunting during the cold-time if the appropriate conditions apply. The variables relate to: the people involved, such as owners and managers, those with foraging rights, residents, also recent history of both burning and resource exploitation in the area, future use proposals, and the weather conditions. Aboriginal people use all this information in developing their management strategy for a resource area.

My main observations of burning while on hunting trips were recorded during a three-week period in June/July 1984. The trips
were with women only and the landscape was burnt prior to hunting because of the immediate advantages achieved. (For a discussion of the benefits for hunting see Nash, 1984:28-29, motivations and effects: 65-69; Lewis, 1981:59-63).

Although I did not participate directly in any firing of country during my second period of fieldwork, I collected data on previous fires in the field area, which were either natural or deliberately lit. In the early cold time, "smokes" were identified almost daily and they occurred outside the regular hunting areas of the communities with which I worked.

People do not generally make trips into a well-known and regularly used hunting location for the purpose of burning alone. Burning is done prior to hunting and the timing and location is not accidental. The exact dates and times for when each identified tract of land was burnt within the last few years were not possible to determine. Much information on type and relative times of firing are able to be interpreted from aerial photographs. Others have used these photographs to demonstrate the increase in fire activity following the return of people to certain areas: For example, Cane and Stanley (1985:72-73) show the evidence for a marked increase in the use of fire in land management following the establishment of outstations in the field area in the early 1980s.

I directed my investigations about firing to women while we were out in the bush, usually in a break between hunting activities. In this way the questions were contextualised for both their knowledge and my developing understanding.

On two consecutive trips to locations one sandhill apart, the contrast in the vegetation was well-marked. The first location had been fired during the cold-time the previous year and the women went across some of this area tracking goanna but continued beyond it for better hunting sites. The second location had been fired almost two years previously and presented a much richer resource area. The grasses, such as _Eragrostis eriopoda_ were much more mature and contained edible seeds although these are not exploited now. The spinifex was gone, the burnt tufts having burnt and blown away. Most importantly, the _akatjirri_ (_Solanum_
were mature plants laden with fruit, some new green/white and crunchy, some wrinkled on the bushes and some dried out on the sand. All types were collected for consumption. Further on along the same road, there were areas that had not been fired for a number of years and one woman mentioned that the area would possibly be fired during the following cold-time. There were plenty of goanna tracks but the spinifex had grown so that it impeded easy walking. Also the Solanum spp. were not nearly as laden with fruit as in the adjacent burnt area.

From these three different areas in one multi-resource location, at least three different stages of regeneration after fire were represented. The benefits for foraging are clear. People do not burn in the same place each year because it would be counter-productive in terms of direct and indirect plant resource exploitation. The rotation pattern of mosaic burning ensures that there are areas in every stage of productivity. (See Latz, 1982: 137-46; Nash, 1984: 67-69, for discussion on mosaic burning, firing frequency and species productivity in the field area.)

In all my conversations with women about their lives and living off the land, there was not one story specifically relating to deliberately lit fires in the landscape. "Smokes" were sometimes referred to as the sign of certain people's presence near-by, or lightning fires were commented on in relation to mythological beings. Firing the landscape is no more a special event than hunting and gathering. Fire is one of many resource management strategies known and used in the past and present by Aboriginal people.

The women's apparent attitude to burning belies the knowledge and skills involved in careful and selective management practice. In answer to direct questions in relation to specific fired locations they demonstrated the type and extent of their knowledge. Who owns/manages this place? Can you forage here - on what basis? With what authority? What resources are available here now, before/after firing? Has this been fired recently (within the last ten, five, two years)? Who fired this area last time? Is today a good time to burn? Which part of the day is best? Whose fire is that burning over there?
Fire is an every day phenomenon for these people: camp fires for cooking and warmth, fires for ceremonial purposes, naturally occurring bush fires (variously interpreted), and purposeful lighting of fires as part of resource use. Their attitude to burning demonstrates that they are in control of the processes as they interpret them. They are aware of the requirements of the land and their role in maintaining their resource base as well as fulfilling their ritual obligations to the Dreaming, in terms of maintaining country as it was handed on to them.

**Women and resources.**

The women would talk for extended periods about their country. They named place after place to which they had travelled, recalling the resources most commonly available there, particularly the nature of the water supply. It became apparent that they hunt and gather in their country for many social and cultural reasons as well as to use the resources there. The cultural significance of hunting trips relates to many areas of their lives, such as economy, environmental management, religion, health and well-being, social relations and cultural identity.

Statements about hunting and gathering permeate the women's anecdotal accounts of their lives, whether they are young or old. The older women have experienced a traditional subsistence lifestyle for at least the first period of their lives until adulthood. They are able to recall the details of their travels, including the daily subsistence activities. The middle-aged women also focus on their travels which were quite different from the previous generation in style and resource use. It is apparent that the activities which were once necessary for survival have remained socially very important since. There seems to be a strong nostalgia for the old lifestyle which is part of the enjoyment of bush trips today.

Nangala, the oldest woman I spoke with, told of the events of her life. Each event was underpinned by a reference to her activities at the time, invariably gathering or processing plant food. The bulk of her story detailed instances relating to her life from the
time she became involved with her husband - a period of approximately fifty years. She remembered that she was gathering ngulu (*Eragrostis eriopoda*) with some other women, when she first saw a man with a red head band. It was that Tjungarrrayi, her future husband. After returning to camp she presented him with a seed cake which apparently represented a turning point in their relationship since she went on to talk about their children and their particular places of birth.

Nangala revealed her extensive knowledge of places and resources, naming 31 places in the order in which they were visited in the region west of Kintore. Some were locations of water and others were noted for a particular food resource. Altogether, 15 different plant food species were mentioned.

Nangala talked about returning to a number of places because of the resources there. A particular place where *kalinykalinyopa* (*Grevillea eriostachya*) grew over a large area was fondly remembered as the taste of the honey flower was so sweet. This species is very fire tolerant and grows in profusion after winter rains (Latz, 1982: App. 1, 141). In the right conditions, Nangala would expect to return to that place and find the sweet flowers in abundance. Other places were renowned for the profusion of *yalka* (*Cyperus bulbosus*) which was arguably the consequence of previous gathering expeditions. People were aware of the effects of their activities in maintaining the productivity of this species. They returned to these places with expectations of resource availability not just because the last time they were there the resource was available, but because they had acted to ensure its continued presence. As well as the ritual action which is taken to promote its renewal, this species is known to be favoured by fire (Latz, 1982: App. 1, 91). So, any firing done on previous visits would be taken into consideration when assessing the availability of resources at that place.

Napaltjarri, Nangala's eldest daughter lived in the bush until she was an adult, which coincided roughly with the time of movement into the missions and ration depots. She remembers the hard work involved for young girls, learning how to collect and process the seeds. With great attention to detail, Napaltjarri described the
procedure for 14 different plant foods. She detailed the habitat of each resource and the techniques for its collection and processing. Information of social significance, such as other people present and their roles in collecting on a certain day, or the mythological associations of particular resources at certain places were embroidered throughout the descriptions.

Extensive knowledge of resources became less important once people came to rely on rations but much of people's knowledge of their environment could be usefully applied to the changing social situations. During the time when people were beginning to camp for periods at the Haasts Bluff mission and then return west for extended trips, their patterns of resource use changed. Many took advantage of the cash available in return for dingo skins and on their return trips to the mission they would hunt dingoes. One Napanangka remembers the pangki (skin) time, when both men and women were keen to capture dingoes to sell the skins; "papa pangkingka mantjilpayi". She described the hunting strategy: first find the lair and take the baby ones. When they cry, the adults will return and are killed by someone hiding close by. At this time also the women collected the ininti (Erythrina vespertilio) seeds, to thread on string which they made from human hair to make necklaces. These were for sale at the mission store.

Hunting and gathering of traditional resources became increasingly restricted as people adapted to the more settled lifestyle in government settlements. After coming to Papunya, the women unanimously regretted that they could only go hunting on weekends in those days. Christmas holiday time is remembered in association with camping holidays back in the bush but this seems to have been for years the only extended period away from settlement living. M. Napanangka recalls that her first two children were born in the bush while she was living at Haasts Bluff. Although slightly restricted having two small children, she went for bush tucker frequently around the mission and often walked long distances to camp overnight at relative's bush camps. The next three children were born after she moved to Papunya and it was not until after the birth of the fifth child that
Napanangka resumed regular hunting. By this time people were comparatively free to hunt or buy their food. M. Nungarrayi stated emphatically that she used to go bush with her grandmother every day when she was a young girl living at Haasts Bluff, but she added that not every one did this.

The younger women are aware of the kind of knowledge that the old people possess and that they do not have to make the same kinds of decisions about survival as in the "olden days". Despite their relative inexperience in traditional ways the younger women all said that they knew about the bush and that this knowledge was part of being Aboriginal and living at that place. For this reason they believe that it is imperative to teach their children about traditional ways.

Every woman told of the way in which she learnt about certain aspects of traditional knowledge. M. Napanangka's mother taught her how to read tracks and how to use a digging stick, especially for hunting goanna, but she did not teach her about grinding seeds: "Ngayulu ngurrpa, rungkalpayi mama ngayuku" (I don't know but my mother knows how to grind seeds). Of course, she admits hearing the stories about gathering and processing seeds, such as wakati (Portulaca oleracea), kayurru (Acacia aneura) and minyina (Acacia tenuissima). M. Napanangka acknowledges that she can locate and identify them successfully but she claims to have only a general idea on how to use them.

Many women talked about learning how to grind seeds and each one said that they were taught by their grandmothers. It is significant for women in M. Napanangka's age-group that at the time when they would have been consistently learning and consolidating their knowledge about their resources, they were spending less time in the bush and more time visiting Haasts Bluff and Mt. Liebig for rations. There is evidence also that the older people were susceptible to diseases brought by non-Aborigines to the area and were dying at a faster rate than previously. Consequently there were women like M. Napanangka who did not have grandmothers to teach them in the traditional way. Napanangka expressed great loss in not having this experience. At that point in her story, she talked about a dish which her
grandmother had made for carrying water. She has kept the dish among very few items of personal property, as it reminds her of her grandmother.

T. Napaltjarri gives a first hand account of learning to process seeds. While a young girl accompanying her mother she had many times observed the processing of *wangunu* (*Eragrostis* sp.) and on this day after a long period of collecting the seeds, her mother told her to try processing. The first stage entails cleaning the seeds and this is done by setting fire to them using a handheld torch of lighted spinifex. The charred mixture is then winnowed and yandied to remove the chaff from the seeds before they are ground. This process which I have observed for enough seeds to make one damper, is very time consuming and quite hard work. T. Napaltjarri recalls working for a long time, cleaning and yandying the mixture while her mother told her to work. Her younger sisters would not help her and she believes that they still do not know how to do it even though they are now grown women.

Another woman, M. Nungarrayi, although young enough to never have had to rely on seeds for food, learned how to grind seeds when she was a young girl. She would accompany her "auntie" (her classificatory mother) into the bush regularly collecting seeds for consumption even though flour was available from the mission.

The women who left the traditional lifestyle before they learned the full traditional repertoire of women's work, often expressed regret. However, they also spoke with conviction about their role in teaching the younger women the knowledge that they possessed. N. Nangala from Haasts Bluff, stated:

"We learned whitefella's religion but we didn't have a grandmother to teach us Aboriginal ways - the proper way to grind seeds to make damper. My grandmother taught me a little bit before she died but I don't know much, only what my two mothers taught me. I'm teaching my daughters Aboriginal ways and their daughters too. Ikuntji (Haasts Bluff) is our country now and we stay here. I've got a family and my daughters have families. Those children were born here and they have a grandmother and a grandfather to teach them."
There are distinctive Aboriginal styles of teaching strongly based on doing and imitation, which were traditionally employed. In addition, there are now more formal ways of teaching people bush skills. I often observed women hunting who would tell their young daughters and grand-daughters how to do things, but generally the most experienced person took the teaching role, and taught by example. Older people are also happily using the opportunity to teach the children traditional skills through the school cultural education programs. The quality and depth of experiences offered in these courses varies from place to place but the emphasis on community participation in education and the importance of culturally relevant education are the main motivations.

A clear example of how the women integrate teaching traditional knowledge in daily life occurred on the first morning of the third school term. The non-Aboriginal teachers were given a 'travel day' and had not yet arrived at school. Aboriginal staff were on duty and the cleaner and two of her female relatives sat in the shade in the teacher's houseyard. Many children gradually congregated around them as they proceeded to gather and process *kalpari*, (*Chenopodium sp*) growing there. The method of processing is complex, time-consuming and hard work. Most children participated in turns for short periods, playing in the vicinity and occasionally returing for closer looks. The women improvised their equipment, using a doubled piece of fly-wire to "clean" the mixture prior to yandying. Once the work of cleaning the seeds was completed, the women and children moved off to their camps.

The women aim to ensure that traditional knowledge and skills will be transferred to the younger generation in the following ways:

(1) They take opportunities to teach traditional skills to children;

(2) This kind of knowledge is held by middle-aged and older women and is used and re-vitalised by them; and

(3) Techniques are adapted to newly available resources.

The women also see that it is important to teach non-Aboriginal people. Two women pointed out clearly that they thought that
going on bush trips with non-Aboriginal people was a good way of
introducing them to their culture and showing them how strongly
they feel about their country.

Women reiterate that they have chosen to live where they are
now living because they have a relationship with the country
which they intend to continue in an active way. M. Nungarrayi
spoke strongly: "We've got to hold this country for our sons and
daughters - dance, sing and hunt". Whatever the nature of their
rights in the country in which they live, they demonstrated their
commitment to living, hunting, gathering and performing rituals
there. Although much reduced from the period before contact
with non-Aboriginal lifestyles, the cycle of ritual activity is
continued. There are many opportunities for women to dance and
sing as part of large ceremonies, such as initiations, or in women's
only performances.

In contrast to traditional responsibilities, the women
demonstrated strong commitment to one place, the community in
which they now live. N. Nangala:

"My brother says my country is past Muruntji, this side of
Docker River but I've never been back there. M., my little
brother was the last one to be born at Puritjarra. We've all
grown up now and I've had a family and I got to stay in one
place. I can't go around visiting places."

Younger women also readily acknowledge the other ways of
looking after the community and the environment generally that
are being incorporated into the community development planning
process. Some women are formal representatives of their
community on health, educational and other working groups
which are concerned with the future living conditions of
Aboriginal people.

All the women refer to the fact that their lifestyles have changed
in many ways, both desirable and undesirable. Furthermore, the
roles of the environment and resources in their lives have
changed in many ways. However, considering these changes, it is
evident that the people's relationship with the bush is less
changed than most other areas of their lives. It is still possible for
the people in the communities in which I worked to go bush and
find food to eat and other resources too. In addition, the bush and associated activities provide an escape from the pressures of settlement living which can be stressful at times. Problems directly related to the consumption of alcohol or petrol sniffing by other community members can sometimes be avoided, at least temporarily, by going away from the settlement.

So, in pursuing the nature of the relationship between women and their resources, many relevant issues can be explored via the women's own comments and actions. The purpose of the information which they presented to me is encapsulated in an interview with senior women at Kintore, when they demonstrated their connection with their country and its resources.

Field Trip Two. Day One.

Within minutes of my arrival at Kintore, three women with whom I had worked during my first field trip, called me over to their camp, the yalukuru or women's camp. They were sitting down and motioned me to sit on the blanket also and each held out their hands in a most serious way. On this occasion I understood that the handshakes were not only the usual welcome after an extended absence. The mood suggested that they were also associated with the death of their close relative since my previous visit. I was given the opportunity to acknowledge this on our first meeting by shaking hands. Just as quickly, the mood and the subject for discussion changed. After handshaking, the women began to talk brightly about my son, husband, the Toyota, our return to Kintore and the future hunting trips that I would make with them.

All at once they stood up and told me to get up too. We walked about 25 m to the west of their camp to a more open place, distant from other people but yet still in public view. We sat down on a blanket and the women unwrapped two large (lower) grindstones, then two hand stones, followed by several smaller stones which spilled out shining, ochred and oiled. They spoke softly, handling the stones and occasionally singing a few phrases. Three women spoke about the stones and their significance, each woman
speaking for the women of those places. A fourth woman was also present, an older sister of the most senior woman and she did not speak but nodded in acquiescence to the others' statements.

Various people came within hearing distance of our group, both men and women with children playing closeby as usual. They could see and hear what was happening but did not come any closer, apparently recognising the intended separateness of the women's display.

My initial reaction to this performance was excitement at being immediately called and included by these women in particular, so soon after my arrival. Such an introduction meant that the familiar fieldwork apprehensions were greatly reduced and the women were providing me straight away with much data for my work.

The stones came from three different places. As each item was handled its place of origin was given and repeated. The women then spoke on tape. Firstly W. Napaltjarri No. 1 declared the references for one large grinding stone, and demonstrated the grinding action for using the two stones: "Mitukatjirrinya wanatjarrana - palya lingku..." (This belongs to all the women at Mitukatjirri - very good). She then transferred our attention to the cluster of small, ochred stones which she had referred to before as eggs from the Dreaming: "...ngaana Pinpirrnga - Pinpirrnga makalarilingku..." (...those from Pinpirrnga - really good...).

Both Mitukatjirri and Pinpirrnga are important places for Napaltjarri, as they were places she used to visit as a young girl when travelling with her family. The grindstones would have been used by her grandmothers as part of daily life. It is only in the last few years since people have established outstations in the area that these places can be visited regularly again. There is a bore at Mitukatjirri and one group wanted to set up an outstation there as it easily accessible by road but they currently lacked the resources to do so. Pinpirrnga (Desert Bore) is serviced by a road and a bore and has been taken up by Napaltjarri's elder brother.
as his outstation. It is in the area of Napaltjarri's "borning place" and she has knowledge of the ritual importance and the resource potential of the area.

I. Nampitjinpa spoke next and she demonstrated the grinding technique using the handstone and larger stone as she talked. The stones came from Walungurru (Kintore) and were used to grind seeds to make seed cakes by her grandmothers. For Nampitjinpa, Walungurru is the place that she now calls her place. It was a place which she visited regularly throughout her life except for a few years after Papunya was established when there was little movement to country westwards.

Finally, K. Napaltjarri spoke. Always slightly reticent in more formal interview situations she nevertheless made her statement strongly. She spoke about the stones from Walungurru and Mitukatjirri, the two places with which she has strong connections relating to her dreaming. Her eldest son is negotiating to establish an outstation at Mitukatjirri because it is also an important place for him. Napaltjarri's borning place is to the west of Walungurru and her dreamings are *akatjirri* (*Solanum centrale*) and *wanguwu* (*Eragrostis eriopoda*) which she described as Walungurru dreamings.

These statements by the three senior women have facilitated my interpretation of the significance of traditional attitudes to the role of plant resources in women's lives. The connection between place, knowledge and resources is clearly presented and its importance underlined by the continually repeated positive pronouncements - "palyalingku", "makalari", "makalarilingku", "wirru". For the older women, traditional knowledge relating to places and resources is the source of their status in the community. Hunting is a way of re-affirming their identity as responsible individuals carrying out their obligations to people and country. Talking about the stones asserts their power as the holders of knowledge acquired during the early part

---

5 'Borning place' is an Aboriginal English term meaning place of conception.
of their lives when they needed to know such information for survival. The stones are not objects without referents - they are linked to places, people and dreamings. Finally, the display is relevant to their lives because they are explaining who they are, where they are living and the reasons for their continued presence there.

For the younger women, with varying degrees of knowledge and skills gained from living a less traditional lifestyle, there is now greater flexibility. Relationships with their environment vary significantly within the limited range of lifestyle options. Some have chosen to live in a major town centre, such as Alice Springs, having contact with the bush while visiting relatives on settlements and outstations. The main alternatives are settlement, mission or outstation living.

The majority of those who stayed in Papunya visit other communities including outstations regularly but spend very little time engaged in traditional pursuits. It seems that hunting activities are confined to the weekend although they do not do this every weekend. People living on outstations give the impression of daily hunting while they remain there. Outstations which I visited in the Papunya, Mt Liebig and Kintore area almost always displayed evidence of very recent hunting. However, as many surveys have shown, outstation populations for this area vary dramatically over time but there are some outstations which have almost permanent residency (Cane and Stanley, 1985; Young, 1981:71-75).

Whatever the mix of lifestyles chosen, people still have direct relationships with their environment for some period of time. They walk, but not as often or as far, as a more traditional lifestyle would require. They hunt and gather but not as often or for as diverse resources as they once did. They participate in ritual activity for traditionally established ritual purposes but also for payment for entertainment and education of outsiders.

The implications of these areas of change are significant for the relationship between people and their environment, and in particular for plant resource management strategies. Traditional plant resources (food, medicines, tools) can be substituted by
commercially available products. The women have shown that the knowledge of the traditional resources is to a significant degree relevant in a modern context: For example, witchetty grubs are still exploited and people still need to know where to look for them, in the roots of certain plant species; *Solanum* spp. are collected and processed; firing is done to maintain hunting and foraging areas. There are, in addition, new practices which call on this 'old' knowledge of plant management and which are providing a changing base for the relationship with the environment. Settled living has produced some new attitudes to the environment.

Information from the interviews led to an exploration of the connections between traditional knowledge and modern lifestyles. The women showed that they are social actors moving in accordance with traditional values. They are able to choose new ways of doing things as their circumstances change, but they are informed by their traditions. The ideas and practices associated with the past will be shown to have greatly influenced modern plant resource use.

**Cultural significance of hunting and gathering today.**

Traditionally it seems that the gathering and processing of seeds occupied a large amount of the women's time compared to other resources. By comparison, most time and effort is given to hunting for goanna on women's hunting and gathering trips today, although many other resources continue to be exploited, including plant food species. Women engage in laborious and time-consuming activities in the pursuit of highly desired items because these trips also serve many other purposes. The cultural significance of hunting trips relate to these areas of their lives: economy, environmental management, religion, health and well-being, social relations and cultural identity.

**Economy.** The economic significance of bush trips has been demonstrated by the data on hunting success of plant and animal foods. Various plant and animal resources are keenly sought after despite the fact that they are no longer needed for survival. Other
natural products, such as materials for making shelter of different kinds, are chosen because they are known and understood, relatively inexpensive, readily accessible and often the preferred medium for the type of construction needed. Seeds and raw materials for artefact production are collected primarily for sale and some items are made for ritual uses. Firewood is required by most people on most days of the year. For some living in camps, it is the only means of warmth and the only source of heat for cooking. Even those people living in houses who have other forms of energy (solar, electric or gas), often prefer sitting, cooking and sleeping around a camp fire.

**Environmental management.** The effects on the environment of the actions involved in hunting and foraging are described above. Briefly, there are many ways in which the techniques of gathering plant resources can maintain or lead to an increase in the abundance of that resource. Furthermore, certain gathering and management practices have been shown to have changed the pattern of distribution of some species. Large-scale management strategies have a most obvious effect on the landscape. In Central Australia, burning the country is the technique most widely recognised.

**Religion.** Aboriginal people have ritual responsibilities which include obligations to look after country. They are required to perform ceremonies to ensure the future productivity of the plants and animals as part of the ongoing Dreaming process. (I have discussed this elsewhere in relation to this group of people, see Nash, 1984:10-11, 51-61) Often these rituals are performed while on a trip in the country. On most hunting trips I have witnessed spontaneous singing and/or dancing by the women, especially at the end of the day by the camp fire and often in the vehicle on the way home.

**Health and well-being.** Are the bush foods merely tasty snacks or are they important components of people's diets?

The contemporary role of plants and animals as foods, medicines, narcotics and poisons should not be underestimated. Compared to traditional times, the importance of bush resources is much
reduced. However, these resources are valuable in the quantities used.

People have strong ideas about food items that they consider to be good and which will make them strong and healthy. Their motivation for eating bush foods is many-sided.

Social relations. Aboriginal people enjoy their trips into the bush for many social reasons. Family groups, all male and all female hunting and foraging parties have certain well-defined patterns of interaction which are acted out in productive and enjoyable ways.

In the case of all women together, I observed their pleasure and excitement while sharing the activities and separateness of women's domain. The women enjoyed the nature of their kinship relationships. Invariably, at some time during a bush trip, someone would list the names of all present in a statement of their enduring social relationships. By calling the kinship names, they would group the sisters, sister-in-laws, the aunts and nieces, mothers and daughters or grandmothers and granddaughters together. Sometimes they would take the opportunity after returning from their hunting, to dance and sing excerpts from their traditional ceremonies, or simply tell stories and gossip. These were important times for information exchange.

Napaltjarri's goanna hunting demonstration showed that there is certain prestige relating to success in hunting and gathering as well as the subsequent distribution of the products to both men and women. Women also use their catch to exchange for childcare, transport or some other 'debt'.

The women often mentioned that they wanted to be out bush at certain times because of social problems at the settlement. They could escape harrassment from drunks, and pressure from relatives for money and goods.

Cultural identity. Apart from the fact that people genuinely like the taste of many bush foods, they are motivated to eat them by their feelings of nostalgia for the past lifestyles, for tradition and to demonstrate their Aboriginality. They believe that they are different from outsiders and that, for example, they eat some
different foods. Eating bush foods is positive affirmation of their Aboriginal identity.

It is true that people who are questioned in informant-researcher relationships do not always give a true account of their actions or intentions, for a variety of reasons (Clarke, 1971:203). So when people say that they go bush as much as possible and eat traditional foods because it is Aboriginal to do so, or for some other reason, it may or may not be true. The important point for my argument is not that the people say this. More importantly they demonstrate that they believe their traditional resources are important by spending time in the bush pursuing these activities. It is clear that they did actually spend a lot of time in this way.

It has been demonstrated that bush trips are culturally significant in many ways. While the primary motivation is no longer exploitation of resources for biological survival, many resources are highly desired today. However, there are social and cultural factors which influence the extent of involvement in these activities. People's commitment to their plant and animal food resources is traditionally based but modern social and cultural factors have broadened the cultural significance of those activities associated with resources. The extent of their bush activities ensures the continued management of their most valued plant and animal resources.
CHAPTER 5.
PLANT RESOURCE MANAGEMENT.

Plant management around the world.

There are non-agricultural groups around the world who have been shown to use a range of resource exploitation strategies. It is no longer accepted that all hunter-gatherer groups are passive recipients of nature but rather each group has devised a system of exploitation which may be based on a range of strategies including hunting and gathering. The term "hunter-gatherer" has undergone some re-definition to accommodate the changing emphasis and refers to a group’s primary means of subsistence.

In the past, researchers have been reluctant to cross the definitional barriers when describing what they observed and this has influenced their conclusions. Groups defined as hunters and gatherers were precluded from any other form of human-plant interaction. Early research into the origins of agriculture generally viewed hunting and gathering as the first stage on the continuum ultimately leading to agriculture. Furthermore, if a group practised some form of cultivation then following a linear view of the evolution of human-plant interaction, inevitably that group must become agricultural. The role of people as knowledgeable agents (Chase, 1989:44) was not taken into account. It has been demonstrated that cultivation needs to be only one set of plant exploitation activities present for some species within a local community. Overall, there is no necessary progression from a hunting and gathering system of plant and animal resource exploitation through certain other stages of intensified human-resource interaction, finally ending in the practice of agriculture (Harris, 1989:18).

The !Kung San who still live a hunting and gathering lifestyle in the Kalahari of Africa also successfully cultivate domesticated crops and herd animals (Brooks and others, 1984:304). Wild plants, such as mangetti nuts and baobab fruit and wild animal species, such as duiker, continue to provide more than half of
their food. Crop plants, such as maize, melons, sorghum, millet and
cucurbits are grown and goats are herded. The researchers
conclude that a "generalist strategy" is much more appropriate in
this semiarid region (Brooks and others, 1984:309), which is true
also for the pastoralists in the area, who hunt and gather as well
as herd.

The nature and origins of early food production in the Kalahari are
not fully known. Hitchcock and Ebert (1984), however, have
challenged the assumption that modern-day hunters and
gatherers have come to produce some of their food as a result of
contact with pastoralists and agriculturalists. Following along the
lines of Harris (1977b) and others who believe that agriculture
may have been preceded by certain environmental manipulation
strategies, researchers in the Kalahari examined the responses of
various groups to resource stress. A variety of responses were
recorded ranging from broadening the diet to intensification of
their gathering activities. In addition, these people were observed
carrying out practices such as controlled burning, intentional
protection of important food plants, replanting of certain species
near base-camps, and intentional cultivation of at least one
species of wild melon. Increased attention given to melons in lean
times "may have led to intentional cultivation in gardens around
residential camps" (Hitchcock and Ebert, 1984:347). The foragers
of the Kalahari, therefore, do not stand as the archetypical hunters
and gatherers who create little impression on their environment.

The Bomagai-Angoiang of the Ndwinba Basin in the New Guinea
highlands are gardeners but also choose from a range of
subsistence strategies to meet their resource needs. They hunt
wild and feral animals, such as pigs, marsupials, lizards, snakes
and grubs, as well as domestic and tame animals, such as
cassowaries; they fish for eels, catfish, crustaceans and frogs and
they garden using spontaneous vegetation and cultivated plants
for firewood and food (Clarke, 1971:51,82,165). Gardens, including
taro, yams, manioc and "greens", orchards of Pandanus sp.,
Gnetum sp., breadfruit and fig, dooryard plantings of dyes, house
and garden "adornments", and also food and semi-cultivated plots
of Pandanus sp. are employed, providing great variety and
accessibility of resources, e.g. tobacco is sometimes a dooryard plant so that it is easily available when desired (Clarke, 1971:74-84). Items from the trade stores introduced by Europeans, particularly salt, have become highly sought after and presumably since the time of Clarke's research have become more numerous and desired. To simply label these people as gardeners because on the linear model of evolution towards agriculture, gardening is their highest achievement, is misguided and implies that their other subsistence activities are unimportant.

There are many agrarian groups in other parts of the world, for whom hunting and gathering is an important part of their broad ranging resource utilisation strategy. The P'urhepecha farmers in the northern part of the state of Michoacan in Mexico, have a strong cultural tradition of gathered food. Caballero and Mapes (1985:40) found that gathering is often for food which varies the monotony of everyday staples: "Wild edible plants are mixed and cooked with maize or beans" and "during the dry and hot season, one of the most common dishes is tamales of maize with 'blackberry' Rubus adenotrichos". In addition, plants are gathered for use as gifts, as well as for firewood, soap, medicinal and ornamental purposes. Although gathering practices are declining because of cultural and socio-economic changes, "gathering of certain teas, fruits and mushrooms for sale at markets is increasing" (Caballero and Mapes, 1985:41). Traditional gathering of plant resources continues because people desire the items which they gather and therefore value them, not purely (if at all) because their economic situation allows them no choice.

Modern Western agriculturalists who are engaged in planting vast areas with monocultures, exploit the land at many levels. For example, farmers in many regions of Australia have access to items of food and other materials which they have hunted and gathered since coming to this country. Very few of these resources are indigenous to Australia but have been introduced through nineteenth century farming practices, demonstrating the European origins of the new settlers. Typical hunting and gathering activities include: rabbiting, kangaroo and pig shooting, duck shooting, fishing and crayfishing in dams and rivers,
blackberrying, mushrooming, collecting honey and firewood. The hunted and foraged resources are valued for a variety of reasons, primarily taste. There is also an important social component when people go together in groups for the enjoyment of these activities. Financially there are advantages in not having to buy food and firewood, for example, but there is a greater expenditure of time and effort to procure them.

So, for modern Australian farmers, hunting and gathering are accepted ways to use resources. In some instances, farmers do what modern Aboriginal people do in the bush. For example, both groups use guns and motor vehicles to hunt. There has been no problem for observers to acknowledge the combination of activities of the farmers. There is great resistance, however, to seeing Aboriginal people as multi-strategists in their environment.

Non-Aboriginal people in Australia generally did not recognise the same resources as the indigenous people. From the earliest days of exploration and settlement, records repeatedly reveal that many people were blind to the possible uses of endemic species, particularly plants. Many explorers perished in regions where there were Aboriginal people living entirely from the land. As far as plants are concerned, they did not recognise the many seeds, roots and fruits as potential food and sources of water, and were ignorant of the gathering and processing techniques which could have saved their lives. In the cases where hardship necessitated them trying the indigenous fare, it was generally considered edible but unpalatable (Cribb and Cribb, 1987:3).

There is a growing awareness of the value of many indigenous plants following research on Aboriginal plant use and also scientific research on the possible uses of indigenous species. Grasses, such as Kangaroo Grass (*Themeda Australis*) are being considered for fodder (Rolls, 1984:267). Following the trend of the 1970s for an emphasis on 'natural' plantings, many species are available for planting in home gardens for utilitarian and aesthetic value. Plant nurseries sell a wide range of Australian plants for native gardens which are valued for their hardiness and low maintenance apart from the attractiveness of flowers and foliage.
Gathering opportunities are available even in the urban industrial environment of Australia where there has been an increasing interest in Australian plants for speciality foods. "In the last few years, Australian interest in the use of native foods in restaurants has grown prodigiously" (Cherikoff and Isaacs, 1989:16). Promoters of this cuisine explain its burgeoning popularity by the fact that it is 'new', distinctly Australian, able to be grown in home gardens and is also very nutritious. By eating this food, some of the experiences of gathering your own food can be had without actually going bush.

It is not always possible to assume correctly that a certain kind of resource regime will require a particular lifestyle and not another, or that a change in lifestyle will bring about a predictable change in food getting strategies. Data from the Kalahari foragers reveal that there are groups who are sedentary and do not produce food but there are also groups who are mobile and are engaged in food production (Hitchcock and Ebert, 1984:347).

**Plant management in Aboriginal Australia.**

Until recently there has been a reluctance to associate deliberate management practices with Australian Aborigines. The evidence presents many challenges to the assumptions about groups which are described as primarily hunter-gatherers. Even now, the terminology used to describe these activities demonstrates that most researchers are looking at the evidence in terms of the presence or absence of agricultural techniques.

There is evidence that Aborigines lived in northern region of the Australian continent for around 50,000 years (Roberts, Jones and Smith, 1990) and through periods of major ecological change. They have been able to occupy the five main ecological zones (following Lawrence, 1968):

1. littoral
2. riverine
3. tropical forest
Each zone can vary greatly depending on other ecological factors, for example, the range of the littoral zone extends from tropical Cape York to the cool temperate southern most part of Tasmania. Resource use varies greatly between regions because of the climatic and vegetational differences. Within each region, groups traditionally relied on a wide range of resources. Seasonality influenced people's movements within their territory as they moved around in order to exploit resources which were available only at certain times of the year. Apart from ecological factors there are many cultural considerations which significantly influence resource exploitation.

The Anbara of the Blyth River on the north coast of Arnhem land continue to hunt fish, shellfish, fresh and salt water turtles, birds, wallabies, snakes and goannas. Vegetable foods such as yams, water chestnuts, *Cycas media* and a great variety of wild fruits still form an important part of the diet (Meehan, 1977:363). By contrast, the Anmatyerr people of the Sandover region of arid Central Australia are restricted mainly to land animals, such as macropods, species of lizard, bush turkey and echidna for their flesh food today (Devitt, 1988:98). People also take advantage of seasonal variations in plant resources. Devitt (1988:125) notes at certain locations, the "intensive harvesting of bush bananas ... which followed early summer rains ... and the intensive collections of desert raisins during May 1982 after heavy rains in the preceding February". Meehan (1982b:66-67) also reported that rain and its effects on resources were major influencing factors in people's decisions to visit specific locations to exploit certain species of shellfish, but decisions about gathering were also closely related to fulfilling ceremonial obligations.

Plants were a major source of food, medicine, tools and shelter for all groups when people lived off the land. Many of these resources are exploited today; some species are merely gathered but others continue to be used in ways which maintain their productivity based on certain management techniques.
Most hunter-gatherer groups are involved in some form of environmental manipulation, modification or management. These actions require knowledge of the environment including its biological and physical processes, in order to manipulate it for cultural reasons. For any particular group, plant resource management relates to the distribution and abundance of plant and animal species in their area and to the group's traditional ecological knowledge. This knowledge is "the understandings that people have of environmental systems and the networks of cause and effect therein" which can be presented as folk taxonomies and as indigenous understandings of the relationships involving plants, animals and various supernatural and environmental factors (Lewis, 1993:8-9).

Traditional ecological knowledge includes:

(1) The group's knowledge, skills, practices and equipment applied to their resources. These include, for example, modern adaptations of former practices (guns for hunting, Toyotas to travel through country, matches for lighting fires) as well as traditional gathering and processing techniques.

(2) Religious beliefs.

Some discussion of Aboriginal beliefs is essential for understanding the relationship between the people and their environment. The Dreaming is the basis of all Aboriginal ritual knowledge and activity (Stanner, 1965). This is the English equivalent of an Aboriginal concept which can be said to have four main levels of significance:

(a) the narrative mythical account of the foundation and shaping of the entire world by the totemic ancestor heroes during the Dreamtime.

(b) the embodiment of spiritual power in the land, including the flora and fauna whereby features of the landscape are given form by the totemic ancestors

(c) the moral and social precepts, rituals and ceremonies which are handed down by the ancestors
(d) a person's relationships to sites which are significant to that person, for example, because of place of birth or membership of a clan. In this way, people are part of the country and the country is part of them (adapted from Charlesworth, 1984:10).

The most relevant aspects of this concept here, are that all the information about plant and animal resources and their gathering, processing and management is contained in the rituals and that the knowledge of these rituals carries responsibilities to country, resources and people. According to Stanner (1965:230), the most significant rituals relating to resources are the "increase" ceremonies designed to maintain and renew, or conserve and produce a particular resource. Rituals vary between groups but for all groups the performance of certain ceremonies is necessary to fulfil obligations to land and to maintain it in its most desirable state. I have described the relationship between cultural and ecological manipulation of the environment for a group of people in Central Australia (Nash, 1984:51-61). In short, it is not only that the rituals must be performed to maintain all life as it is known but every interaction between the people and their resources is driven by their religious beliefs, by the Dreaming.

Previous considerations for plant management in Australia.

Although some early literature suggests that Aboriginal Australians lived totally by hunting and gathering anything that was available and edible in their environment, there has since been a major re-assessment of the cultural influences on subsistence practices. Many authors have argued about the degree to which it can said that Aboriginal people in Australia do manage their environment and the possible motivations for their actions, economic and cultural. There are examples in the literature demonstrating belief in very different degrees of management but all with the underlying assumption that whatever kinds of plant management were involved, Aborigines did not adopt agriculture. Nevertheless, there is a change in emphasis from earlier denials of any Aboriginal manipulation of their plant resources (Clarke, 1977:10; Cleland, 1940:4), to more recent attempts, discussed
Many different terms have been employed in the description of plant resource exploitation and management. This survey aims to show that people have been seen to modify their environment and manipulate their resources in many different ways although the extent of the changes are not fully understood. Elsewhere I have argued that Australian Aborigines continue to modify their environment, and through various techniques, seek to maintain it in a highly productive state (Nash, 1984:63-69). The technique with the most obvious effects on the environment and which continues to be used by people today is fire. There is much evidence for this form of management.

Fire is used systematically to change the landscape and maintain the desirable effects. Controlled burning is possible with the knowledge of the effects of seasonality and frequency of firing in various environments. In Northern Australia, Aborigines burn the bush according to well-defined firing practices to increase the availability of certain desired resources without damaging culturally important areas within the landscape (Jones, 1975:25; 1980; Lewis, 1981:63-64).

It is significant where people choose to burn and not to burn. In the north of Australia, people are very careful not to burn the monsoon forests, which contain many fire-sensitive plant species and they are particularly careful not to burn sacred sites in these forests. Different zones are treated differently; swamp areas are burnt more frequently. Similarly, in Central Australia people burn around important sites and avoid firing significant resources, such as the fire-sensitive *Acacia aneura* (Kimber, 1983a:40, 43). By taking into account the flammability of the vegetation, the wind and firebreaks, an area is fired accordingly. The most common method in the arid region, is to light a bunch of spinifex and then trail this along the line to be burned. There are many instances of people simply driving along and dispensing lighted matches from a moving vehicle as they travel through their country (D. G. Nash, pers. comm.).
Patterns of mosaic burning have been described for Central Australia where different types of vegetation are produced according to the relative fire-tolerance of the species involved (Gould, 1971:22; Latz and Griffin, 1978:79; Latz, 1982:124). Most of the important food plants are "fire weeds", which means that they require regular burning in order to maintain their maximum productivity (Latz, 1982:123). Firing has also been responsible for the increased distribution of some food plant species in Central Australia, which thrive in fire-disturbed areas, such as *Solanum* spp., *Ipomoea* and various grasses (O'Connell and others, 1983:99). Although there has been no detailed study of the role of firing and its effects on soil fertility and plant growth in Central Australia, burning of the vegetation adds some nutrients to the soil (P. K. Latz, pers. comm.).

While there has been some debate on the extent of Aboriginal burning in this country in the past, it is agreed that fire-adapted species, such as *Eucalyptus* spp. are ubiquitous in Australia (Singh, Kershaw and Clark, 1981:48). Some of these are important Aboriginal resource species. Firing increases the yield of cycads and that this was recognised by Aborigines (Beaton, 1982:51). The unanswered question in the literature is whether they incidentally or deliberately used fire for this purpose.

The use of fire in the present by various groups would suggest a multi-purpose strategy for burning. Any increases in a desired resource would obviously be one good reason for this strategy. Conversely, lack of firing results in reduced productivity of some known resources. Latz (1982:123) demonstrated that *Solanum centrale* greatly reduced its productivity in the absence of firing over a period of years. There are more obvious, practical reasons for firing the landscape. In many regions of Australia, burning is carried out to increase hunting success by clearing the area for walking and allowing for easier tracking of game. Aboriginal people recognise that game animals are readily attracted to the new growth which follows rain after burning.

Jones (1969) introduced the concept of "fire-stick farming" in an attempt to emphasise the deliberate use of fire for resource management by Aboriginal people throughout Australia and its
ecological effects. This research added weight to the burgeoning debate on the ecological impact of hunters and gatherers worldwide. Horton (1982:248-249) challenged Jones's claims arguing that Aborigines made use of "the natural potential fire regime of Australia" but did not alter this regime. He further objected to the use of the word "farming" in "fire-stick farming" on semantic grounds, stating that there is no such thing as "partial farming". Having stated clearly that farmers are interferers and hunter-gatherers are observers, Horton saw no evidence to reassess the hunting and gathering status of Australian Aborigines.

Jones, however, did not suggest that Aborigines were on their way to becoming agriculturalists by using the term "fire-stick farming". He argued very clearly in later publications that the Gidjingali do not show any attempt to nurture or domesticate their plant resources (Jones and Meehan, 1989:128-129). Drawing similar conclusions to Peterson (1976:274), Jones and Meehan (1989) state that there was great stability or conservatism through religious tradition in the subsistence regimes of Australian hunter-gatherers. There is evidence for some degree of symbiosis between people and plants but generally they argued that evidence suggesting a more intensified relationship is part of an incidental process. It seems that they are suggesting to some extent, that a lack of economic incentive explains why Australians did not adopt horticulture or any other more intensified relationship with their plant resources. In other words, there was no need to intensify as they were successful hunters.

Some other researchers have implied a slightly higher degree of intention behind people's actions. In a study of the ecology of root use by south-eastern Australian groups, Gott (1982:65) suggests that the actions of digging up certain roots led to increased propagation of desired plants, and this might be regarded as a form of "natural cultivation". The terminology is confusing in some ways as it contains a contradiction. However, the point being made is important. Gott (1983:9-11), following the ethnographic record, describes how the women dug and gathered murnong (Microseris scapigem) and the effects on the plants: "the breaking-up of the clumped tubers, with some parts inevitably remaining in the soil,"
equivalent to the well-known horticultural practice of thinning tuberous perennials, would have promoted the growth and spread of the plants”.

The use of fire also encouraged the abundance and spread of murnong, but it is not possible to attribute this effect to Aboriginal management alone. It is most likely, however, that they were aware of the connection between certain sorts of fire and their effects on plant growth and also the loosening of the soil and increased plant growth. Although reluctant to comment on the people's level of understanding of their actions, Gott (1993:196) tentatively suggests that the distinction between gathering and cultivation seems less sharp than one might have expected.

Latz (1982:91) and Watson (1983:40) use "husbanding" in relation to the manipulation of pituri (native tobacco). Although this term can be used synonymously with cultivation and farming, its more common meaning is the frugal use of some resource. In this context, both meanings are drawn upon and these researchers admit that there seems to be some deliberate intention by Aborigines to select the best plants and influence their use.

Apart from his observations that the leaves are carefully selected and the stand husbanded, Latz (1982:91) also observed seeds being scattered apparently to ensure future crops and leaves stored when there was excess. In addition, the harvesting technique for pituri varies and seems directed towards future production. I have seen armfuls of *Nicotiana* ready for drying, the entire plants having been uprooted. In doing so, the patch was thinned out making space available for more plants. All species of *Nicotiana* are encouraged by fire and the effects of fire on the production of these and other desirable resources was known (Latz, 1982:92,138). Similarly, people purposefully employed a method of gathering tobacco plants whereby the fresh young leaves were continually harvested, which increased the production of the most highly desired part of the plants.

Some aspects of the husbanding of pituri have been documented on video for one Central Australian Arrente community, showing the continuing practice of careful selection of the best leaves for use and the protection of the stand itself (Ngulpa, 1988). One
woman living there today tells how she brought seeds from another place many years ago and planted them in her place, but that some of the plants were always there. She points out that the plants grown under the shade of the orange trees were protected from frost. It is possible that this kind of activity pre-dates European occupation of the area and that these kind of management strategies were traditionally employed.

The use of water as a form of environmental manipulation has been described for groups in Central Australia and arid areas of New South Wales, South Australia and Western Australia. Stones, earth and debris were used to cause water to flood over a greater area after rain and so increase the area for growth of grass resources (Tindale, 1974:102; Tindale, 1977:347; Rowlands and Rowlands, 1969:134-135). The extent to which this method was used in the past is uncertain since few reports have been made.

Hynes and Chase (1982:38) introduced the term "domiculture", which they defined as "hearth-based parcels of knowledge, strategies and actions applied to each domus", hearth-centred environment. They demonstrate that past human actions in different locations on varying suites of plant species with edible parts, are reflected in the present vegetation. Although the deliberate actions on plants, such as husbanding of fruit trees and replacement planting are given, the emphasis is on the effects of these actions in particular environments. There is not enough evidence to suggest that the genetic components of individual plants have been altered or that the process of domestication (defined below) was underway.

Most importantly, Hynes and Chase (1982:48-49) emphasised the importance of cultural dimensions in assessing the impact of people on their environment, in particular that people's modification of the landscape is not accidental. They referred to the "orchard-like assemblages" and "gardens" which had resulted from past management systems, stating that these were no longer practised. They at least wished to emphasise that Aborigines were not "ecologically passive and moulded by a largely 'natural' landscape".
Yen (1989:62) uses the term "domestication of the environment" to define the processes of incidental selection whereby Aborigines influenced resource production through the manipulation of the environmental settings of the exploited species. The examples of influenced species would survive natural competition, however, the state of the environment created by human action does not remain without continued interference. He admits that there is evidence for intensification of some species, such as pituri, some grass-seeds and yams, but that domestication within species is absent from hunter-gatherer systems in Australia.

Discussion so far highlights that there has been considerable flexibility in the use of terms regarding Aboriginal plant resource management. The literature is unanimous in stating that Aborigines are not agriculturalists or even horticulturalists. However, the techniques of cultivation and horticulture were not unknown to Aboriginal people. Instances of planting, tilling, harvesting and selection and care of seed and root crops have been documented for various parts of Australia. The information, presented in Table 10, is based on Gott's (1993:196) table comparing agriculture and horticulture with Aboriginal management techniques. Additional data on species names, location and references for this information are included here.
<table>
<thead>
<tr>
<th>Technique</th>
<th>Species</th>
<th>Location</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planting:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>replanting, transplanting</td>
<td><em>Ficus</em> sp.</td>
<td></td>
<td>Hynes and Chase, 1982:40</td>
</tr>
<tr>
<td>sowing</td>
<td><em>Dioscorea</em> sp.</td>
<td>Groote Eylandt</td>
<td>Levitt, 1981:137</td>
</tr>
<tr>
<td></td>
<td>coconut</td>
<td>Cape York</td>
<td>Hynes and Chase, 1982:40</td>
</tr>
<tr>
<td></td>
<td><em>Portulaca oleracea</em></td>
<td>?</td>
<td></td>
</tr>
<tr>
<td><strong>Digging:</strong></td>
<td><em>Cyperus bulbosus</em></td>
<td></td>
<td>Tindale, 1977:</td>
</tr>
<tr>
<td>to gather</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fertilising:</strong></td>
<td><em>Typha</em> sp.?</td>
<td>s-w W. Aust.</td>
<td>Irvine, 1970:279</td>
</tr>
<tr>
<td>by burning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Thinning out</strong></td>
<td><em>Dioscorea</em> sp. and</td>
<td>s-w W. Aust.</td>
<td>Hallam, 1989</td>
</tr>
<tr>
<td>dividing clumps</td>
<td><em>Typha</em> sp.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of tubers while</td>
<td><em>Microseris</em> sp.</td>
<td>Victoria</td>
<td>Gott, 1983:11</td>
</tr>
<tr>
<td>digging</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Protection</strong></td>
<td>(small seedlings of</td>
<td>Eastern Cape York</td>
<td>Hynes and Chase, 1982:40</td>
</tr>
<tr>
<td>barriers erected</td>
<td>certain species)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>around seedlings</td>
<td>grasses, such as <em>Panicum</em> sp.</td>
<td>Macdonald Downs, NT</td>
<td>Tindale, 1974:102</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Irrigating</strong></td>
<td><em>N. gossei</em></td>
<td>Central Aust.</td>
<td>Latz, 1982: App.1, 176</td>
</tr>
<tr>
<td></td>
<td><em>Solanum chippendalei</em></td>
<td></td>
<td>Latz, 1982: App.1, 216</td>
</tr>
<tr>
<td></td>
<td>Dillon bush, seeds</td>
<td>Victoria</td>
<td>Gott, 1993:200</td>
</tr>
<tr>
<td></td>
<td>sprouted around camps.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Roots traded.</td>
<td>Geelong area</td>
<td>Gott, 1993:196</td>
</tr>
<tr>
<td></td>
<td><em>Duboisia hopwoodii</em></td>
<td>s-w Queensland</td>
<td>Watson, 1983:11</td>
</tr>
</tbody>
</table>

Reference:
- Chase and Sutton, 1981:1833
- Gregory, 1886
- Harris, 1977:452
- Hale and Tindale, 1933:113
- Hynes and Chase, 1982:40
- Irvine, 1970:279
- Irvine, 1970:278
- Levitt, 1981:137
- Hallam, 1989
- Gott, 1983:11
- Hynes and Chase, 1982:40
- Tindale, 1977:
- Irvine, 1970:279
- Irvine, 1970:279
- Irvine, 1970:279
- Irvine, 1970:279
- Hynes and Chase, 1982:40
- Hallam, 1989
- Gott, 1983:11
- Hynes and Chase, 1982:40
- Tindale, 1974:102
- Latz, 1982: App.1, 176
- Latz, 1982: App.1, 216
- Gott, 1993:200
- Gott, 1993:196
- Watson, 1983:11

128
Techniques of plant management.

There are many examples in the literature of management of yams, *Dioscorea*:

**Replanting** the tops or leaving the tops in the ground, is common in Cape York Peninsula and Arnhem Land (Harris, 1977a:437; Jones, 1975:23; Peterson, 1976:275). There is evidence that the people were not simply benefiting from the chance of vegetative reproduction of this species. "After harvesting the edible yams, the Tiwi women break off a part of the yam and replant it in the hole so ... they will always be able to find yams in that location" (Goodale, 1982:203).

**Transplanting** was traditional practice from Cape York Peninsula on the Aboriginal mainland (Hynes and Chase, 1982:40) to the offshore islands of the Torres Strait (Harris, 1977a:427). Both actions suggest that these yams were managed, not merely gathered resources.

There is some evidence for transplanting of other plants. In Central Australia, it appears that people may have transplanted seedlings or planted seeds of the Bat's wing coral bean tree (*Erythrina vespertilio*) around rockholes (P. K. Latz, pers. comm.). This tree grows at many rockholes where there is water nearby but not in similar habitats without water. The cultural significance of this species would have been a motivating factor for such management activity.

**Digging** the soil in the process of gathering underground roots and tubers, such as *Cyperus bulbosus* (Tindale, 1974:96), *Typha* (Gott, 1982:65), *Microseris* (Gott, 1983:11), *Ipomoea* (Yen, 1989:60), *Vigna* (Veth and Walsh, 1988:22) and *Dioscorea* (Hallam, 1989:137) has been described as a technique of environmental management used in various regions of Australia. This process has also been recognised as important for breaking up the clumps of tuberous roots, similar to thinning out domesticated species, such as orchids to improve productivity. Although not fully explored for indigenous species, all of the above activities most probably had a significant effect on the continuing productivity and spread of those valued resources.
Weeding can be defined as the removal of unwanted plants in any location. As a technique of managing resources, it has been observed on many occasions in Central Australia. The Warlpiri commonly weed around sacred sites, such as trees or stones; they also burn close to a site before firing so as not to destroy the site, particularly if it is a tree (N. Peterson, pers. comm.). Young initiates are sometimes punished in the form of being told to weed around sacred sites (D. Bell, pers. comm.). There is no reason to believe that these practices are not part of traditional lifestyles. It is also common practice today to weed around graves, as I observed in the cemetery at Papunya. This application is modern but the technique has a basis in the past.

Planting of seeds. Observers have noted from early colonial days that Aborigines have brought plants back to camp as part of the gathering process and furthermore that these actions influence the distribution of those plants. In Victoria, Beveridge noted that Dillon bush (Nitraria billardieri) plants sprang up around the cooking mounds in camps where the stones from the fruits were discarded (Gott, 1993:200). In recent years, Jones (1975:24) evidenced the growth of watermelon crops and Eugenia suborbicularis at a community in north-east Arnhem Land, following the dispersal of seeds around the campsite. Melons from old campsites were gathered and transported to new living areas thus continuing the spread of desirable resources. In the case of Eugenia, the large seeds were thrown to the edge of the camp area and the people apparently recognised that they would germinate and eventually produce fruit "all the same gardeny". In Central Australia, the fruits of Solanum chippendalei have been gathered, transported to camp where the seeds are dispersed, reproduced and fruit again gathered (Nash, 1984:43-44). It has also been suggested that Aboriginal people may have been responsible for the introduction of Solanum ellipticum to the Simpson Desert (Buckley, 1981 in Kimber, 1984:17). This kind of symbiotic gathering activity, similar to that described by Jones for people and their fruit trees (Jones, 1975:25), either intentionally or otherwise, has influenced the distribution of some species.
Seeds have been reported to be deliberately scattered to ensure future crops in some areas of Australia. In the north eastern part of Central Australia the Alyawarr people "have deliberately established colonies of these plants [Solanum chippendalei] south of their normal range by scattering seeds near their camp sites" (Latz, 1982:App.1,216). Native tobacco seeds were scattered around the camp sites near Alice Springs by one Arrente woman mentioned above (Nganampa Anwerenekenhe, 1990). Kimber (1984:16-17) also provides evidence from an Aboriginal informant and the ethnographic literature to conclude that "a limited form of cultivation of certain important plant species", such as nardoo (Marsilea quadrifolia) and some grasses, was practised in Central Australia. Dix and Lofgren (1974:74) reported that their informants from the Laverton area of Western Australia stated that "seeds were carefully scattered in the cracks of the clay pan to ensure that after the heavy rains, a bountiful crop would be produced". It is not known to what extent these practices were followed in the past.

Spread of cultivars. The full impact of these activities on the distribution and abundance of the plants is not known but their role in management of resources seems clear. By bringing the foods back to camp and allowing the seeds to grow, they were increasing the number of locations for gathering of that resource. People recognised that some resources spread as a result of firing and according to O'Connell and others (1983: 99), this can be viewed as a "form of low-cost cultivation" employed by people throughout Australia. They cite evidence that modern Alyawarr people commented on the reduced distribution of certain resources following years of European policy of absolute fire suppression.

By accessing plant resources outside their domain through trade, people were increasing the variety of their resources and were therefore adding to the strategies available for management of their diet. The trade routes for the narcotic drug, Duboisia hopwoodii (Mulvaney, 1975:111) demonstrate that this social system of spreading resources was widespread and may have applied to many other plant resources, even if to a lesser extent.
The evidence for storage as a form of food resource manipulation has been reported for some regions of Australia. Invariably the foods are said to have been stored at a certain stage of gathering or processing for later consumption. There are no reports which suggest that seeds were stored for future cropping. However, if the examples of seed sowing mentioned above are representative of widespread activities then perhaps the evidence on storage is biased and incomplete. Seeds may have been collected in small quantities and stored in preparation for sowing.

The most often quoted example of stored resources in northern Australia (Ashwin, 1927:16) is remarkable because of its size, with about a ton of grass seed stored in 17 large dishes covered with paperbark. It is generally held that stored food, such as cooked loaves of processed cycad nuts, was a significant resource at certain times but did not constitute a staple food (Levitt, 1981:51). Examples of storage from the arid regions suggest provision of emergency food supplies only, given the quantities stored (Gould, 1969:264-265; Tindale, 1977:346). Cane (1989:104) concludes that storage of edible seeds was a very important aspect of the Great Sandy Desert economy for the last few months of each year. However, as Devitt (1992:46) cautions, this should be interpreted in the light of his conclusion that seeds were an important resource at some sites during some times.

The temporary storage strategy of the Bagundji of the Darling Basin indicates that Panicum was a more intensely managed wild resource. Apart from burying small caches of seeds for emergency food supplies, the Bagundji collected native millet grass while it was still green and before its seeds had ripened. This strategy ensured a prolonged ripening period and made the seeds available about two months after their normal time of ripening in July, the cold, resource-lean time of the year (Allen, 1974:313). However, it is not absolutely clear why people did this. Traditional patterns of subsistence had been disrupted since contact: "no historical accounts give reasons... All that is known is that it was large scale" (Williams, 1979:94). This activity is an example of people manipulating and changing their environment,
and furthermore, it is possible that people were tapping the potential of seeds as a more settled subsistence strategy.

In the western district of Victoria, it is reported that "surpluses were common" particularly as a result of eel strandings and whale beachings on the coast and that instead of being stored the excess food "provided the bulk of the resource base for periodic gatherings of people (Williams, 1987:313). Short term storage of plant food resources seem to have provided food for ceremonial gatherings in other regions also. On Groote Eylandt, the nuts of the burrawang (Cycas angulata) are still a popular food. Many important ceremonies were held about the time that the Burrawang was ripe and the 'bread' made from the processed nuts could keep for six days. The nuts were also stored for up to five months after being cracked and leached to remove the poisonous substance (Levitt, 1981:50, 79). The Gigjingali people of Northern Arnhem land make 'bread' of Cycas media which "is specifically associated with important ceremonial occasions, such as the performance of Kunapipi, when hundreds of people congregate for several months" (Jones and Meehan, 1989:124). So there is some evidence that storage was not only used to relieve food stress but to ensure variety in diet, as well as for other social and cultural reasons.

From the evidence given so far, it is clear that Aborigines are involved in management regimes which stretch the definition of hunting and gathering to include many techniques more commonly associated with agriculture. The discussion on Aboriginal management practices suggests that researchers are keen to place Aborigines somewhere on the continuum of food procurors to producers. While it is now widely accepted that there is no necessary path leading from one to another, comparison between different systems of resource management can be useful. Models designed to show the continuum of human action on plants from gathering through to agriculture, are analytically useful to break down processes, such as cultivation, into unambiguous activities, e.g. digging. However, it is misleading to describe motivation in terms of the action only; people dig, among other activities, to obtain food, but why do they choose a particular
resource and why act on it in a particular way? The effects of human interaction with plants can be recognised by the people involved and result in further action. Another way of approaching these questions is to consider the role of choice and the motivations behind it; people can choose on the basis of traditional values, as well as being influenced by changing social, environmental and cultural circumstances.
CHAPTER 6.
ABORIGINAL GARDENING IN CENTRAL AUSTRALIA.

For Aboriginal people in Central Australia, gardening is one focus for activity with their plant resources. This section explores the historical, social and economic context for gardening in the study area. Full descriptions of the home-gardens lead finally to an explication of Aboriginal gardening and the motivations for such activity.

Gardens from Central America provide an analogy for examining the evidence for Aboriginal gardening, its origins and possible directions. The form which a garden takes is culturally determined in that it reflects the significance of certain plants and the motivations of the people involved. This form may not be recognisable to outsiders, as Anderson (1952:137-142) illustrated in his description of Central American Indian gardens. In brief, the "home-gardens" did not satisfy the European perception of gardens, yet contained the equivalents of a vegetable garden, and orchard, a medicinal garden, a compost heap, a dump heap and a beehive. A combination of wild and domesticated species grew, all of which were useful in some way.

Similarly, "dooryard gardens" of Puerto Rico contained a wide variety of plants from many sources: "cuttings from older gardens, seedlings from stores and nurseries, specimens left by visiting children, or those bought from vendors. Most are domesticates, others are wild forms brought into cultivation" (Kimber, 1978:6). Activities in the gardens such as planting, weeding and harvesting continually modify the garden habitat maintaining the people's desired resources.

These gardens raise questions concerning features of the Aboriginal gardens, such as:

To what extent are the gardens traditional or introduced, productive or ornamental, wholly or partly accidental or planned, permanent or temporary?
How many plants are indigenous or exotic, cultivated or transplanted, weedy or domesticated?

It can be argued that Aboriginal gardening is basically a continuation of traditional practices, which have been maintained or have been given new applications in modern lifestyles. Modern Aboriginal gardening occurs in both home-gardens and bush-gardens.

For Central Australia, Cane and Stanley (1985) chronicled the attempts and failures of market-style gardening in the Pintupi, Luritja, Warlpiri and Pitjantjatjara desert communities. In addition, they distinguished an alternative approach in some communities where they observed "Aboriginal inspired attempts at horticulture and camp improvement" (Cane and Stanley, 1985:78). In relation to all the communities visited they concluded that there was a shift from large-scale European inspired gardens "in favour of small, more manageable gardens which contain plants that are nice to eat and easy to grow" (Cane and Stanley, 1985:102). Following the evolution-oriented idea of cultural development, they went on to interpret this as the possible "humble beginnings" of "substantial horticulture" or "incipient agriculture". This interpretation is grounded in the belief that there is one basic motivation for people's activity with plants, and that is an economic one, and that human systems necessarily progress from simple to more complex relationships with their resources. Using the data on traditional plant use together with the data on Aboriginal gardens below, it is my aim to demonstrate that this common approach is flawed.

Historical context.

From the very early period of non-Aboriginal control over Aboriginal people's living situation in other parts of Australia, attempts were made to establish self-sufficient Aboriginal farming communities as part of an effort to convert Aborigines to a Christian and European lifestyle. In the 1830s in Tasmania, European settlers had taken over most of Aboriginal land and George Augustus Robinson, the Chief Protector of Aborigines, is
reported to have rounded up the remaining Aborigines and transported them to Flinders Island where he carried out a program of 'civilisation'. This is described in an excerpt from the Journal of Flinders Island, 21st December, 1845: "Robinson's programme was designed to teach the natives about the blessings of Christianity and civilised, decent living habits; the essence involved adopting the life-style and values of Europeans. The Aborigines were encouraged to wear clothes, live in clean houses, work for a living and accumulate possessions. To set an example the mission Aborigines were housed in small separate huts surrounded by gardens and fences" (Wales, 1978:8).

Gardening was indeed carried out by the Aborigines at Flinders Island, who built fences and grew vegetables and fruits (Birmingham, 1992:153-158). The major emphasis in cultivation appears to have been on potatoes of which they were particularly fond, but cauliflowers, carrots, turnips, peas and strawberries are also mentioned. There seems to have been some dispute as to whether Aborigines or convicts did the work in the gardens. The second report of inquiry stated that the Aborigines were not very interested in gardening but would do that and other work for the remuneration given. It seems that Aboriginal men were encouraged to garden but "it is undeniable that Aboriginal achievement in any European-based tasks was heavily dependent on leadership and personnel management" (Birmingham, 1992:154).

As Wales points out, the philosophy operating at Flinders Island, which was based on changing a race of hunter-gatherers into Christian farmers was considered so successful, "it became in subsequent years the basis for native policy in much of mainland Australia" (Wales, 1978:2). So, Aborigines in other places were coerced into gardening in a way which was outside their traditions and which they did not accept.

Non-Aboriginal settlement in the field area of Central Australia forced many changes in Aboriginal lifestyle. Missions, pastoral stations and government authorities involved some Aboriginal people in gardening activities with the intention of changing their ways. Although strongly encouraged to participate in various
modes of agriculture, including horticulture, it is only very recently that Aboriginal people have shown significant interest in such pursuits.

Most of the people who are now living at Kintore and smaller communities in the field area, came to visit Haasts Bluff for rations in the 1950s, camping there on a regular basis while some settled more permanently. Aboriginal people were introduced to the idea of gardening as the mission staff initiated the planting and maintenance of fruit and vegetables for consumption. The garden was maintained with the help of Aboriginal gardeners who were paid with some money and food for their work. According to a nurse employed at the mission in the 1950s, the Aboriginal "garden-boy ... hosed, chopped wood, and kept the grounds clean" (Gatrell, 1957:21). It seems that the actual gardening was done by non-Aborigines and that the Aborigines showed little interest.

Other missions in the region, such as Hermannsburg and Areyonga, which were larger and longer established, maintained quite large gardens to supply the residents with fresh fruit and vegetables. Aboriginal labour was employed to work these gardens (NTA, 1961a; NTA, 1961b).

Apart from mission interest in horticulture, gardens were also a focus of government interest when establishing Aboriginal settlements in Central Australia. Fresh vegetables and fruit were required for the settlement dining rooms. Training programs were instituted by government departments which, with the direction of local non-Aboriginal co-ordinators undertook to develop various gardening enterprises in Aboriginal communities. At Papunya many attempts were made to coerce Aborigines to garden as part of the new lifestyle planned for inhabitants of government settlements. People at Haasts Bluff had been moved to the new settlement of Papunya in 1959 because of the deterioration of the water supply at Haasts Bluff and, in keeping with the assimilationist ideas of the period, were being trained to live a more European lifestyle.

Authorities endeavoured "to introduce the general concept of 'work' as a worthwhile aim in life" (NTA, 1961c:21) and gardens were to play an important role. Department of Aboriginal Affairs
reports describe activities associated with gardening in terms of work attitudes. Gardens are listed under "Employment" in community reports and are sometimes the only item of employment listed (NTA, 1971/72:66). Assessment of sites for new settlement for the Papunya people in the late 1960s and early 1970s always included a reference to the suitability or otherwise of the soil in the area for market gardening (NTA, 1971/72).

The many agricultural and horticultural schemes introduced at Papunya were aimed to promote self-sufficiency in the long term, and in the short term, to provide supplementary food for consumption and sometimes sale. In fact there were many favourable reports on the progress of some of these activities. Records of the Department of Aboriginal Affairs list many small and large communities in the Papunya area as having gardens at various times during the period from 1961 (DAA G68/2273). Some of these gardens are reported to have had limited financial success, although not for very long periods (DAA G69/358).

It is clear from such records that the authorities were committed to the idea of gardening for Aboriginal people. In the first stage of settling down, it was believed that people should have access to permanent water, have rudimentary shelter and show their commitment to the new place and lifestyle by beginning a worthwhile enterprise, such as gardening. Government policy varied in relation to the nature of horticultural development and funding strategies but remained consistent concerning the overall worth or relevance of such activities to the lives of Aboriginal people. While the government's attitude has been fairly clear, the attitudes of Aboriginal people varied according to individual interests and in response to social changes within communities, as well as the political opportunities that arose under changing government policy.

At certain times there were political incentives for people to plant a garden in their community. During the early 1970s, when people at Papunya were starting to move westwards away from the settlement institutions, they could apply for assistance from the Commonwealth government for bores, vehicles, radios and other
equipment needed to set up small communities based on a more traditional lifestyle. The more convincing their argument concerning their desire to remain in these outstations, the more likely they were to receive help. The most desirable assistance came in the form of a Toyota four wheel-drive vehicle. An attempt at a garden seemed to go a long way towards impressing the officials of intended long term occupancy of a site (R. G. Kimber, pers. comm.). Gardens from that era in the Papunya area, rarely survived for more than a few months and in those cases, the gardens were largely looked after by non-Aborigines.

Ernabella, in northern South Australia, is often quoted as a success story in terms of the development of horticulture in Aboriginal communities. Programs there, which began in 1968, were mostly concerned with reafforestation and education of Aboriginal people in the ways of non-Aboriginal plant management. The success of these programs is largely due to the long term contribution of non-Aboriginal advisors. Although taken on with some enthusiasm by Aboriginal people the initiatives for the new level of plant management came from non-Aboriginals. Through them and the resources that they were able to organise, horticulture became an important part of people’s lives on outstations from Ernabella in the 1970s and 1980s (Last, 1986). Other communities did not have this level of continued support.

Kimber (1983b:179) lists nine failed horticultural enterprises at Papunya, including a date palm plantation, a rose garden, and a carob tree plantation. He blames the failure of these projects on the misguided policies and practices of the various government departments involved, arguing that they did not take into account the attitudes and lifestyle of traditionally oriented Aboriginal people. Cane and Stanley (1985:77) share this impression of failed attempts at horticulture in desert communities, speculating on three main reasons for failure:

(1) need for a sedentary lifestyle to maintain gardens;
(2) camp abandonment as part of mourning ritual; and
(3) harsh desert environment.
To some extent the government authorities had attempted to address these problems because they remained committed to market style gardens for Aboriginal communities. However, the social and cultural constraints on people's behaviour were not always recognised and taken into account. The three reasons are discussed in turn.

(1) Gardens were at times left unattended for extended periods and suffered severely from this. However, it is not clear that the people actually wanted to garden in these camp sites but the government's funding options were incentives for settling down and partaking in this kind of activity. It seemed that if there were signs of ongoing horticulture, then this was viewed as commitment to the group's future in that place. Financial and other resource support was granted accordingly.

The problem with this approach is that details on gardening activity do not provide significant information on Aboriginal people's intentions. Aboriginal people generally do not consider, as most non-Aboriginal people do, that time spent gardening is an investment that can be capitalised upon in the short term, as well as the long term. When a group is observed to begin gardening and then later abandon the work usually through a period of absence from the camp site, it has typically been concluded that these people are:

(a) ignorant of the requirements of a garden;
(b) not really interested in horticulture (of any sort);
(c) not totally committed to living at that place; and
(d) too traditionally oriented to be provided with community services which assume permanent residence at that place, eg visiting health, educational services.

Lack of understanding of Aboriginal cultural priorities has meant that the course of events has often been misunderstood. It is my view that non-Aboriginal observers often confuse the concepts of 'settled living' and 'lack of mobility' in terms of effective land management. Aboriginal people who are living a settled lifestyle can still be highly mobile. When they are not moving around they
live in a way that is similar to anyone who is permanently settled in one place. In other words, people can be described as settled in one place although they frequently move for short periods to nearby places for social reasons, but at the same time, they remain committed to their own place.

In the case of people at Papunya in the 1970s, it was true that many were not committed to the places at which they were living. The Pintupi people moved many times after coming in to Papunya, largely because they were not on their own land. They were also continually compelled to move for social reasons, such as death of relatives. Generally, they became concerned to return to their country and the westward moves to the outstation locations were steps in that direction.

(2) When people vacate a living place due to the death of someone who has been living there, they are not totally prohibited from visiting the place. This custom is not necessarily a barrier to garden maintenance where people really desire to tend their gardens. It is more likely that the gardens were neglected in the way the researchers observed because they were not important to the people involved. On a number of occasions Aboriginal people communicated their lack of concern about the demise of a garden following people's absence. They did not see a problem because a garden will grow again if desired.

(3) The problems of gardening in the harsh desert environment were also recognised by advisory and funding authorities. A Commonwealth Scientific and Industrial Research Organisation (CSIRO) report (Griffin and Lendon, 1979) on three Aboriginal homelands in Central Australia, including the Haasts Bluff-Papunya area provides details on land management developments at that time. A number of outstations were regularly inhabited and the community leaders were involved in planning for future needs with funding bodies including government departments. The main problems related to water, store supplies, land degradation, horticulture, transport and communications, employment and housing. Problems of horticulture resulted from lack of suitable water and soil conditions on one hand and
according to some, a lack of "sufficient horticultural knowledge" on the other (Griffin and Lendon, 1979:7).

These researchers must have believed that the solution to the problems was to address each area of difficulty and provide more resources of the same kind which had been tried before, i.e. more education and more drip hoses. While it is true that these are valuable resources for any kind of gardening activity, the supposed solutions contained no new elements of understanding of Aboriginal people's desires.

The terms of reference of the study were not broad enough to incorporate all the horticultural activity on Aboriginal communities visited. The researchers were looking for conventional styles of gardening, such as lawn, trees, flowers and vegetables in garden beds, and did not appear to be sensitised to other examples of interaction between Aboriginal people and plants. The "spiritual and social function" of the use of natural food supplies was recognised as plants were understood to be used in traditional ways, but there is no mention of other kinds of usage of local species adapted to the modern way of living. In short, the criteria for judging success of gardening has to change before Aboriginal gardening can be appreciated.

Therefore, studies which locate the blame for the failures in the past primarily on lack of understanding of Aborigines by non-Aborigines may be correct. However, their analyses are limited in terms of the modern garden activity by Aboriginal people. It continues to be true that very few people in Aboriginal communities, are interested in gardening intensively on a permanent basis to produce either market goods or to consistently provide fruit and vegetables for themselves (Young and others, 1991:151). It is also true, however, that some Aboriginal people, individuals and groups, have been experimenting for a number of years with seedling transplants, limited crops of fruit and vegetables, and shade and shelter plantings while continuing their traditionally based plant usage. Generally there has been little success in these new pursuits of the kind expected by the authorities, but in some places motivation and change is obvious.
Generally the results have not been viewed in a positive way by outsiders and often have not been recognised.

**Tree planting projects.**

Beginning in the 1980s, a change in emphasis concerning the potential role of European horticultural activity took place. As well as the emergence of individual garden activity around people's living areas, there was a renewed enthusiasm by all relevant authorities to plant trees for shade and shelter in Aboriginal communities. The new priorities were set to a large degree by the wider community who recognised the need for research and action directed towards protecting the environment. The Conservation Commission of the Northern Territory now runs projects for soil rehabilitation and conservation. It assists and advises pastoralists, Aboriginal groups, mining and pipeline companies and other government departments in the area. Similar projects in this area of arid zone research are operated by the Department of Primary Industry and the CSIRO in Alice Springs. Aboriginal organisations, such as the Tangentyere Council6 and Anangu Pitjantjatjaraku7 have taken the advice of the research groups and initiated their own programs for 'greening the bush'.

Before the development of Aboriginal organisations in the area during the 1970s, it was generally the case that ideas concerning development or 'advancement' of Aboriginal communities came from non-Aboriginal people involved in the affairs of those communities on pastoral properties, missions or in government settlements. There are now Aboriginal organisations which are the official advisers of independent Aboriginal communities employing both Aboriginal and non-Aboriginal people. Aboriginal

---

6 Tangentyere Council is responsible for the community management programs and land management services for town camps around Alice Springs as well as minor involvement with bush communities.

7 Anangu Pitjantjatjaraku is responsible for programs and services to both Northern Territory and South Australian Pitjantjatjara communities.
community councils, with the assistance of their advisers, identified some short and long term problems which could be alleviated by carefully planned land management programs, such as tree planting projects. In 1990/91, 17,000 trees were supplied to Alice Springs town camps and 80 bush communities (Tangentyere Report, 1992:15). People are involved in horticulture and arboriculture in many communities across Australia depending on local interest and opportunities (Young and others, 1991:153), and while many programs are short-lived the people are experimenting with forms of land management in ways that are appropriate to their needs.

In an interview on 1/5/1987 for *The Centralian Advocate* (an Alice Springs newspaper), Mike Carmody, working for the Land management section of Tangentyere Council, said that "the Aborigines are developing their own unique agricultural system to suit their own style of doing things and their own needs". His comment refers to the adaptation by Aboriginal people of standard horticultural techniques to provide shade, shelter and some fresh fruit in accordance with their priorities for better health and general living standards worked out in conjunction with their advisors. He is referring mainly to the town 'fringe' camps where these programs are being developed.

There is also a recognised need for improved living conditions in more traditional communities outside the main centres of population, such as Alice Springs. In its UPK (Uwankara Palyanyku Kanyintjaku) report on environmental health in Pitjantjatjara Lands, the Nganampa Health Council listed nine areas of healthy living practices which need to be acted on to significantly improve health of Aboriginal people in remote communities (Nganampa Health Council, 1987:2). Of those nine practices, six (including problems of nutrition, crowding, separation of dogs and children, dust and temperature control, and general trauma) could be assisted to varying degrees through the use of planned and managed garden and horticultural activities. Three strategies for promoting the healthy living practices are listed below:

1. Fresh fruit and vegetables to improve nutrition;
(2) Landscaped garden and outdoor living areas to reduce domestic crowding, given that 80% of Aboriginal people spend 70% of the time outside (Nganampa Health Council, 1987:35); and

(3) Planting of trees and grasses in appropriate places to significantly control temperature and dust.

The report also identified the need for education concerning the implications of traditional practices in a settled environment. Denuding of mature trees for shelter and firewood, seriously increases environmental health risks, such as dust-related diseases (e.g. eye infections) and problems for children particularly, such as extreme heat-dehydration. In addition, it is pointed out that by creating a healthier physical environment, the level of stress related to everyday living can be reduced.

Health issues related to eye and chest illnesses are of great importance, and the establishing of trees and grass around living areas can greatly reduce the problems which promote ill health. Buffel grass (*Cenchrus ciliaris*) is an introduced pasture grass which has become "naturalised" in Australia (Jessop, 1981:480) and has spread widely in Central Australia. Ground covers bind the topsoil and suppress dust, and together with trees for shade, can produce much more comfortable living areas. Aboriginal people are also beginning to recognise that they will need to develop wood lots to supply their continuing need for wood fuel (A. Kalotas, pers. comm.).

There is some evidence to suggest that people's attitudes to the environment are changing. I observed an interchange between a Kintore resident and a visitor from a small community further west. The visitor was camped on the western edge of the settlement and like the entire settled area, it is now very sparsely vegetated and the remaining trees are mostly very poor specimens. As he proceeded to tear away the remaining few branches of an *Acacia pruinocarpa* for his much needed firewood, the Kintore man approached ordering him to stop. He did not rip down any more branches but walked off with what he had already collected. This practice almost surely kills trees and has been recognised before as a problem relating to environmental education for settled living. In connection with this style of
"harvesting", Mollison (1979:77) warns that there is a need to educate Aboriginal people to pick the fruit and not the tree.

There is some concern by observers of Aboriginal resource use practices that younger people are unaware of both traditional plant management and European styles of land and resource care. Without this knowledge their continued use of some resources may cause severe depletion of desirable resources without their intention to do so. Programs for education in environmental resources are being considered in some communities to prevent this problem.

While work has been done in many communities to improve physical conditions in the environment and indirectly health conditions, the original objectives have not been achieved. In the course of educational programs, there is a need to consider health, management and environmental issues together. If a community is assisted with the planting of trees and grasses, then the people must be given the resources, skills and the education to understand the implications of their actions on their overall health and the environment. The ATWORK study (Centre for Appropriate Technology, 1988:7) recommends that garden and landscaping skills are "particularly important for managing effective dust control in the domestic environment and the community as a whole". The report found, however, that particularly in small communities where there were urban style houses, the "surrounding gardens and plants" generally required repair and were "often unserviceable" in terms of reducing the effects of extreme temperatures and of dust problems (Centre for Appropriate Technology, 1988:29). The level of environmental modification through landscaping seems to be very much dependent on individual community members who decide to pursue such activities. Even then, there can be problems of lack of resources, such as tools for the work involved.

The house and garden or home-garden tells the story of the interaction between technology (both appropriate and inappropriate), environmental factors and human initiative and response. Technology associated with settled lifestyles can provide essential items for better health. In other words, more taps equals...
more trees. However, poorly managed changes resulting from settled living have been established as the cause of many health problems. It is ironic that the problem areas of the poorly planned and maintained technology, such as leaking taps, open drains from washing machines and laundry tubs, septic tanks and storage trenches are sometimes important sites to observe many interesting botanical and horticultural developments. People's responses to these phenomena are important indicators of their motivations, as the information from the gardens demonstrates.

The discussion so far highlights the many spheres of influence in the history of Aboriginal people's gardening activities in the study area. People were coerced, cajoled, educated, trained and managed in the hope that they would adopt European work habits and values which would also benefit their health. Generally, there were few long term results for the authorities and mostly this approach has been abandoned just as the gardens have been abandoned. As was demonstrated in Chapter 3.1, the pressure of outsiders and the introduction of new foods was not sufficient reason for Aboriginal people to adopt new food ways. So, too, the coercion to adopt gardening was not totally effective.

Recent efforts towards increasing awareness of environmental management in the context of settled living, however, has changed the face of some communities and seems to be influencing Aboriginal people's attitudes and actions on the environment. It is particularly interesting to observe the parallel gardening activities being carried out by Aboriginal people.

**Aboriginal gardening.**

A new phase of plant use seems to have developed along with more settled living. Observers have recorded many examples of planting, transplanting, protection and encouragement of certain indigenous species, particularly where people have brought plants from the bush into a domestic location. There is evidence for some elements of these activities in the past, but people's commitment to such practices has not been established. Management of
Solarium spp., pituri, bush potatoes and yams and certain culturally significant trees are detailed below:

(1) *Solanum* species.

An important food species, *Solanum chippendalei*, has been spread beyond its natural area of distribution as a result of collecting and processing. Whole fruits are collected and transported back to camp where they are prepared for consumption. Each fruit is split in half and the small, inedible, black seeds are removed. The seeds fall to the ground and in areas cleared of natural vegetation, such as abandoned camp sites, are likely to flourish. (Latz, 1982: App. 1, 216; Nash, 1984: 43-44).

Kalotas (1983: A.50) reports that an Aboriginal man from Wingellina, Western Australia, dug up a mature *Solanum coactiliferum* plant a few miles north of Wingellina and transplanted it into the garden he manages there. Traditionally, the fruit of this plant were eaten after the bitter juice was squeezed out and furthermore, it is important in the mythology of this area (Latz, 1982: App. 1, 219).

(2) Pituri (Native tobacco).

Seeds of *Nicotiana* sp. (probably *N. gossei*) were planted in the school's kitchen garden by an Anmatyerre woman who worked as a cook for the Utopia school (Nash, 1984: 73). The seeds were reportedly scattered over the area which had been prepared and planted with vegetables. I observed that some plants grew to maturity and the leaves were picked for sun-drying.

Latz (1982: 91) observed the scattering by hand of *Nicotiana* seeds, apparently for the production of a future crop. He also documents the careful selection of leaves from the plants, where only the older more potent leaves were collected. Reference to this practice is recorded on video, where an Aranda woman talks about her pituri garden and demonstrates preparation of the leaves for chewing (Ngulpa, 1988).

Plants were rarely uprooted, however, I have observed armfuls of *Nicotiana* plants which had been uprooted from a dense patch of
Nicotiana sp. in the Utopia area. The woman commented that there were "plenty there"; and probably thinning out the patch would indeed ensure a continued supply.

Mature plants of Nicotiana excelsior were observed by Kalotas (1983:A.51) in a garden at Kalka in 1981, and some whole plants were being sun-dried for use.

(3) Bush potato and yams

Kimber (1976:147) reports that a Warlpiri man, living at Papunya, collected the trailers of bush potato (Ipomoea costata) to plant back at his camp.

A Pintupi man at Kintore together with a visiting botanist bought some sweet potato from the store and planted them in his garden. He told me how he had dug them up some time later and eaten them. Only the depressions in the ground remained.

There were also reports in the area of attempts to transplant other tubers, such as Vigna, by planting the tops and trailers.

(4) Significant trees.

The practice of transplanting the seedlings of certain trees appears to be widespread. Cane (1986:7) reports that he "observed the common practice of transplanting bean trees and red gum trees at camps" of the desert homelands.

Kimber (1976:147) reports that a Warlpiri man picked some branches and fruit of a native fig from an important ritual site that he probably would not return to, so that he could plant them at Papunya where he lived. Another man gathered some Acacia dictyophleba seedpods to plant at his home in Yuendumu. Wood from this Acacia is traditionally used in spear making. Brachychiton gregorii seedlings "are often uprooted and replanted in Homeland communities of the far northwest of South Australia" (Winfield, 1982:69). Kalotas (1983:A.51) observed young ngalta (B. gregorii) treelings of 2 m-3 m tall being dug up and transported for a few hours in the back of a vehicle, before being transplanted at Kalka community. He attributed their survival to the large tap root typical of this species. Erythrina vespertilio has
a comparatively large tap root also and this probably accounts for most of the transplanting successes which I recorded.

In the Papunya and Kintore region, many seedlings had been transplanted from the bush into home-gardens. For example:

Native kurrajong (*Brachychiton gregorii*);

Native pine (*Callitris columellaris*);

Bat's wing coral bean tree (*Erythrina vespertilio*); and

River red gum (*Eucalyptus camaldulensis*).

Mostly the seedlings were transplanted with little care for the condition of the roots and also without mulching. While lacking protection, they had little chance of survival even when regularly watered.

The primary value of *Erythrina vespertilio* and *Eucalyptus camaldulensis* in living areas today is their shade value. It is probable that in the past, *E. vespertilio* were planted near soakages to shade the water and reduce evaporation (P. K. Latz, pers. comm.) for the same reason that rocks and branches were used. Secondarily, these species may contribute to the availability of useful seeds. Although not consumed, they are important economically. The bean tree seeds are made into saleable handcrafts. Certain stands in Central Australia are known to belong to particular women who alone have the right to gather the seed to make saleable items (Latz, 1982:App.1,118). The seeds of the River red gum are sometimes collected in bulk for sale.

Traditionally, trees were valued in many ways. For example, the seeds of the kurrajong (*Brachychiton gregorii*) were ground into a wet paste and eaten; the leaves of the pine tree (*Callitris columellaris*) when ground and mixed with fat can be used as a rubbing medicine. Apart from their traditional use value, these trees are associated with places which are important in the lives of the people. They might have lived there or their relatives might have lived or died there, or perhaps the place and the tree may have some mythological significance. In general, the motivation to have particular trees nearby is their cultural importance as well
as potential shade. Traditional economic uses and nutritional factors are not the primary importance of these trees today.

When Cane and Stanley (1985:73) recorded the presence of *Solanum* plants growing around the camps at New Bore and Five Mile outstations of Papunya, they described them as "fortuitous gardens". By contrast, when Cane (1986:7) observed transplantings of trees at outstation communities in the area, he concluded that Aboriginal people were recognising "the benefits and possibilities of domesticating bush crops and thus having bush foods at their finger tips - rather than scattered widely through the bush". It is indeed the case that the *Solanum* fruits are carried back to camp for food and for future supplies, as has been discussed. It is difficult to believe, however, that this is the reason for most other plantings because many of the plants, which are the target of people's gardening efforts, such as bean trees and red gum trees, are not current food resources. It is more likely that other culturally important factors relating to the trees motivated such actions.

Cane (1986:8) and others before him, such as Latz and Griffin (1978) and Mollison (1979), see hope for improving the economic and nutritional status of people in Central Australia, by domestication of some bush foods; they advocate the incorporation of traditional resources into a system of European horticulture to be used in Aboriginal communities. There may be some role for this approach in the long term, however, there are too many unknown and unexplored factors to know whether this is where people are heading now and if, indeed, they are interested to proceed further in this way. Analysis of their involvement with plants goes some way towards assessing the current level of commitment to gardening and other kinds of plant management.

The actions on culturally significant plants described above, are not typical hunter-gatherer strategies, although they may have some basis in the past. The techniques used, the scale of the operations and the apparent desired effects are more appropriately associated with gardening. Many attempts by outsiders to induce certain kinds of gardening activity in the past were unsuccessful. Apart from the fact that people now use exotic
species of plants in various ways, there is little to suggest that Aboriginal people's style of interaction with plants has been copied from non-Aboriginal practices. It must be that people now have their own reasons for interacting with plant species in the ways described. To what extent can it be stated that people are gardening?

Many specific questions were raised by my initial field work concerning the extent of people's manipulation of plant resources around their living areas. Some of these questions are:

1. Is a pituri patch a garden when it is situated in the bush and when use of particular plants extends beyond living memory?

2. Is a man or woman gardening when transplanting a culturally significant 'wild' plant from the bush to a settled domestic environment?

3. Are people gardening when they throw the seeds of a highly desired and not readily available food plant into a protected corner of plant growth near their dwelling?

4. Are people gardening when they exploit the same patch of *Solanum*, *Nicotiana* or *Ipomoea* each season, and firing to maintain high production levels?

I argue that all of the above are examples of gardening, and put forward the operational definition of an Aboriginal garden, as "a culturally defined place in which a plant resource is planted, protected or encouraged". Any form of managing individual plants is gardening. There are traditional Aboriginal gardens or bush-gardens, which are in non-domestic and more remote locations and which may or may not include naturally occurring species; and modern Aboriginal gardens or home-gardens. Home-gardening involves a range of species:

1. Cultivated species, i.e. cultivars, generally introduced species, such as fruit, vegetables, shade trees, vines and grasses which are culturally important.

2. Encouraged species, i.e. generally endemic species, planted or original, with high cultural significance, such as
Eucalyptus camaldulensis. Also, introduced species such as buffel grass (Cenchrus ciliaris) which have become established in the region. These plants are managed/cared for by various techniques, such as watering, staking, soil preparation, protection from wind and sun.

(3) Tolerated species, i.e. endemic species with low cultural significance, such as some shrub or grass species which may have had high cultural significance in the past.

(4) Weeds, i.e. any unwanted plants in the garden location which are generally removed.

It is important to recognise that gardening and horticulture are not synonymous. Harris (1989:19) argues that gardening refers to a type of agroecosystem which, unlike horticulture, is not agricultural, and which does not relate predominantly to the propagation of domesticated species or cultivars. Gardening is characterised by a high proportion of "wild" and "weedy" species and in Harris's view, it is for this reason that gardening strictly should not be referred to as horticulture. So too, Aboriginal gardening is not horticulture.

In their research on South American gardens, both Anderson (1952) and Kimber (1978:4) dealt with "dooryard gardens", a term which applies to "all plants including weeds surrounding a dwelling and the spaces they define". It is this style of gardening that Harris (1989:19) considered to be outside the true definition of horticulture, which relates more closely to agriculture than small-scaled gardening. Kimber's (1978) Puerto Rican gardens contrast greatly to any form of field cultivation in their composition of wild and domesticated species. The information presented below demonstrates that Aboriginal gardens resemble these gardens in many ways.

In this context, I introduce the gardeners and gardens of New Bore, Mt. Liebig and Kintore. Close examination of the planting and protection of various species leads to an interpretation of gardening in modern resource management in the study area.
CHAPTER 7.
GARDENS IN THREE ABORIGINAL COMMUNITIES IN CENTRAL AUSTRALIA.

Data concerning the gardeners and their gardens is provided in this section. Features of modern plant management in settled lifestyles demonstrate the cultural significance of Aboriginal people's plant resources in garden locations.

Planting and other gardening activity varies from community to community in Central Australia. In 1987 and before, I visited many Aboriginal communities, such as Utopia, Tennant Creek, Yuendumu, Papunya, Mt Liebig, Kintore, Haasts Bluff, Docker River and outstations from these communities, where more and more people were being provided with permanent housing. I observed that people living in houses and even more temporarily located camp shelters, were tending shade trellises, lawn areas and individual trees in their living areas. Some communities had been assisted with resources for gardening. In others, individuals had planted what they desired.

Official planting projects had been undertaken by the above communities with some success. Aboriginal people were introduced to the practices of arid zone horticulture, notably irrigation, protection and mulching. A range of exotic and native plant species, provided by Tangentyere's nursery in Alice Springs were planted in co-operation with community members and expert horticultural assistance was given if required. Some species were recommended, for example eucalypts, peppercorn and poplar for shade, and citrus, fig and grapes for fruit and also ground cover grasses. New species were constantly being trialled. Initially, these plantings were introduced into the community at public locations, such as the store, school, council office or hospital/clinic and not people's living areas. Some people wanted similar work done around their houses and the data presented below relates to official project gardens and home-gardens in these communities.
In my initial discussions with non-Aboriginal people at Kintore, I mentioned my interest in the gardens which I had observed were appearing around the community, both in Aboriginal and non-Aboriginal living areas. Invariably the response came that there were "no real gardens" there, especially not Aboriginal ones. A number of non-Aboriginal people had established garden areas by frequently watering the naturally occurring plants and a few gardens contained vegetable patches. Aboriginal people's gardens were not so obvious in the landscape.

The distinction made between the presence or absence of gardens is related to the way in which the community project gardens have been formally encouraged, as well as cultural differences concerning the nature of a garden. At the end of 1986, Arpad Kalotas, a non-Aboriginal botanist, began working on a ten week treeplanting program arranged by Tangentyere Council. The program was part of a larger effort in Central Australia to revegetate Aboriginal living areas. Some funds had previously been used at Kintore for this kind of work but through lack of organisation and resources very little had been achieved. In the next venture, Kalotas worked with men ("household heads") who asked for assistance in setting up shade and wind-break areas. They were also assisted with various resources, such as exotic and native plants from the Tangentyere nursery, drip-hose systems, wire-mesh tree guards and later treated pine logs for fences. Some local seedlings, for example *Eucalyptus camaldulensis* and *Erythrina vespertilio*, were also transplanted in the gardens.

The non-Aboriginal people in the community were aware of the official project and did not see any developments beyond it. As mentioned, non-Aboriginal people had well-defined ideas concerning the nature of a garden and when these were not met, they were led to conclude that there was no gardening of any kind. Some were satisfied to abundantly water the area around their own houses to promote luxuriant growth and they referred to this as their garden. Others planted some vegetables in carefully prepared beds protected by fences. These were also recognised as gardens. There are in fact, other gardening activities which have yielded less conspicuous results. These are the home-
gardens of Central Australia, defined as the areas around people’s houses where they have planted, encouraged or protected culturally significant species.

The gardening fieldwork was designed to survey and describe the home-gardens at Kintore, Mt. Liebig and New Bore; to collect information on the traditional and non-traditional use of plants by the people in those communities; to document the techniques of plant management; to research the motivations and attitudes towards modern human-plant relationships by interviewing those involved in gardening; and to describe and assess non-Aboriginal initiatives in gardening.

I approached individuals whom I had observed tending plants around their houses. I requested permission to photograph and survey the gardens of those who showed interest in talking about or showing me their gardens. Fortunately, each person approached was interested enough to have me continue working.

During the first field trip, I began talking to the man and/or woman who were responsible and photographing the garden which surrounded their living area. A few months later I drew the garden and noted any developments since my previous attention to it. I began with the garden at New Bore and the other gardens at Kintore and Mt. Liebig were researched in a similar way, with most of the data being recorded in my second trip to the field.

Altogether, nine gardens were studied. Seven gardens only (five at Kintore, one at New Bore, one at Mt. Liebig) were surveyed and notes were taken on several others from limited observations. It is relevant that I was able to monitor the gardens for about nine months so as to be able to assess the actions and attitudes related to this relatively new plant usage, especially over the driest time of the year.

The boundaries of the house yards were the results of consultation with local communities within a fairly restricted range of options. In most cases, the garden was contained within this space. Financial constraints involving plumbing costs, etc. were the main determinant of house siting, however, the
community had a strong input on the siting of each group of houses (P. Bartlett, pers. comm.).

I walked over the area with the gardeners and encouraged them to talk about and name their plants, the traditional and modern plant uses, locations in the garden, positive and negative features of gardening, and any future plans. Photographs of the main areas and also some individual plants helped to compare the gardens with the surrounding landscape.

Each garden was surveyed using a mounted compass with built-in level, two 30 m measuring tapes and a graduated staff. I recorded the position and distance of plants or planted areas (in the case of ground covering grasses) in relation to each other, the associated dwelling, other dwellings and roads. I had originally planned to chain survey the gardens but hired a Buhr level on site for increased accuracy and ease of operation. The New Bore garden was chain surveyed only. Much of this data was collected in the second field trip having discussed and described most gardens in a very general way during the first trip. Drawings of the gardens are presented along with the details of plantings.

I talked to the gardeners at another arranged time. Each interview focussed on that individual's involvement and motivation in setting-up and maintaining a garden. Information from the interview with each person is presented accompanied by a description and sketch map of their garden where appropriate.

**Project gardens and home-gardens.**

There are some significant differences between project gardens and home-gardens. It is important to make this distinction to emphasise that the home-gardens are a separate development and cannot be ignored. The two kinds of gardens are characterised in Table 11.
<table>
<thead>
<tr>
<th>Table 11: Project gardens and home-gardens compared.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project gardens</strong></td>
</tr>
<tr>
<td><strong>Home gardens</strong></td>
</tr>
<tr>
<td><strong>Species</strong></td>
</tr>
<tr>
<td><strong>Location</strong></td>
</tr>
<tr>
<td><strong>Establishment</strong></td>
</tr>
<tr>
<td><strong>Funding</strong></td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
</tr>
<tr>
<td><strong>People involved</strong></td>
</tr>
<tr>
<td><strong>Planting style</strong></td>
</tr>
<tr>
<td><strong>Success</strong></td>
</tr>
<tr>
<td>Project co-ordinator, e.g. botanist; local community employee/s</td>
</tr>
<tr>
<td>Plantings equidistant and in rows with mulching</td>
</tr>
<tr>
<td>Good short term results, long term unknown</td>
</tr>
</tbody>
</table>
The information presented in Table 11 illustrates that the two kinds of plantings are not necessarily linked. In most cases, home-gardens were carried out independently of projects. Both kinds of activities did occur at the same locations following the construction of new houses. However, not all new house areas were given official plantations. Out of the nine gardens which I studied in detail, four were home-gardens only. The five gardens which comprised both project and home-gardens showed clear separations between the two activities.

Ostensibly the purposes of both kinds of planting activity are similar. However, the motivation behind the actions appear to be different. Further investigation of the cultural significance of the plants involved supports this view.

Firstly, the garden at New Bore is presented in detail. This was an extensive home-garden compared to the others studied. I had known the people there for eight years and my ongoing relationship with them allowed for easy and fruitful communication. This case study is followed by discussion of eight home-gardens at Kintore and Mt. Liebig. Information on all of these gardens contributes to an analysis of the cultural significance of gardens in Aboriginal people's lives and the continuing role of traditional plant resources.
The home-gardens.

Gardens examined in this field study are listed below. Within each community location, each home-garden is identified by a symbol, followed by the name of the person/s involved. The gardeners are referred to by their kinship terms, to avoid use of personal names.

New Bore.

NB: Tjakamarra and Napaltjarri

Mt. Liebig.

ML: Nungarrayi

Kintore.

A1: Nangala
A2: J.Y.
A3: Kumantjayi and Nungarrayi
A4: Tjampitjinpa and Napaltjarri
A9: Tjapaltjarri and Nakamarra
C1: Y. Nampitjinpa
C2: K. Nampitjinpa

Case study at New Bore - NB: Tjakamarra and Napaltjarri.

The garden at New Bore is relatively well-established compared to others in the area, and it exemplifies many aspects of Aboriginal gardening observed in some of the more settled communities in Central Australia. All the planting had been done privately by one family group without official assistance of any kind.

I returned to New Bore during my first field trip in 1987 for the first time since July 1984 and was astounded by the changes around the main camp. Housing had been in the planning stages in 1984 but since then six small lock-up shelters, separated into two housing clusters, had been built. Tjakamarra and his family occupied four shelters and B. W. and his family lived in the other two. These two families had moved to New Bore together from
Papunya some years earlier and although there had been many temporary moves, Tjakamarra and B. and their families were still the main occupants. Nevertheless, New Bore was always described as Tjakamarra's place.

The most significant changes were in the appearance of the camp. The shelters were surrounded by fences and large amounts of greenery although Tjakamarra's area was far more developed than B.'s. I investigated the changes, firstly taking photographs and talking to Tjakamarra and his wife Napaltjarri, whom I had known for a number of years.

**History:** The two extended families had moved to New Bore in late 1979 when the only structure was a hand pump on an artesian bore. Camp locations were restricted by the practicality of carrying water from the pump and so they moved camp periodically to different locations near the bore. Their shelter then consisted of corrugated iron humpies, waterproofed by tarpaulins, which they used mostly at night during cold times and when it was raining. The people spent the day time, especially the hottest part, in camp under bough shades. In conjunction with the building of more permanent shelters, the hand pump was upgraded to a windmill with an overhead tank, and a pipe connected the tank to the new camp site at one tap. This was the basis for change in the camp environment and from that point on, there has been a lot of water running around the camp.

The increased water supply led to many improvements in lifestyle for the inhabitants. Apart from the obvious benefits of running water for washing and drinking, it has allowed the creation of a little oasis, particularly around Tjakamarra and Napaltjarri's camp. Tjakamarra is largely responsible for the garden. Firstly he built fences around the shelters and gradually planted many different kinds of plants from as many different sources. He had worked as a stockman on a nearby station in the 1960s and says that he learnt about European gardens there. The idea to make a garden came when the windmill and tank were built and it was then possible to make the place "green looking, with cool shades and make a good windbreak". His brother-in-law, B., was not very interested: "I always tell him, but he doesn't worry for trees,
green ... he worries for cards." In the early 1970s, B. used to be a very active gardener at Kakali Bore (Fred Myers, pers. comm.) but since moving to New Bore, he was happy to let Tjakamarra do all the work.

The site for the first stage of housing at New Bore was graded before the houses were constructed. The troublesome plants, such as spinifex and some prickly plants were removed from the site in this way and in well-trafficked areas are slow to reappear. The larger trees were left for shade. The newly graded area provided ground ready for planting. Gardening activity is mainly done by hand with the aid of a metal crowbar or wooden digging stick for loosening the soil. Tjakamarra planted some vine seeds by scooping the soil out with his hand, placing the seeds in the depression and smoothing some soil over them. There are certainly no machines used in the garden areas and specialised tools are absent apart from a rake and hoses.

The garden: On very hot days there were many cool shady spots to sit in the vicinity of the shelters. The people obviously enjoy this and sought out the coolest areas - and so did the dogs. There were a couple of original trees which provided good shade and some of the planted trees were already tall enough to sit under. Each shelter had a shade area at the front and the back which was improved by the flourishing Lantern vines (*Momordica balsamina*), which had grown from seed to form a dense screen within a couple of years (see Plate 1). As well as the shade areas on the houses, Tjakamarra had built a small hexagonal bough shade (c.1.5 m high and 2 m diam.) inside the garden area where he had planted vine seeds (see Plate 2). In 1991, I received a photo of the bough shade which depicted it completely covered with dense vines (see Plate 3).

The garden was based on a roughly rectangular fence line around three shelters with a fence dividing the two most often used from the other one, as shown in Figure 3. Hand-made posts of *Erythrina vespertilio* and wire netting formed the boundary fence and two trees were incorporated into the fence line. There were no gates, only gateways and the fence at the western end between the two
Figure 3: New Bore home-garden.
Plate 1: Vine-covered verandah at New Bore.

areas of housing had been pushed down to accommodate cars and generally make the tap more accessible from the living area. *Sorghum* sp. was growing at various heights along most of the fence line and acted as a good windbreak.

The garden was a combination of exotic and indigenous species and the people's relationship with the individual species was most interesting. There were clear examples of resource management which relate particularly to the garden location. *Ininti* (*Erythrina vespertilio*), *mantala* (*Acacia pruinocarpa*), *pura* (*Solanum chippendalei*) and *akatjirri* (*Solanum centrale*) have responded to frequent watering. The *E. vespertilio* was planted as a seedling, dug from the nearby stand that line the creek and had grown to about 2 m. In the early part of my time there, Tjakamarra was very concerned that the White cedar tree (*Melia azedarach*) was going to die from an infestation of termites and that the *E. vespertilio* might become infested too. He sat for hours picking them off the lower trunk and killing them one by one, and pouring soap powder around the base to poison the rest. Unwanted grass growing around the base of the tree was weeded out also. One month later the tree had survived and there was no sign of continuing termite activity.

An original *A. pruinocarpa* grew well, regularly watered from the tap run-off. This species of acacia is still exploited for its leaves which are burnt to produce a fine white ash for chewing with native tobacco. This particular tree was probably protected from having its branches removed for ashes, firewood, temporary windbreak/shade or some other domestic purpose because it was located in the garden and valued as permanent shade.

Napaltjarri enjoyed drawing my attention to the *pura* (*Solanum chippendalei*), which flourished in an overgrown section of the garden (see Plate 4). She had brought the fruit from Kintore and ate them at New Bore which involved the seeds being discarded there. These seeds germinated in the wet environment of the garden and have continued to thrive producing many fruit. *Akatjirri* (*Solanum centrale*) grew in the surrounding area were not highly productive for two main reasons: lack of firing in the immediate area over the last few years and because the area was
Plate 4: *Solanum chippendalei* in New Bore garden.

Plate 5: 'Nursery' of *Ricinus* seedlings in New Bore garden.
graded in preparation for future housing. Tjakamarra commented that lots of *akatjirri* had been removed by the grader but that they would come up again after the next good rain. Certainly, they thrive in disturbed areas and so Tjakamarra could expect a good supply of fruit. The plants in the garden were flowering profusely but did not occur in great numbers.

Introduced plants were used for both shade, such as *Ricinus*, *Melia azedarach*, sunflowers and vines, and for future crops of fruit, such as mango, citrus and passionfruit. Tjakamarra had brought seeds from Papunya, some from the rubbish tip and some from established plants of the species, e.g. *Ricinus*, which he called "myrtles", as well as sunflowers and vines. "Myrtles" were greatly appreciated because they are fast growing and provide dense shade. Tjakamarra said that he intended to have many of these bushes around the camp. He created a 'nursery' of seedlings to be planted out later, perhaps when the gardens were expanded. About fifteen seedlings were growing on a mound of soil efficiently situated to take advantage of the water from the much-used tap. Tjakamarra had dug a trench from the tap to the large *mantala* to carry the water away but also to act as a water supply for the seedlings.

Sunflower seeds, collected in Papunya were planted in a row along the overhang of Tjakamarra's eldest son's house. They had grown to about 1.5 m and provided some shade from the afternoon sun. People commented on the "pretty flowers", but did not appear to eat the seeds. Tjakamarra and B. had collected vine seeds from underneath established vines at Mt. Liebig and Papunya and planted them in rows along the edges of other verandahs. Seven year beans and Lantern vines provided dense shade on the shelters and parts of the fences. In turn, Tjakamarra had collected seeds from his own vines and sunflowers and had stored them in a tobacco tin for future planting, most probably for the new home-gardens.

The citrus fruit trees and passionfruit vines were bought for him from Alice Springs but the mango he sprouted himself (J. Hulcombe, pers. comm.). Although only young trees, they had been kept alive and healthy for a few months and so it seemed...
that with regular attention they and the garden generally, would survive.

Care and maintenance: In the past, gardens at various locations were neglected for many reasons and so any attempt at gardening is viewed sceptically by outsiders. From my observations of the events involving New Bore people, I understand that the social pressures to vacate camp at certain times are strong, e.g. after the death of a close relative. Equally strong is the desire to complete mourning obligations and return. It is not valid, therefore, to assume that the people lacked motivation for gardening because they left their gardens unattended for a long time.

When Tjakamarra’s father-in-law died, New Bore was vacated for some months. For most of this time they camped at Mt. Liebig (approx. 10 km away). I asked Tjakamarra and Napaltjarri if anyone would look after the camp while they were away. The reply came that although they could not camp there, they could go back to look after things. They could travel from Mt. Liebig to New Bore to water the garden, every day if it was really hot weather.

When I returned in September, four months later, New Bore was still uninhabited but the garden had mostly survived despite being irregularly watered during the dry season. During the first couple of weeks people talked about returning for "finish business". Two Napaltjarris referred to the purpose of the proposed visit - "nyangpini parrkatjarra", to dance with leaves, which is part of the conclusion to the period of mourning when the ground where the deceased used to camp is swept.

The move was not made quickly because Tjakamarra’s father was very sick. He died a few weeks later further delaying their return to New Bore. Tjakamarra explained that he was not really worried about the camp because he was expecting "proper houses" to be built later that year and when that happened he would build new gardens too. In June 1988, I received a report that the old inhabitants of New Bore had returned there and that Tjakamarra was hard at work expanding the established garden by building new fences which will enclose the proposed new houses. In 1991, I received photographs showing the houses which featured vine-
covered trellises and many thriving trees. So, the gardening activity at New Bore continued.

Table 12 presents the contents of the garden at New Bore in 1987 and a summary of the cultural significance of the plants involved.

Table 12 : Plants in the New Bore home-garden.

<table>
<thead>
<tr>
<th>Plant name*</th>
<th>Native or Exotic</th>
<th>No. of plants</th>
<th>Source</th>
<th>Trad. use</th>
<th>Modern use</th>
</tr>
</thead>
<tbody>
<tr>
<td>sunflower</td>
<td>E</td>
<td>approx.12</td>
<td>Papunya/Kintore rubbish dumps</td>
<td>n.a.</td>
<td>ornamental screen</td>
</tr>
<tr>
<td>Seven year bean</td>
<td>E</td>
<td>many planted in rows</td>
<td>&quot;</td>
<td>n.a.</td>
<td>screen on perimeter fence; shade for house verandahs</td>
</tr>
<tr>
<td>Momordica sp.</td>
<td>E</td>
<td>planted in lines to create 'wall'</td>
<td>&quot;</td>
<td>n.a.</td>
<td>shade/screen</td>
</tr>
<tr>
<td>Ricinus sp. (Castor oil plant)</td>
<td>E</td>
<td>3 large bushes; 30 seedlings</td>
<td>&quot;</td>
<td>n.a.</td>
<td>shade</td>
</tr>
<tr>
<td>melon (water melon, rock melon)</td>
<td>E</td>
<td>several vines about 0.5m growth</td>
<td>&quot;</td>
<td>n.a.</td>
<td>edible fruit</td>
</tr>
<tr>
<td>Mangifera indica</td>
<td>E</td>
<td>1 sprouted fruit from seed, purchased c.15cm high from Alice Springs</td>
<td>n.a.</td>
<td>edible fruit</td>
<td></td>
</tr>
</tbody>
</table>
Tjakamarra’s reasons for planting the garden are evident from the species chosen. There were five out of the total ten exotic species which primarily provide (or will provide) shade. Similarly, there were five fruit-producing species, and the passionfruit was the only one which would offer both substantial shade and fruit. The choice of many fruit bearing exotic species does suggest that a significant motivation for the garden was to provide fruit. However, I suggest that it is only of secondary importance.

Tjakamarra gave his reasons for wanting a garden around the living area. He liked the greenness, the way the plants look together: "I like all that green coming up". Other people visiting
New Bore commented on the greenness too, referring to it as "that *yukiri* (green) place now". It is widely accepted in most cultures that one function of a garden can be to create a luxuriant environment, which may be in contrast to the surrounding landscape\(^8\). At New Bore, the motivation for this seemed to be a desire to produce a kind of oasis in the desert, a little paradise.

Certainly in the long term, Tjakamarra would have been very happy for his plants to have produced fruit, but it was not of survival importance at any time. *Solanum* fruits were picked and eaten as they ripened providing a snack for a few people. The exotic fruits, however, were not mature enough to bear fruit but Tjakamarra talked about their potential produce. In the meantime he was enjoying the process and the emerging greenness.

Some bushes in the garden provided nice, cool shade. One of the fastest growing species, *Ricinus communis* can grow to 3 m but its branches begin close to the ground. Its large leaves provided dense shade but because of its low form, the shade was not as easily accessible as some other species. However, all the plants supplemented the area under shade. The vine-covered verandahs and fences provided substantial windbreaks. The bushes in general have supported this effect. All three features, greenness, shade and windbreaking, are particularly significant for living outdoors where the effects of sun, wind and rain are more immediate and severe and where people spend most of their time outside, on the ground.

There is a sense in which the garden is a place for experimenting with both native and exotic plants. Tjakamarra's attitude to newly planted seedlings was generally 'wait and see'. He sprouted an avocado from the seed of a fruit which had been bought in Alice Springs. He had never seen an avocado tree and had only eaten a few fruit, so every part of the plant's development from his point

---

\(^8\) The symbolism of gardens and flowers relates to 'the concept of Paradise as a garden, probably through the ancient Persian word *pairadaeza*, which meant an enclosure of trees and fountains - a veritable paradise in a hot and dry climate' (Kaden, 1982:37).
of view would be new. The taste of avocado was certainly an important incentive.

In general, the easily picked fruit species were the most popular exotic species. This is true of other communities where gardening has been pursued, such as Ernabella. "The fresh fruit which is ready to eat from the tree or vine has been the most popular form of horticulture" (Last, 1986: Chapter 2.8). It is my impression that significant native species are even more important to people than the exotic fruits.

Native *Solanum* species in the garden were definitely enjoyed by Tjakamarra and Napaltjarri. This species is capable of fruiting several times a year, after rain and a high productive rate can be maintained through artificial watering. The advantage of *Solanum* in the garden is that the plants do not die if they are not watered; they merely delay flowering and fruiting.

The seeds of the *Solanum chippendalei* were not planted out in exactly the same way as the exotic species in the garden. Instead, *Solanum* seeds which were removed to process the fruit for consumption were deliberately thrown into the area of the garden where they would be most likely to survive. They grew along the fence line away from the well-trafficked areas. Other patches were thriving also where they had grown from seeds discarded in a favourable area. The number of fruit available from these bushes at any time was not large in comparison to the number of people. At best they would receive an occasional snack. Motivation for protection and encouragement of this species lies in the fact that it is not available locally but grows west of Kintore and is highly desired for its size and taste. Consequently, any amount of fruit produced is viewed favourably. This was demonstrated when children arriving at New Bore from Papunya, dived on the fruit with great delight, not having had recent access to it.

Bat's wing coral bean tree (*E. vespertilio*) is a very significant tree and was probably chosen for the garden on this basis. Seedlings are available from the near-by creek bed, one of the many locations of the species in the area. The brightly coloured seeds were traditionally used as beads, threaded on human hairstring to form long strands for use in ceremonies. They continue to be used
in this way but also their use has been widened to include objects for sale, such as bead mats. The light, soft wood of the tree, used traditionally for making hand-held carriers, has also been used for the manufacture of artefacts for sale.

This tree played an important role in the mythology of the area. I have recorded stories which relate the activities of these people's ancestors to the formation of the present-day stand of bean trees along the creek near New Bore. The ritual significance of the tree was well known to the people there and ceremonies which were still performed include references to these events. The cultural value of the tree was reinforced by its new role in the garden.

The practice of transplanting had been going on for at least as long as the group had lived at New Bore. At first, water supply was a problem and probably delayed most planting activity. Napaltjarri periodically transplanted seedlings, mostly eucalypts and bean trees from the nearby creek beds (J. Hulcombe, pers. comm.). The seedlings perished soon after transplanting due to lack of water, no mulch, no shade protection and damaged roots. With more care, especially watering, the trees probably would have survived.

Soon after the water supply was installed at New Bore, Tjakamarra began the garden. The combination of improved water supply, water tank, taps and permanent shelter provided the resources which led to the establishment of gardens. Better living conditions made people generally feel more comfortable and led them to consider the possibilities that would be appropriate for a slightly changed lifestyle. Better housing and facilities led to the desire to create better surroundings. "We've got a house, well we've got to have a garden too", according to Y. Nampitjinpa, a frequent visitor to relatives at New Bore. Although Tjakamarra did the most gardening at New Bore, others made some attempts.

In some ways, Tjakamarra was able to copy the style of gardening which he saw on pastoral properties and at the missions in the area. He had previously worked on nearby cattle stations, owned and managed by non-Aborigines and learnt about fencing and gardening there. As soon as the first very simple houses were erected at New Bore, Tjakamarra built fences around them. Most plantings were done on the fence line which provided protection.
for the small plants and gradually provided windbreaks. Fences in the mission and station gardens were designed to keep out anything which might damage the garden but the fences at New Bore were not maintained and could not serve that purpose. It did not take long before some parts were pushed down to allow easier motor vehicle access to the houses.

The influence of the missions has been more far reaching than merely influencing the style of the garden at New Bore. Tjakamarra declared himself to be a Christian and had studied and worked on a casual basis with the local pastors and missionaries for many years. The messages from The Bible about the usefulness of gardening would have been clear to him. In comparison, the other important man at New Bore, Tjakamarra's brother-in-law, was not a committed Christian and spent much of his spare time playing cards. He had not been interested in gardening since he had settled there.

As mentioned above, there was a plan at the time of my field study for the community to move to better housing at a nearby site. This occurred in 1991 and since that time the gardens have continued to flourish. There has been a strong emphasis on establishing trees in the new location and with the aid of drip hoses this has been an easier task than before. It seems that the people have chosen a level of horticultural activity which is appropriate for the style of living and resources presently available.

The plant-related activities at New Bore fit the definition of Aboriginal gardening set out above. The area around people's shelters contained indigenous and exotic species which were planted, protected and encouraged, as follows:

(1) Cultivars, including exotic food plants, such as citrus trees, watermelon vines and others; shade producing species, such as climbing vines and *Ricinus communis*.

(2) Encouraged species, such as the established *Acacia pruinocarpa*, and the indigenous *Solanum* spp., a nutritious and popular snack food. The most often used methods of encouragement and
protection were watering and transplanting. Many *Eucalyptus camaldulensis* seedlings were transplanted but few survived.

(3) Tolerated species consisted mainly of formerly important resource species, such as grasses with edible seeds, e.g. button grass (*Dactyloctenium radulans*). Other tolerated species, such as spinifex grass, which was removed when it grew in a part of the domestic area, were left to grow in other parts of the gardens.

(4) Weeds. There were apparently very few unwanted plants which grew in the garden, however grass was weeded from around a White cedar tree when it was infested with termites.

Many techniques were employed to care for the plants that were chosen for the garden. People have deliberately planted, replanted and transplanted a range of exotic and indigenous species in their domestic environment. All of these were grown on a small-scale in the space around dwellings.

The main purposes for the plantings seems to have been for:

(1) shade (5 species),

(2) edible fruit (7 species), and

(3) establishing plants of traditional cultural significance close to home (2 species).

Exotic fruit trees were popular but endemic species were certainly favoured also. Moreover, the reasons for gardening were most likely a variety of cultural ones given that the gardens were not primarily populated with economically useful plants. Tjakamarra experimented with several exotic fruit species which also had the known potential as shade producers, such as the orange trees. In general, effort was made to ensure the abundance of many plants which were shade-producing. It was a welcome dividend when the garden provided a convenient place for the growth of the highly desired fruits, such as *Solanum* spp., however, many attempts at transplanting trees suggested an extended role of the garden beyond planting for food and other resources. Tjakamarra
and Napaltjarri have endeavoured to maintain the garden by watering and protecting culturally significant species. The garden at New Bore illustrates that the criteria for gardening is met by the people's activities with plants around their dwellings, and that the garden as a whole and the individual plants are in some way culturally significant.

**Mt. Liebig.**

**ML: Nungarrayi.**

Nungarrayi lived in one of the new houses (c. 3 months old in September, 1987) at Mt. Liebig, with her daughter and other close relatives. The garden around this house, depicted in Figure 4, was the most established, although some other houses had fenced-off areas of flourishing lawn. Nungarrayi's choice of plants indicated her priorities and motivations in relation to gardening.

Towards the western side of the house she had planted figs, grapes and mulberry trees supplied by Tangentyere nursery. Some of these seemed in need of water but she was not worried about their survival and was looking forward to the fruit. The other five plants were endemic tree species, *ngalta* (*Brachychiton gregorii*) and *wanga* (*Callitris columellaris*) which she had collected as seedlings of various sizes from their original locations. No protection or mulching was used but the plants were watered regularly. With almost unrestricted vehicle access to the house and garden area, it seemed likely that the plants would be run over. Nungarrayi tried to guard against this by planting close to a small, established tree and next to a tree stump. She had many plans for adding to the garden to provide much needed shade around the house.

*B. gregorii* were brought as large seedlings from Brown's Bore, Kungkayunti, an outstation community approximately 50 km away. This place was culturally significant for Nungarrayi because of the relatives who lived there, and her relationship to the
Figure 4: Home-garden ML.
dreamings\textsuperscript{9} which travel through the area associated with Mt. Liebig. \textit{C. columellaris} brought from Inyilingi, a nearby outstation, was planted towards the front of the house roughly on the corner of the garden. This plant partially reflects the strong social relationship that Nungarrayi had with extended family who lived at that place. The women regularly hunted and danced together, sharing ceremonial responsibilities to places in the area. \textit{C. columellaris} is also an important source of traditional medicine used to relieve respiratory problems. The leaves are crushed and combined with fat/vaseline and used as a chest-rub.

Table 13 relates to Nungarrayi's garden, except for the buffel grass lawn which was established at a nearby house. This second garden was fenced-off and the occupants were creating a large grassed area but had not planted anything else.

Table 13: Plants in home-garden, ML.

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Native or exotic</th>
<th>No. of plants</th>
<th>Source</th>
<th>Trad. use</th>
<th>Modern use</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{Ficus} sp.</td>
<td>E</td>
<td>1</td>
<td>Tangentyere nursery</td>
<td>n.a.</td>
<td>edible fruit, shade</td>
</tr>
<tr>
<td>\textit{Vitis} sp.</td>
<td>E</td>
<td>3</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>\textit{Morus} sp.</td>
<td>E</td>
<td>3</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>\textit{Brachychiton gregorii}</td>
<td>N</td>
<td>4</td>
<td>near Brown's Bore</td>
<td>seeds ground with water, eaten as wet paste</td>
<td>shade</td>
</tr>
</tbody>
</table>

\textsuperscript{9} The 'dreamings' refer to the travels of the Ancestral Beings through the landscape.
Nungarrayi's garden consisted of cultivars, encouraged and tolerated species and weeds. The motivation for planting the exotic cultivars was clear, since fruits were very popular as well as being actively promoted by the Aboriginal organisation's nursery. Similarly, ground cover grasses were promoted to aid dust reduction as part of programs for general health improvement. Two indigenous tree species were transplanted to the garden because of their cultural significance, including potential shade, which is important for cultural and social activities. The people value their traditional resources and although not used in the same ways, the past significance of these resources is recognised.

Nungarrayi's garden has three main purposes potentially:

(1) food, both traditional bush food and introduced fruits (4 species);

(2) shade and shelter for physical and social reasons (5 species);

(3) trees of cultural significance (2 species), which provide in a more settled lifestyle, associations of previously more accessible, significant places, events and people.
Momordica vines and trellising beans were well established providing dense shade. Both the melons vines and Solanum flourished in the watered and protected environment. Buffel grass spread out from the tap area and around the base of the well-watered vines.

Nangala planted the Momordica seeds because she wanted a lush, green shade and sheltered area and she watered the seeds to achieve this. In doing so, a moist soil environment was created which was appropriate for the Solanum, buffel grass and melons to thrive. While her primary concern seems to have been for shade, the growth of the other plants was recognised and encouraged. Environmental regulation was the main motivation for planting here as illustrated by the plants in Table 14.

Table 14: Plants in home-garden A1.

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Native or Exotic</th>
<th>No. of plants</th>
<th>Source</th>
<th>Trad. use</th>
<th>Modern use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cenchrus ciliaris, buffel grass</td>
<td>E</td>
<td>c. 12 sq.m</td>
<td>cover</td>
<td>-</td>
<td>dust control; green looks</td>
</tr>
<tr>
<td>Momordica sp.</td>
<td>E</td>
<td>in row seeds from other gardens</td>
<td>-</td>
<td>shade; screen</td>
<td></td>
</tr>
<tr>
<td>water melons</td>
<td>E</td>
<td>3 plants with 0.5m runners</td>
<td>&quot;</td>
<td>-</td>
<td>edible fruit</td>
</tr>
<tr>
<td>Solanum chippendalei</td>
<td>N</td>
<td>small clump</td>
<td>seeds discarded fruit, fresh eaten raw from fruit and dried brought back from west of Kintore</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Seven year beans had been planted and buffel grass (*Cenchrus ciliaris*) was established through regular watering. The original *Acacia pruinocarpa* at the front of the house was also benefiting from the amount of watering being done by hand-held hose. Although no further planting had been done since the project planting for shade and shelter, this garden shown in Figure 5 is a good example of how encouragement of that planting had produced agreeable results.

Around the time of the project planting, the gardener at A2 had planted two species, listed below in Table 15. Buffel grass was responding well to watering and had produced a large area of dense lawn, which moderated the dust coming from the north into the living area. Vines had thickly covered the verandah area providing shade as well as a screen to the front of the house, facing the road. Original trees were producing good shade also.

The primary motivation for this garden was environmental modification to achieve a more comfortable living area.

Table 15: Plants in home-garden A2.

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Native or Exotic</th>
<th>No. of plants</th>
<th>Source</th>
<th>Trad. use</th>
<th>Modern use</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Cenchrus ciliaris</em></td>
<td>E</td>
<td>large, thick</td>
<td>seeds</td>
<td>-</td>
<td>dust control; green appearance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>patch near</td>
<td>probably in the soil</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>hydrant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seven year beans</td>
<td>E</td>
<td>single row</td>
<td>other gardens in area</td>
<td>-</td>
<td>shade; screen</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 5: Home-garden A2.
A3: Kumantjayi and Nungarrayi.

The garden is in two sections as shown in Figure 6:

(1) Project plantings. On the eastern side of the house, there were mainly trees, the majority protected by wire mesh tree guards.

(2) Front enclosed garden. On the northern side to the right of the front entrance there was a small fenced-in area of vines and shrubs.

(1) On a preliminary walk around the entire garden, Kumantjayi gave the names of all except two plants (one tree and one vine), some in Pintupi and others in English. He had worked with the project botanist to plan and plant the trees around his house. Individuals did not choose the seedlings but relied on appropriate stock to be sent out to them from the nursery which provided a range of indigenous and exotic species. However, the final decision about which species to plant and the outcome of the planting was the gardener's responsibility. I asked about mulching of the newly planted trees, having observed *tjanpi*, dry spinifex (*Triodia*) around the base of the orange tree only. Apparently it was a 'thirsty plant' and he said that he had not got around to putting *tjanpi* around the others. As Kumantjayi commented further, this method was used traditionally to reduce evaporation from rockholes and so the technique was not new to him. I have recorded a similar technique for bunches of the grass, *mina* (*Digitaria brownii*) which were used to cover water carried in coolamons in order "to keep the hot water cool" (M. Napanangka, pers. comm.), as well as to help prevent spillage.

(2) In the front garden (see Plate 6), Kumantjayi had planted water melons and Lantern vine (*Momordica*) soon after moving into the new house and the vine had established a densely shaded area covering netting on the front verandah. Two indigenous plants, *Cassia* and *Eucalyptus camaldulensis* showed the effects of regular watering with an abundance of leaf growth and seed pods compared to other plants of the same species in the landscape. Kumantjayi liked the way in which the garden was developing and wanted to plant more *punti* (*Cassia*) because it has traditional uses, such as ashes for chewing tobacco.
Figure 6: Home-garden A3.
Plate 6: The front garden, A3 at Kintore showing water melon vines, *M. balsamina* and *Cassia*. 
Kumantjayi had plans to expand the garden and would have liked to see some "pretty flowers - make it look a bit nice, you know" and also more shade trees on the western side. There was some lawn spreading on the southern side of the house where the outlet hose from the washing machine frequently flooded.

Pine logs were provided also by the nursery, but he had not worried about getting them. The people next door had placed theirs in the ground but had not proceeded any further, even after some weeks. Kumantjayi preferred a different sort of fence, "short one - like this look (points to the rear bumper bar of the Toyota indicating approximate height), not long one". He planned to cut the logs in half so that when people came to visit they could simply hop over into the yard. He also talked about a gateway for cars. So the main purpose of the fence was more like a notional boundary to the living area, which had a physical component.

**Why worry about a garden?**

Kumantjatyi was interested in growing trees even before the official project was initiated. When he first came to Kintore he stayed in "that green house near the road". There he saw an ininti (*Erythrina vespertilio*) seedling just sprouted and he kept watering it. It had grown to 2.5 m. Continuing his interest in native trees, he regularly watered the two original trees near the house, *E. camaldulensis* and *E. terminalis*. Top priorities for the new house and garden were windbreaks and shade. He also wanted flowers, lawn and fruit trees. It is important to make the houses look good and "so when visitors come and look they can say, 'Oh, really nice place: Blackfellas and Europeans, too'".

In Papunya, Kumantjatyi had worked on the large garden organised by a 'white advisor' and talked about its demise. The man was well-liked by the Aboriginal men who worked with him, so while he encouraged them they continued to work. However, it seems that they understood that the garden belonged to him in effect, not because of what he said but because he was obviously the boss; and then he went away: "He went away. You see that's the difference between European and Aboriginal way. Blackfellas
sit down in one place and Europeans, they stay for maybe two months or two years, and then they go".

Kumantjayi stated that he intended to maintain his garden and that there was no problem because he rarely left the community. Originally he came from Yuendumu but only visits there occasionally, mostly staying home: "Well that way you can look after your garden".

Kumantjayi viewed his garden as part of the development in the general standard of living, including housing. He and his wife have their own washing machine, refrigerator and would like air-conditioning, "But whitefellas say that's not a good idea and I always tell them: What you gonna do when it gets hot - you get up your swag and go home. Blackfellas want air-conditioning too. This is our home."

In general, Kumantjayi described the developing garden in terms of economic and aesthetic attributes which he valued in other gardens, especially non-Aboriginal people's gardens in Alice Springs: "Garden is all right too; cool and looks nice outside." His aspirations were concerned with having a better standard of living and he could see a role for gardening in achieving a modified environment around his house. I understood that he was not particularly interested in experimenting with plants, however, he was aware of the results of general living and gardening activity on the naturally occurring plants, particularly the effects of water. Kumantjayi's priorities, illustrated by the plants listed in Table 16, are as follows:

(1) shade (2 species),
(2) edible fruit (1 species), and
(3) culturally significant trees (1 species).
Table 16: Plants in home-garden A3.

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Native or Exotic</th>
<th>No. of plants</th>
<th>Source</th>
<th>Trad. use</th>
<th>Modern use</th>
</tr>
</thead>
<tbody>
<tr>
<td>water melons</td>
<td>E</td>
<td>2</td>
<td>garden project</td>
<td>-</td>
<td>edible fruit</td>
</tr>
<tr>
<td>Momordica balsamina</td>
<td>E</td>
<td>several</td>
<td>other gardens?</td>
<td>-</td>
<td>shade</td>
</tr>
<tr>
<td>Cassia sp.</td>
<td>N</td>
<td>1</td>
<td>original</td>
<td>edible grubs in roots; ashes for pituri</td>
<td></td>
</tr>
<tr>
<td>Eucalyptus camaldulensis</td>
<td>N</td>
<td>1</td>
<td>&quot;</td>
<td>grubs in trunk; lerp; bark for artefacts, e.g. shelters; dishes; ashes for pituri</td>
<td></td>
</tr>
</tbody>
</table>

A4: Tjampitjinpa and Napaltjarri.

This garden is divided between husband and wife: the enclosed side garden, A4(a), is Tjampitjinpa's and the front and rear plantings, A4(b) belong to Napaltjarri.

Tjampitjinpa worked with the project botanist to create his garden inside the windbreak area as shown in Figure 7. The hessian enclosure worked as a windbreak and provided shade and privacy, as well as a more protected area for the plants, which are listed below in Table 17. Various vines grew on the perimeter of the windbreak to take over the function of the hessian which would eventually perish and fall away from the mesh frame. Pawpaw plants were growing well in this area, along with a couple of indigenous species.
Table 17: Plants in home-garden A4(a).

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Native or Exotic</th>
<th>No. of plants</th>
<th>Source</th>
<th>Trad. use</th>
<th>Modern use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carica papaya, pawpaw</td>
<td>E</td>
<td>3</td>
<td>Tangentyere nursery</td>
<td>-</td>
<td>fruit, poss. ornamental</td>
</tr>
<tr>
<td>Seven year bean</td>
<td>E</td>
<td>1</td>
<td>&quot;</td>
<td>-</td>
<td>shade</td>
</tr>
<tr>
<td>Momordica balsamina</td>
<td>E</td>
<td>1</td>
<td>poss. other gardens</td>
<td>-</td>
<td>shade</td>
</tr>
<tr>
<td>Sorghum sp.</td>
<td>E</td>
<td>1</td>
<td>&quot;</td>
<td>-</td>
<td>wind-break</td>
</tr>
</tbody>
</table>

This enclosed area of the garden began as an experiment (A. Kalotas, pers. comm.) and had obviously been maintained by Tjampitjinpa. He had continued to water the plants regularly and kept them protected using the mesh guards. The pawpaw closest to the hessian protection had grown to 1 m. Outside this area the project plantings were regularly watered providing the conditions for other plants to grow. An E. vespertilio seedling had become established adjacent to a planted Eucalyptus and some Sorghum had been planted with a Cassia.

Tjampitjinpa’s appeared to have two main priorities in the garden:

(1) shade and wind protection, and

(2) fruit.

At the front of the house, a small and roughly rectangular area had been enclosed for vines and shrubs. The original idea had been to fence-off the area and apply water, allowing the natural plants to grow with minimal disturbance and in a favourable environment (A. Kalotas, pers. comm.). However, Napaltjarri had bought various plants in Alice Springs to plant in the front garden. She had appropriated this section as hers and referred to the windbreak area as her husband’s garden, although she used that area too. At the rear of the house she also had a garden.
None of the plants are native to the Kintore region (except Solanum sp.).

Figure 7: Home-garden A4.
Many of the plants chosen would have required a totally artificial environment to survive at Kintore, e.g. *Hebe buxifolia*, "mountain plant of wet ground" (Kreuiter and Tardif, 1986:231). Motivation to have this plant would have had to be high to ensure the continuous protection needed. The prevailing attitude for the garden seemed to be one of experimentation: "Wait and see, it might be something". On the other hand, Napaltjarri knew what to expect from the "lilies" or "whitefella blooms", as she called them. Having seen them at former European staff houses in Papunya, she transplanted some to her garden. They were planted in a row along a brick wall of her house and protected by mesh guards (see Plate 7). The plants were growing well, having been watered and weeded. The northerly aspect of the main ornamental garden, however, meant that it was exposed to the maximum amount of sun, as well as strong winds, which together dessicated the foliage of most plants. Table 18 refers to the front and rear gardens planted by Napaltjarri.

Plate 7: "Lilies", *Canna* in garden A4 at Kintore.
Table 18: Plants in home-garden A4(b).

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Native or Exotic</th>
<th>No. of plants</th>
<th>Source</th>
<th>Trad. use</th>
<th>Modern use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geranium sp.</td>
<td>E</td>
<td>1</td>
<td>K Mart, Alice Springs</td>
<td>-</td>
<td>house/garden ornamentation</td>
</tr>
<tr>
<td>Hebe buxifolia</td>
<td>E</td>
<td>1</td>
<td>&quot;</td>
<td>-</td>
<td>&quot;</td>
</tr>
<tr>
<td>Archontophoenix alexandrae</td>
<td>E</td>
<td>1</td>
<td>&quot;</td>
<td>-</td>
<td>&quot;</td>
</tr>
<tr>
<td>Felicia angustifolia</td>
<td>E</td>
<td>1</td>
<td>&quot;</td>
<td>-</td>
<td>&quot;</td>
</tr>
<tr>
<td>Melaleuca diosmifolia</td>
<td>E</td>
<td>1</td>
<td>&quot;</td>
<td>-</td>
<td>&quot;</td>
</tr>
<tr>
<td>Vitis sp.</td>
<td>E</td>
<td>2</td>
<td>garden project</td>
<td>-</td>
<td>edible fruit, shade</td>
</tr>
<tr>
<td>Seven year bean</td>
<td>E</td>
<td>1</td>
<td>&quot;</td>
<td>-</td>
<td>shade</td>
</tr>
<tr>
<td>Solanum chippendalei</td>
<td>N</td>
<td>some plants discarded</td>
<td>edible fruit, dries and fresh</td>
<td>edible raw fruit</td>
<td></td>
</tr>
<tr>
<td>&quot;lily&quot; (possibly Canna sp.)</td>
<td>E</td>
<td>3 clumps</td>
<td>Papunya garden</td>
<td>-</td>
<td>ornamental</td>
</tr>
<tr>
<td>Yucca sp.</td>
<td>E</td>
<td>1</td>
<td>poss. Papunya garden</td>
<td>-</td>
<td>&quot;</td>
</tr>
</tbody>
</table>
Only one species, *Momordica* was planted specifically for creating shade. Although grape vines were also grown for shade as well as fruit, modification of environmental conditions does not seem to be Napaltjarri's highest priority in the front or rear gardens. Her experiments with the ornamental exotic species suggest a desire for adornment of the house and garden area. *Solanum chippendalei* were part of the garden, as ornamental purple flowers but mainly because they grew so well in the watered area, producing favoured fruits.

The main priorities of Napaltjarri's garden are:

1. ornamentation (7 species),
2. shade (2 species), and
3. fruit (2 species).

**A9: Tjapaltjarri and Nakamarra.**

Tjapaltjarri planted a mixture of 24 native and exotic trees surrounding his house as shown in Figure 8. This was done mainly under the guidance of the project botanist but he showed interest beyond the duration of the job itself. The botanist assisted the establishment of an enclosed garden for fruit and vegetables in which Tjapaltjarri keenly participated. The contents of this area are listed in Table 19.

Table 19: Plants in home-garden A9.

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Native or Exotic</th>
<th>No. of plants</th>
<th>Source</th>
<th>Trad. use</th>
<th>Modern use</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Eucalyptus camaldulensis</em></td>
<td>N</td>
<td>1</td>
<td>local seedling</td>
<td>artefacts</td>
<td>shade</td>
</tr>
</tbody>
</table>

195
<table>
<thead>
<tr>
<th><strong>Acacia coriacea</strong></th>
<th>N 1</th>
<th><strong>Tangentyere nursery roasted and eaten</strong></th>
<th><strong>seeds roasted and eaten</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrus sp. (orange)</td>
<td>E 1</td>
<td>&quot;</td>
<td>edible fruit, shade</td>
</tr>
<tr>
<td>Morus sp.</td>
<td>E 1</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>water melons</td>
<td>E 2</td>
<td>&quot;</td>
<td>edible fruit</td>
</tr>
<tr>
<td>Vitis sp.</td>
<td>E 3</td>
<td>&quot;</td>
<td>edible fruit, shade</td>
</tr>
<tr>
<td>sweet potato</td>
<td>E 3</td>
<td>Kintore store</td>
<td>edible tuber</td>
</tr>
<tr>
<td>Sorghum sp.</td>
<td>E several; nursery</td>
<td>-</td>
<td>windbreak</td>
</tr>
<tr>
<td></td>
<td>row along fence</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Momordica</td>
<td>E 1 m row other vines</td>
<td>-</td>
<td>shade, windbreak</td>
</tr>
<tr>
<td>balsamina</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solanum</td>
<td>N several discarded</td>
<td>edible fruit</td>
<td>edible fruit</td>
</tr>
<tr>
<td>chippendalei</td>
<td></td>
<td>from local fruit</td>
<td></td>
</tr>
<tr>
<td>pumpkin</td>
<td>E few nursery</td>
<td>n.a.</td>
<td>edible vegetable</td>
</tr>
<tr>
<td>tomato</td>
<td>E small punnet Coles supermarket</td>
<td>n.a.</td>
<td>fruit</td>
</tr>
<tr>
<td>corn</td>
<td>E &quot;</td>
<td>&quot;</td>
<td>edible seeds</td>
</tr>
<tr>
<td>&quot;pretty flowers&quot;</td>
<td>E &quot;</td>
<td>&quot;</td>
<td>ornamental</td>
</tr>
</tbody>
</table>
Figure 8: Home-garden A9.
Plate 8: *E. camaldulensis* in garden A9 at Kintore.
There was only one naturally occurring tree, *Eucalyptus camaldulensis*, near the house and Tjapaltjarri seemed very pleased to have it: "Itara that one. I'm gonna look after him, water him good. That's a good tree." The tree was protected and encouraged in its prime location (see Plate 8). For some seedlings, however, the level of protection was not enough. After three months, we counted three trees that had not survived: two run over by motorcars and one other perished through lack of water.

Tjapaltjarri was very satisfied with the way in which the garden had progressed and admitted that he was looking after it well. There were some exotic trees that he could not identify, such as pomegranate. In answer to my queries he would say, "Might be something. We might wait and see that one." He kept watering them because they might be highly desirable resources and because he had been given assurances by the botanist.

Part of the original plan for the garden had included an enclosed section for fruit and vegetables. Tjapaltjarri and the project botanist planted sweet potato (bought from the store and sprouted), citrus, grapes, mulberry, pumpkins and water melons with some *Sorghum* and *Momordica* on the perimeter, together with a few culturally significant indigenous species, such as *Acacia* and *Eucalyptus*. Most of the sweet potatoes had been dug and eaten leaving depressions in the ground, however, the other species had not reached maturity. The area was regularly watered and the hose often left running there. This had brought about increased growth of some naturally occurring species, particularly *Solanum chippendalei*. In this case, it was not clear whether the seeds were in the soil or had been deliberately scattered there since the garden had been set up. Water was used to good effect in other parts of the garden also. In the run-off from the tap to which the garden hose was connected, a melon vine flourished.

The garden fence was not well-constructed and had been pushed down to a large extent by children and dogs. Nevertheless, the area was watered and functioned as a garden but was also used by the people in other convenient ways. On a few cool evenings, I saw people playing cards on a blanket in the middle of the garden.
This probably only happened when Tjapaltjarri’s relatives were camping in the area adjacent to the garden. It was a comparatively attractive and comfortable ground space to sit on, free of prickles and rubbish. Outside the semi-enclosure, there was widespread rubble and litter.

Both Tjapaltjarri and Nakamarra worked in the garden and it seemed that there was no set area of responsibility for either of them. When something needed to be done, mainly watering, one of them did it: "Tjinguru ngayulu, tjinguru Nakamarra." (Might be me or might be Nakamarra.). Two days after I surveyed the garden, Nakamarra requested some seed for the garden, in particular corn seed. The next day Tjapaltjarri added "pretty flowers" and tomato plants to the list that I could buy for them on my next trip to Alice Springs. I suggested that the dogs would probably destroy any new plantings but he assured me that he was satisfied. He thought that he might get more netting or even shoot some dogs. I felt that this response was aimed to allay my fears that the plants might be harmed, rather than present his intentions. Aboriginal people are generally very reluctant to shoot their dogs. The seedlings were bought and delivered and subsequently planted in the semi-enclosed area and watered well. After a couple of days, each seedling was fairly shrivelled, showing the effects of being exposed to strong sunlight without mulch or shadecloth. They did not survive. Nevertheless, Tjapaltjarri and Nakamarra planned to try again.

They were keen to maintain the trees and wanted to plant many more trees but were restricted by lack of resources. The entire garden area was watered from one tap and a very long garden hose which they tried to leave permanently connected but the children often pulled it off the tap to have drinks. Requests for extra taps and fittings were not being met because supplies and maintenance were done on a contract basis, generated by large works orders requiring visiting workers from Alice Springs. Small requests were generally slowly acted upon. Meanwhile, it was clear that they wanted to maintain and develop the garden. They continued to water the trees and demonstrated also that they wanted to remain living in the house.
Tjapaltjarri worked on the garden but it is unclear how much of the planning was his and whether his expectations were for a permanent garden of this kind in this position. He gave some attention to the plants, watering them as they were growing. He dug up and ate the sweet potatoes, but there was no other produce from the exotic species. *Solanum* produced consistently in the well-watered environment and were enjoyed, particularly by the children. The melons growing near the site of the dripping house tap flourished.

Tjapaltjarri showed his greatest enthusiasm for the indigenous trees which would eventually be good shade producers, particularly *itara* (*E. camaldulensis*). Like many other species, *itara* holds traditional cultural significance for people in this area. An important mythological story, *Kungka kutjarra*, relates the travels of two women, who are believed to have played a part in forming this country. Certain events in the two women's travels are depicted in the landscape and I recorded two such events in the form of individual *itara* in separate locations, close to Kintore. By association with these events, all *itara* have cultural significance for people at Kintore and this provides motivation for looking after this species in the garden.

There were three main purposes for gardening activities at A9:

1. edible fruits and vegetables (10 species),
2. environmental regulation, mostly shade (4 species), and
3. religious and other cultural significance of the indigenous species (2 species).

C1: Nampitjinpa.

Nampitjinpa had moved into one of the newest houses on the western side of Kintore with her brother, his wife and family, together with her daughter and grandchildren. She had begun a garden by planting some trees, depicted in Figure 9:

1. kurrajongs (*Brachychiton*) which she had brought as seedlings from near-by Brown's Bore,
"myrtle" (*Ricinus communis*) from New Bore.

Most were looking quite dry but alive. Nampitjinpa explained that the ground around the new houses was really "tight", and they needed the tractor to come and dig deep holes for the trees and also scratch the surface to plant lawn. The area surrounding the house had been cleared of large stones left by the grader which originally cleared the area for building. Subsequently, the women had raked the ground within approximately 5 m of the house.

Nampitjinpa talked about the kind of area that she would like to create:

"Big shade - like in Alice Springs. Might get some *ngalta* - you know *ngalta* - good shade tree that one. Want to make it nice and cool - big shade for *pipirri* (children) mob".

At her previous camp-site which she had occupied for a couple of years until a recent death, she had grown grapes and planned to grow some around the new house.

"I like spinach. I might get some and other things too. We need fence around. That whitefella, I want him to help get a fence and wire (i.e. guards) for trees, stop the dogs and motorcars. I like fruit trees too and so do my dogs," she laughed. Nampitjinpa had called two of her dogs Grapes and Bananas because they liked to eat those fruits!

I asked about the need for watering and maintenance:

"It's all right. I'm not going anywhere. Maybe one week holiday. Well, plenty of family there. They can water the garden."

Nampitjinpa clarified her position on the existence of gardens:

"We've got a house now. Well, we should have a garden."

Apart from plants, there are also ducks enclosed in an up-turned vehicle canopy in the house yard. The two fully grown ducks occupied the hot and dusty space. They were given water regularly and fed on food scraps by the adults in the house. The children delighted in teasing the ducks to provoke their strange noises. It was not feasible to let them range free because the camp dogs would kill them. Nampitjinpa's brother was the owner of the
Ricinus communis
2 groups of 3 seedlings
Brachychiton gregorii
slightly raised rubble pushed up from graded road and raking around house area
Ricinus communis
duck enclosure (upturned utility canopy)
area cleared of large stones by raking

Figure 9: Home-garden C1.
ducks and it is unclear whether they were being kept for meat, eggs or some other purpose.

Nampitjinpa stated that she must have a garden around her new house, mainly to provide shade. Most of the larger original trees had been stripped for firewood, and the area was very bare around the house. She had transplanted one row of seedlings, listed in Table 20.

Fruit and vegetables were the second stated priority but none had been planted at that time. Certain practical problems were recognised. The ground was very dry and hard and once planted, seedlings required protection, such as fences and tree guards.

The main purpose for planting appeared to be environmental modification. Nampitjinpa obtained the seeds of the fast growing Ricinus from New Bore probably hoping to reproduce the same kind of flourishing plants which provided low but densely shaded areas there. The Brachychiton seedlings would have produced good shade too, if they survived. However, the cultural importance of this tree can not be discounted as a motivation for planting.

There are reasons for Nampitjinpa wanting to "take some of that country home" to Kintore. Motivated in the same way as Nungarrayi from Mt. Liebig, Nampitjinpa transplanted the important trees from Brown's Bore to her new home to be reminded of the place and people there.

Table 20: Plants in home-garden C1.

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Native or Exotic</th>
<th>No. of plants</th>
<th>Source</th>
<th>Trad. use</th>
<th>Modern use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ricinus sp.</td>
<td>E</td>
<td>6 seedlings</td>
<td>New Bore</td>
<td>-</td>
<td>shade</td>
</tr>
<tr>
<td>Brachychiton gregorii</td>
<td>N</td>
<td>3</td>
<td>Brown's Bore</td>
<td>seeds eaten; wood for making coolamons (dishes)</td>
<td>shade</td>
</tr>
</tbody>
</table>

204
C2: K. Nampitjinpa.

This garden is an example of people's attitude to the area around their house, demonstrating a combination of planting and non-planting activities. Table 21 details the single planting activity.

Table 21: Plants in home-garden C2.

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Native or Exotic</th>
<th>No. of plants</th>
<th>Source</th>
<th>Trad. use</th>
<th>Modern use</th>
</tr>
</thead>
<tbody>
<tr>
<td>commercial lawn seed mix</td>
<td>E</td>
<td>Kintore store</td>
<td>-</td>
<td>dust control</td>
<td></td>
</tr>
</tbody>
</table>

I observed the garden over its initial two weeks only. The area to the west and east of the house had been raked and cleared of large stones followed by the scattering of lawn seed and was watered daily using a hand held hose. During September, the maximum temperature was regularly 30+degrees centigrade, and combined with the effect of no shade, no top dressing, strong winds and watering by hand, germination was extremely poor. Over a period of two days, two women constructed a white, quartz stone border around the lawn area. This activity was also undertaken by a woman at one of the newest houses on the east of the community.

On the western boundary, two stunted *Acacia pruinocarpa* were producing new leaves. Probably the trees had been broken down for firewood, when people camped in the area prior to the houses being built. It seemed that they were going to be protected from this fate in the future.

There was a strong motivation for environmental modification in the actions observed at this location. Both lawn and shade trees would have provided an improved living area in this dry and
windy place. The rocks demonstrated that these people wanted to mark out a garden space in their living area.

Non-planting gardening activity.
Other features of the gardens were not planted, but demonstrated a desire to further design and structure the domestic landscape. People had undertaken landscaping activity apart from straightforward planting for shade and shelter. This was particularly noticeable at the two groups of houses in Kintore, which had been occupied since the completion of the second tree-planting program there. People built fences of various kinds and also assembled white stone borders to their garden areas.

(1) Fences
Fences were built to mark boundaries and also to restrict access to the living areas by people, cars, animals or all three. However, according to some people I spoke with, the fences were not always the most appropriate way of achieving the required ends.

There were two kinds of fences used:

(a) Wire-netting and posts. This type of fence was used at New Bore and around some houses at Mt. Lbig. Without exception all fences were in a fairly poor state of repair. In some cases, a few panels had been torn down to move vehicles into the living areas. On occasions, wire or netting had been required for more urgently perceived reasons and so some fence had been dismantled. Some parts of the fence were covered with Lantern vines which provided effective wind breaks.

(b) Pine logs. Tangentyere provided pine logs for fences but as mentioned previously the uniformity of height and relative permanency of the structures were not popular features of this style of fencing. In other places, such as Halls Creek, high fences are preferred for privacy (Ross, 1987:118), but this did not seem to be the view of most Kintore residents. A couple of houses at Kintore had these fences in the early stages of preparation and did not proceed any further.
(2) Stone borders.

Two houses (C2, B4) had white stone borders to their apparent yard perimeters. There was no practical reason for these boundary markers as they were not built in any area of household activity. They seemed to be purely imitative of the kinds of phenomena that people would have observed at mission and pastoral station homesteads, where the entrance and front garden borders were sometimes defined in this way. Perhaps people were influenced by the stones arranged around the garden border of a non-Aboriginal nurse's house, the only non-Aboriginal example of this phenomenon in Kintore. Alternatively, the stone borders may have been a manifestation of the people's desire to define the limits of their house and garden space using readily available resources in an accepted way.

This concludes the presentation of the individual gardens. It is clear that people were planting a wide range of species around there homes and in many ways the gardens are distinctly Aboriginal. The people's choice of species to plant together with the style of gardening contribute to this phenomenon.
Both the plants and non-planted features of the gardens illustrated the people's gardening activities. Indigenous and exotic cultivars, encouraged and tolerated species and weeds formed the home-gardens in ways which were not recognisable to many European observers. However, the techniques used in the gardens and the possible motivations for them are clearly discernible. Comparisons between modern and traditional plant management and also with other cultural systems of management suggest that many modern Aboriginal gardening techniques have much in common with traditions of plant resource use, in Australia and elsewhere.

Techniques of management.

Table 22 lists the various techniques of management which have been employed in the gardens to encourage or protect some plants, as well as tolerating others and weeding the unwanted plants.

Table 22: Techniques of management employed in the gardens.

<table>
<thead>
<tr>
<th></th>
<th>NB</th>
<th>ML</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A9</th>
<th>C1</th>
<th>C2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>digging; raking</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>watering</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>mulching</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Various forms of management were used in the gardens:

Soil preparation.

Every garden employed some method of soil preparation for planting, either digging, raking or both.

(a) Digging.

People used crowbars and digging sticks to turn over the soil prior to planting. In some gardens, the preparation was minimal because of the kind of planting. For example, small depressions were made to plant the seeds of the trellising vines. Other gardens using large tree seedlings required many large holes to be dug.

(b) Raking.

For the immediate area of the hearth, there is a traditionally based motivation for raking to control debris and refuse. The area cleared in this style of camp organisation is generally restricted to within about 2 m of the hearth and sleeping areas. Areas raked near the new housing were much larger than this, and in most
cases not adjacent to cooking or sleeping areas. The overall effect was neatness due to the reduction of amorphous rubble and refuse. Raking was also done, in preparation for planting of lawn seed.

Watering.

Most gardens were watered regularly using hand-held hoses. Water from the outlet hoses of washing machines provided beneficial run-off in two gardens. Dripping taps certainly supported some plants, such as the water melon vine at A9.

The heat of the water caused by the hoses lying in the sun was a problem for the seedlings.

At New Bore the run-off from the tap was put to good use by supporting a 'nursery' of *Ricinus* seedlings. They were inadvertently watered every time someone used the tap, the only one for the two family groups.

Some plants had trenches dug around them in order to hold water. At New Bore, Tjakamarra had dug around a number of plantings, such as the citrus trees, in this way.

Mulching.

Although not evident in many gardens mulching was encouraged as part of the project plantings. In the deeply recessed holes often with the added protection of tyres, the mulch remained effective. Three of the gardeners said that they put spinifex grass over some plants in the very early stages of growth. In shallow planting, unless the grass was kept damp or held down in some way the strong winds would blow it away. With water available from taps it may have seemed easier to keep the plants watered regularly rather than replace mulch. In some gardens where there was denser vegetation, such as New Bore, some rubbish and other material blown next to the plants acted as mulch and was not removed.

Planting and replanting.

All gardens contained species of various kinds which had been placed there deliberately as seeds or seedlings. Some species,
notably the Lantern vine (*Momordica balsamina*) were grown from seed in five gardens and in turn, the seeds from the vines were collected for replanting in the same or other gardens. Also, Seven year bean vines were planted from seeds in three gardens. Similarly, the seeds of *Solanum chippendalei* were replanted in four gardens with the likelihood of spreading to all gardens as they became more established, providing the conditions ideal for their growth. *Ricinus* was planted at NB from seed and seedlings transplanted to garden C1.

**Transplanting.**

Removal of some endemic seedlings from nearby locations to the gardens has been discussed above. The following species were transplanted:

- Native kurrajong (*Brachychiton gregorii*),
- Native pine (*Callitris columellaris*),
- Bat's wing coral bean tree (*Erythrina vespertilio*),
- River red gum (*E. camaldulensis*),
- Native fig (*Ficus platypoda*).

Seedlings from Tjakamarra’s ‘nursery’ of *Ricinus* were transplanted at New Bore and elsewhere.

**Protection** in the garden took many forms. In the more established gardens the protection was given by other plants from wind and sun. At NB and A9 the shade structures offered protection. Some gardens provided little protection apart from the fact of being within the garden area, thereby preventing the destruction of the plant through use as firewood, for example.

The example of pest control at NB illustrates the dedication of time and effort given to protecting a favoured tree from an infestation of termites. All the work was done by hand, slowly picking off and killing each termite.

**Weeding.**

There were few unwanted plants in the gardens. The main reason for this was that most of the gardens were newly made and the
areas had been cleared of all vegetation prior to the construction of houses. Spinifex and other prickly grasses were removed if they grew close to the hearth or outside sleeping areas. Long grass is generally pulled out or burnt in bush camp areas to clear the way for spotting snakes, scorpions, etc. and this would most probably be applied to the house garden area if required.

I observed weeding at two gardens (New Bore, A4) where grass was pulled out around newly planted exotic species.

Role of the gardens.

There are five main purposes of the gardens:

(1) Environmental modification;

(2) Planting and encouragement of edible species;

(3) Ornamental plantings;

(4) Access to traditional culturally significant plants; and

(5) Social status.

Each species planted is categorised according to its role in the garden on the basis of these five purposes. For some species, the reasons for planting in the gardens seemed clear but others were probably planted for a variety of reasons. In such cases where there was no obvious primary purpose, the species appears in more than one category, for example, *Erythrina vespertilio* is included in categories (1), (3) and (4).

(1) Environmental modification.

All of the nine gardens contained species which were potentially important in regulating the house-garden environment and these are listed below in Table 23. Most dwellings (six) featured established trellising vines and other shade species which moderated the temperature, creating cool environments especially valuable for the long summer. Some tree species provided windbreaks where the natural vegetation was sparse. Similarly, ground cover grasses were encouraged to spread, reducing the wind-blown erosion of the soil and the production of dust. All
plantings provided some form of shade and assisted in binding the soil, however, larger form species were very significant for providing shade in this climate.

Five species (6, 9, 10, 12, 14) of the 14 different plant species used in the gardens are endemic to this area. Those species (\textit{Ficus, Brachychiton, Callitris, Eucalyptus} and \textit{Erythrina}) were planted at four gardens. One was recorded for New Bore, however, Napaltjarri had also transplanted other species, such as \textit{Eucalyptus} in the past, but with little success. The traditional cultural importance of these species must have been a strong influencing factor on their use in the gardens. The potential shade value was also probably a factor in the choice but only secondary because an exotic species would have been chosen if shade was the primary goal.

The three introduced bushes and trees are relatively fast growing and hardy in this region. One mulberry bush, \textit{Morus}, grew 2 m within five months, mainly because it was protected from the wind (Kalotas, 1988:2), as well as being well-watered. \textit{Morus} and \textit{Melia} have the advantage of being deciduous, allowing more sun in the living areas during the colder time of year, and \textit{Ricinus} is extremely popular for its dense shade. These species were planted in five gardens.

Spinifex grasses and other prickle-bearing species, such as \textit{Sida platycalyx}, were removed from the immediate living areas. Their removal was motivated by the desire for comfortable places to sit and lie on the ground. They were also removed from around the garden plants to prevent them taking over the garden.

The most significant reason for planting appears to have been for modifying the home environment. Fast growing species which provide dense shade to moderate the temperature were most frequently employed.
Table 23: Species planted for environmental modification.

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Garden 1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bore</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liebig</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A9</td>
<td>+</td>
<td>+</td>
<td></td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cl</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key to plants:
1. Seven year bean
2. *Momordica balsamina*
3. *Ricinus communis*
4. *Melia azedarach*
5. *Sorghum* sp.
6. *Ficus platypoda*
7. *Vitis* sp.
8. *Morus* sp.
9. *Brachychiton gregorii*
10. *Callitris columellaris*
11. *Cenchrus ciliaris*
12. *Eucalyptus camaldulensis*
13. Commercial lawn seed
14. *Erythrina vespertilio*
(2) Planting and encouragement of edible fruits, seeds, tubers and other vegetables.

Six out of nine gardens contained some plants with edible parts, as shown in Table 24, which appear to be the major reason for their being included in the gardens. Out of the 16 different species recorded, only five (4 exotics and 1 native), occurred in more than one garden. The native species, *Solanum chippendalei*, occurred in four gardens demonstrating the high popularity of this tasty fruit. These gardens were the most established ones. If the other gardens become more established through watering and further planting, *Solanum* would most probably be included.

Apart from *S. chippendalei*, two other native species were planted:

(a) *Ficus platypoda* at Mt. Liebig. *Ficus* sp. is not abundant in the area and only occurs around water holes in the hills. Although the seedling planted at Mt. Liebig was unlikely to survive, the desire for its fruit together with its mythological significance has probably resulted in subsequent planting attempts.

(b) *Acacia coriacea* at Kintore. This is a popular traditional seed food and is abundantly available around the Kintore area. The seeds are roasted in the pod and eaten. Tjapaltjarri was keen to try growing it at his place, presumably planning on future snacks.

Easily picked, tasty fruits are the most popular food species of both the native and exotic plantings. People enjoy the sweet tastes of both. The broad range of exotic species planted indicates that many species were being experimented with by two gardeners in particular. Watermelons and grapes were planted in three gardens, orange and mulberry in two only. There was no evidence of any market-style gardening.
Table 24: Species planted for edible parts.

<table>
<thead>
<tr>
<th>Plant</th>
<th>Garden</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.B.</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mt.L.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td></td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A9</td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cl</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key to edible plants:
1. Watermelon
2. Mangifera sp.
3. Passiflora sp.
4. Citrus sp., lemon
5. Citrus sp., orange
6. Solanum chippendalei
7. Ficus platypoda
8. Vitis sp.
9. Morus sp.
10. Rockmelon
11. Acacia coriacea
12. Sweet potato
13. Pumpkin
14. Tomato
15. Sweet corn
16. Carica papaya
(3) Ornamental/aesthetic appeal.

People commented that greenness means "cool shade" and "looks nice", and that flowers are "pretty" and "look good". There was no evidence that flowers were being picked for any kind of decoration. In fact, on the occasions when they could have been used, such as for funerals, plastic flowers were bought at great expense.

When an opportunity came to be photographed, occasionally younger women would pick a flower and place it in their hair. Perhaps this could be another role for flowers in the gardens.

Three gardens only (NB, A9 and A4) contained plants chosen for their ornamental qualities. At New Bore, Tjakamarra planted sunflower seeds along the small shade area at his son's house. The row of flowers were striking and made a screen effect but did not provide significant shade or screening from the wind and dust. Also the flowers and seeds of the Bat's wing coral bean tree (*E. vespertilio*) were appreciated for their bright red colours.

Tjapaltjarri planted out several exotic flower seedlings but they were not given sufficient protection to survive the harsh conditions. Another gardener at Kintore planted six ornamental exotic species, five of which she had bought in Alice Springs. They were struggling to survive. The "lily" which she had brought from a clump in a nearby settlement, appeared to be coping with the conditions probably because the garden was watered frequently.

It seems that planting for ornamentation is not a high priority although a few people are experimenting with plants for this purpose in their gardens. A consistently high level of protection and encouragement is required in this climate for these ornamental exotic species to survive.

(4) Access to traditional culturally significant plants.

Five species of traditional culturally significant species were planted in the gardens as detailed in Table 25.
Table 25: Traditional culturally significant plants in the gardens.

<table>
<thead>
<tr>
<th>Plants:</th>
<th>Gardens:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>NB</td>
<td>+ +</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ML</td>
<td>+ +</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>A4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>A9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>C1</td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key to plants:
1. *Callitris columellaris*
2. *Brachychiton gregorii*
3. *Eucalyptus camaldulensis*
4. *Erythrina vespertilio*
5. *Solanum chippendalei*

*Erythrina vespertilio*, an important resource traditionally and today was planted at New Bore. Although several of the trees are growing along a nearby watercourse, Tjakamarra and Napaltjarri clearly wanted to grow this tree at their home. Today, the wood is used for making various artefacts and the seeds are threaded to make mats and necklaces. Napaltjarri had attempted to transplant seedlings many times, as she did other native seedlings. The recorded success was probably the result of the improved water supply.

At Mt. Liebig, Nungarrayi planted *Callitris*. Its traditional medicinal use was probably one motivation for this planting.
All except two of the privately planted gardens contained traditional resource species which had been transplanted or encouraged next to the person's dwelling. At New Bore, *Solanum chippendalei* seeds were scattered in a protected area of the garden. Also Napaltjarri had attempted many times without success to transplant trees, such as *Eucalyptus camaldulensis*. Clearly she is keen to have this particular species near-by where she is living. Economically, it is not highly significant and there were many other species which could have been grown to produce shade. *E. camaldulensis* features in the mythology of the area and may be valued mostly for this reason.

Nungarrayi at Mt Liebig and Nampitjinpa at Kintore both transplanted *Brachychiton* sp. soon after moving into their new houses. This endemic species was planted before any action was taken to plant shade trellises and exotic fruit trees. Although valued traditionally for food, its modern importance is most likely based on its association with places and people, through the Dreaming.

Similarly, M. Napanangka in a garden at Papunya, which is not presented in detail here, persisted in trying to transplant this species and blamed the poor water quality for the garden failure. In the long term, this species would produce good shade, but is also valued for other cultural reasons, such as its mythological associations.

Culturally significant trees were given high priority although this was not obvious at first. Most houses which had culturally significant trees also had exotic shade-producing species which generally grow quickly and were more clearly visible. The gardens demonstrate one way in which the religious significance of plant species continues after the economic importance of the resources has diminished.

(5) Social status.

The garden as a unit together with a house, or home-garden, is growing in significance for Aboriginal people in the study area. Lush, green, established gardens in Alice Springs and elsewhere,

219
are commented on favourably. It seems that for some people there is status attached to living in a house and having a garden. People are making efforts to create green, protected spaces as part of their living areas. Although it may be that "whitefella" plants are not as important as endemic species, the overall contribution of the exotic species (and indigenous species from outside the area) to the garden is recognised in a positive way. This means that the exotic species are also encouraged or cultivated. Greenness seems to have been an important motivation.

The plants used in the gardens were a combination of indigenous and exotic species which had been cultivated and transplanted. The gardens demonstrated that both exotic and native (as well as endemic) species were culturally significant to these people. Some exotic species have at least a 20 year history of use as shade, e.g. *M. balsamina*. Each plant in the gardens had some value and was recognised. Some were tolerated and other unwanted plants were often removed.

Gardens were both productive and ornamental, incorporating new and old ideas of management, including protection and encouragement. The range of species planted together with the locations planted in the gardens suggest that the gardens were planned to some extent. There is certainly no evidence that they were accidental. When *Solanum chippendalei* grows from seeds in an Aboriginal garden, it is no less a deliberate act than when a European person throws seeds in the garden hoping that they will 'strike' - a fairly common practice. While the locations of some plants seemed accidental and perhaps were not ideal from a horticultural point of view, the multiple plantings around the home were purposeful, particularly for environmental modification. In other words, plants were used in culturally significant ways towards achieving a more satisfying place to live.

It could be argued that the effective stimulus for the gardens which I observed was either the people's move into some form of permanent housing or the project planting initiatives, or a combination of both events. This argument can be sustained for some plantings but not others. There are examples, both from my observations at earlier times in the field area, as well as in the
literature for other Aboriginal groups, which demonstrate that gardening activities are identifiable in more mobile lifestyles. Certainly, in many cases, gardens have flourished around houses following the adoption of a more settled lifestyle, but housing is not the only stimulus for this kind of activity.

**Emergence of gardens.**

The dump heap.

There are theories based on observations of other cultural groups which account for the emergence of gardens around their living areas. One body of theory holds that new plant communities evolve through human interference at a level which does not involve controlled direction of actions towards a goal of creating a new plant community. Anderson's "dump heap" theory (1952:136-150) states that the disturbed habitats created by human camp sites present ecological conditions in which certain plants can survive without their natural competitors. These plants are recognised to be valuable and are protected by the group. Further production is encouraged by active or passive replanting. In this way, not only does the original plant spread beyond its habitat, but it is a prime candidate for becoming a cultigen.

Anderson (1952:144) put forward the notion that refuse heaps which accumulated near people's dwellings were most likely very significant to the origin of cultivated plants, following on from the idea that any disturbed habitat is a likely centre for evolutionary activity (Anderson, 1956:766). Human activity creates new and open soil environments for more/different species to become established and refuse heaps are open to colonisation in this way. The dump heap areas are examples of new habitats in which he argues that many species grow because they can tolerate the conditions and other organisms cannot (Anderson, 1956:770). In the process of becoming sedentary, as humans came to recognise these plants and gradually used them and eventually cultivating some, it was these plants that were most likely to become cultivars (Anderson, 1952:149).
Areas around human habitation are altered in many ways depending on the style of habitation, number of inhabitants and length of stay. In the Mexican and Guatemalan village gardens described by Anderson (1952:136-141), there are many characteristics of the dump heap represented in the human-plant interactions taking place. The three significant conditions for a dump heap are:

1. disturbed soil;
2. a well-watered environment; and
3. a nitrogenous zone.

He described the garden as the most "primitive" which he had studied and drew attention to the major differences between modern Western gardens and this "primitive garden". Although it appeared to be nothing more than a dump heap it served as "a vegetable garden, an orchard, a medicinal garden, a dump heap, a compost heap and a beeyard" (Anderson, 1952:140-141). The primitiveness was in Anderson's original perceptions which he gradually overcame.

Aboriginal gardens and the dump heap.

In what ways do Aboriginal ideas and activities involving plants as described above, exemplify the dump heap? The three areas are considered with reference to Central Australian examples.

1. Disturbed soil.

The soil is effectively tilled or turned over by grading, digging and raking which created a suitable environment for new growth. Soil is disturbed around new houses, where the growing layer of soil has been substantially removed or covered over during excavation for foundations and plumbing. Foot traffic and motor vehicles compact the soil. This effect together with strong winds combines to delay re-establishment of top-soil without introduction of artificial means, such as grass planting. Roads and road edges (often also the perimeters of garden areas) within the
settlement area are regularly turned over by the grader, preventing the re-establishment of natural vegetation.

In the areas close to dwellings, the ground is raked which reduces the rubbish but also disturbs plant growth. Although the ground has been cleared, the natural species could re-colonise the area if it were left undisturbed, since the seeds of many species would still be in the soil or would soon be transported there by wind, water or birds. The way is open to new species as well, without the competition of an already existing plant community and with the advantage of continuing altered conditions. These conditions apply similarly to camps as well as house environments, however, camps are moved regularly to avoid the accumulation of debris which is a significant part of the dump heap phenomenon under discussion.

Such conditions were not sufficient reason for the gardening activity which I observed. It might be motivation enough for a modern western house-holder, who would prefer or even feel pressured to establish some sort of ground cover rather than leave bare dirt. This is not so for Aboriginal people in the traditional past or today.

Traditionally, Aboriginal people cleared the earth around their living area or hearth and the area beyond became the refuse disposal zone (O'Connell, 1987:81). In present day bush camps I have observed women sweeping the ground in close proximity to the camp especially around the hearth area. Although most camp sites are chosen in a vegetated area they are soon stripped of brush for shelter, wood for fires and grasses are quickly blown away with some top soil as a result of the increased traffic, from both humans and motor vehicles.

Initially the camp site is cleared of uncomfortable sharp grasses and prickles, stones and sticks and easily flammable material. Daily sweeping or raking of the living area, sometimes within only 2 m of the hearth area keeps the rubbish, such as food wrappings, cans and other large rubbish items away from the cooking fire and away from where people mostly sit. Dogs generally take care of any food scraps. So, in a camp environment the priority seems to be a clear area around the hearth and sleeping areas. Very little
concern is given to whether the wider area is vegetated or cleared because it serves as a refuse dump.

(2) Well-watered environment.

As a result of project garden activity, especially tree planting, there has been an increased amount of watering with hoses to home-gardens. Water is supplied from artesian bores and the water quality varies between bores. Generally, the water is high in salts and so when used to water plants the salt accumulates in the soil and is visible as a white powder.

Project-planted areas were generally watered with hand-held hoses and some with drip systems which resulted in grassed areas near drip nozzles. Enclosed areas were sometimes watered by leaving hoses running which provided water to the original species in the enclosure, as well as cultivated ones. Run-off from watering allowed grasses to become established.

Dripping taps and hoses with leaks provided water for grasses or any other species to flourish, e.g. water melon seed lying dormant. Other examples at Kintore and New Bore are:

(a) Buffel grass growing under evaporative air conditioning overflow;

(b) Grass around school yard tap where children frequently drink; and

(c) Water run-off from tap channelled to plants at New Bore.

Domestic activities can cause water to run-off onto garden area, e.g. the run-off from the washing machine outlet at Kumantjayi's house at Kintore, helped to maintain grass at the rear of the house.

(3) Nitrogenous zone.

There was limited opportunity for food wastes to accumulate and decay because of the large underfed population of dogs in Aboriginal communities. Bones and ashes provided some nutrient materials which together with other conditions, such as moisture, were conducive to germination and growth generally.
Human excreta were lessening in the environment since the introduction of pit toilets in some communities, however, these wastes were still obvious in areas of habitation. Dogs played a role in reduction of human wastes but polluted and fertilised the environment themselves in close range of people’s living areas. It is the accumulation of human wastes in the soil that provides nitrogenous fertilisers to the plant community.

Therefore, the conditions were present in various combinations which coincide with the theory put forward by Anderson (1952). Without an intention to protect or give any particular treatment to plants, there were many factors operating in an area of human habitation of the kind described at Kintore and New Bore, which promoted changes in the plant environment. Some of these provided benefits to the people living there and were recognised as the results of their living activities based in permanent housing. In addition, people were simultaneously pursuing deliberate actions involving conventional gardening practices, such as digging, weeding, watering and planting, to alter their surroundings.

Arguing oppositionally, there is no evidence to suggest that the soil disturbance around Aboriginal camp/housing sites was providing anything except accidental changes to the plant environment. In other words, the people may have been disturbing the soil in various ways, as well as adding water and nitrogen, but any resulting changes to the plant environment were more the result of people’s ignorance and neglect than an understanding of human-plant interactions. The flourishing vegetation around the site of a dripping tap could have been seen as a purely incidental outcome resulting from neglect by people who were well-known for not looking after settlement equipment. On the other hand, perhaps there was no point fixing a tap or hose that provided ideal conditions for the growth of a desirable plant with minimum effort from humans. Furthermore, people were recognising the usefulness of reticulated water for watering plants.

In a similar way, castor oil bushes (Ricinus ) grown from seed at New Bore can be viewed as inappropriate from a non-
Aboriginal perspective because they provided inferior shelter and shade, "more suitable for the dogs than people" (J. Hulcombe, pers. comm.). The main reason for this reaction being that although the bush grows to 3 m and its leaves are large, it branches close to the ground which seemed to make it difficult for people to sit under the shade. In addition, *Ricinus* does not produce useful fruits or nuts and its seeds are highly toxic: one seed chewed by a child can be fatal (A. Kalotas, pers. comm.). However, Aboriginal people all over Australia, including these people in Central Australia, have always been dealing with naturally occurring poisonous substances in their environment and have developed ways of safely handling them. In general, the castor oil bushes are appealing because they grow quickly and with little need of attention to provide highly valued, dense shade.

There are other factors influencing the plant environment:

(1) The role of rubbish, apart from the nitrogenous wastes, in creating a suitable environment for new plant growth.

Kintore has become well-known for the amount of rubbish in the landscape mainly created by disposal of packaging from store foods. Plastic carry-bags have been blown westwards by the wind for approximately 2 km but this has no serious environmental effect so far. Rubbish from food remains, as well as human and canine excreta around living areas is seen as highly instrumental in causing disease, particularly as it provides a breeding area for flies.

Most of the domestic rubbish is not left where it might fall within close proximity to living areas. There are rules about where food remains can and cannot be thrown; for example, no remains are thrown into the cooking fire to avoid polluting the ashes for cooking in. Traditionally, as now, women sweep rubbish of all kinds to the perimeter of the hearth area. This is not, of course, any barrier to flies, dogs or children. So while there is a serious health risk in modern sedentary living, the traditional method of clearing produces the accumulation of wastes or dump heap which may be very important in terms of future human-plant relationships.
The style of planting, in some of the gardens, is conducive to plant survival and growth. Project plantations are generally planned with trees in rows a certain distance apart and reliant on regular watering. They have been planned to afford maximum shade and protection for the house occupants. Where possible the trees have been positioned to make a windbreak when full-grown, which is desirable to protect against the strong and seemingly unrelenting north-easterly winds prevailing during the colder months. The other identifiable plantings could be described as haphazard and cluttered compared with western horticultural practices. There are some benefits of this style of 'companion' planting that can be measured in terms of survival of plants receiving minimal help in their artificial situation.

The dump heap theory does not require that there is deliberate intervention designed to change the plant environment. On the contrary, it describes ways in which unintentional actions in new situations can lead to changes. If these changes are recognised in some way by the people and further action taken to enhance the changes for their benefit, then there is a new level of human-plant relationship. Long term results of this kind could produce significant changes in the plants and the way in which they are used. The dump heap theory provides one explanation for the modified human-plant relationships observed.

**Dooryard gardens.**

Kimber (1978) described the "dooryard gardens" of Puerto Rico, following on from Anderson's development of the concept. Like Anderson, she was particularly concerned with the process of change that may have been occurring either in the phenotype or genotype of the plants with which people were involved.

The relevance of Kimber's work here is that she includes a cultural dimension to one process of change, which she labels "conscious folk domestication" (Kimber, 1978:2). The motivation behind the choice of individual plants for special attention is culturally based because it represents a deliberate decision by the person/people to act in certain ways on certain resources.
Although the actions of Australian Aboriginal people cannot be described as goal-directed domestication, they modify the factors of natural selection to achieve other goals. As the features of their gardens demonstrate, plants are planted and/or protected for culturally significant reasons.

The priorities of the people must be taken into account to fully understand the processes involved in the interaction between plants and people. Chavero and Roces (1988) analyse the home gardens of peasants in Balzapote, Mexico where there is a tradition of management and experimentation with plants. This community is made up of families from different cultural regions and with varying periods of residence in Balzapote. The species planted and their abundance revealed each family's priorities in terms of the people's broad ranging plant knowledge.

Generally, the research showed that the gardens serve dual purposes of a habitational unit and an economic unit. This is reflected in the choice of plants which can be categorised into three groups: backyard, garden and orchard. Food and ornamental usage are dominant but there is a lot of variation between gardens.

Most species contained in the gardens are cultivated in Balzapote but there are also wild species and other plants from nearby and distant places due to individual's desires to plant familiar species. Financial resources have a significant effect on the number of exotic ornamental plants which are brought into the community. Poorer families have more food plant species and richer people tend to have more exotic ornamentals. Other differences relate to cultural background of families and their differing knowledge of local environmental conditions. The house and garden are viewed as one unit called "solar" and the role of the "solar" is "peculiar to each family" (Chavero and Roces, 1988:56). Broadly speaking, the home garden is a multifunctional production alternative. It is a place where people live and work and which reflects their worldview.

Chavero and Roces (1988:58) conclude that in their home gardens, families experiment with plants, "introducing new wild species in an incipient form of domestication or management and in the
selection of different varieties". Although from a different tradition of plant resource management, there are some significant ways in which the Aborigines in Central Australia compare with the people of Balzapote. Discussion at this level can lead towards a better understanding of Aboriginal intentions and the role of gardening in their lives.

There are three areas of similarity between the two groups:

1. knowledge of plant resources;
2. introduction of new plant species; and
3. the garden as a part of a house and garden unit.

Traditionally, Aboriginal people's knowledge of plant resources is extensive. In Central Australia, there are approximately 140 plant food species for which the management, collecting and processing strategies are known (Latz, 1982:40). The cultural significance of plants is well recognised even now, when their quantity of use is greatly diminished. Species, such as *Solanum* spp. and *Nicotiana* spp., which continue to be economically valuable, are being incorporated into a different lifestyle and are planted in the space around dwellings. Other culturally important plants which are not significant for their usefulness are also included in the gardens. New plant species are being introduced and accepted as part of the economy and ecology and in many cases are culturally significant.

For the majority of people who live in some form of permanent housing, there is increased involvement with plants around their dwelling sites. The major area of difference is that for Aboriginal people in Central Australia, housing is a recent development which has arisen from people's gradual change to a more settled lifestyle. Houses and gardens are still not fully established as important cultural concepts. In the case of gardens, this is changing, partly due to the efforts of work by groups, such as the land management services of local Aboriginal organisations. Some individuals are choosing the new settled lifestyle and prefer housing and as many amenities of modern lifestyles as are available.
However, gardening is not a wholly introduced concept as discussed above, since many elements, such as digging, planting, transplanting and others, were known in traditional Aboriginal societies. Some plants continue to be managed in their original locations but other plants of traditional cultural importance are now being planted and protected in the environment of people's houses. There is evidence, too, of growing enjoyment in establishing and maintaining a home-garden, as well as appreciation of the benefits it can achieve. Furthermore, it seems that some status can be conferred by planting around houses.

Aboriginal gardens show people experimenting with resources in ways similar to traditional gardeners from other cultures. The home-gardens at New Bore and other communities are similar to the type of home gardens at Balzapoté in the way that the current practices of Aborigines are contained in the much more intense management regime of the Mexicans. Perhaps it is a glimpse at the early stages of domestication of some indigenous species. Alternatively, the goals of Aboriginal people, like many other groups, may be such that they do not further intensify their relationship with their plant resources. The Paiute of Owens Valley, California, who knew about many aspects of fish and plant food production (Lawton and others, 1976), did not change to agriculture.

The home-gardens at Kintore, New Bore and Mt. Liebig closely resemble the "dooryard" gardens described by Anderson (1952) and Kimber (1978). There are cultivated species, tolerated and encouraged plants as well as weeds. Cultivars are both introduced and indigenous species of various kinds, but domesticated indigenous species are absent, as far as is known. The gardens are small-scaled, providing a limited economic role and cannot be classified as horticultural. They exemplify a reconciliation between traditional and modern plant management practices. Many plant species and locations for planting are new but also traditionally significant plants are given a place in the gardens.
Having established that Aboriginal people are gardening when involved in particular management practices with certain plants in their home-gardens, what is the relationship between this activity and the traditional plant resource management practices?

This question is partially addressed above by the discussion of the traditional uses of plants where the traditional uses of some plants have been sustained and so the cultural significance of these plants is clear. The process of throwing the seeds of a highly desired fruit, such as *Solanum chippendalei*, into a protected corner of the house yard, and then watering the area is not markedly different from past activities with this species. The plants and their fruit continue to be significant and so are the management practices. The location may have changed but the techniques remain the same.

My contention is that the modern practices are traditionally inspired and not accidental, copied or temporary phenomena. The ideas behind gardening practices today are contained in the traditional ones. Consider the techniques used in traditional management practices, in comparison with modern gardening techniques as they are listed in Table 26.

Table 26: Comparison of traditional plant management and modern gardening techniques.

<table>
<thead>
<tr>
<th>Management technique</th>
<th>Traditional plant management</th>
<th>Modern Aboriginal gardening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digging</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Replanting</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Transplanting</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Sowing seeds</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Weeding</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Use of water</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Use of fire</td>
<td>+</td>
<td>?</td>
</tr>
<tr>
<td>Trade, spread of cultivars</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Storage</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
Digging, replanting, transplanting, weeding, sowing seeds and use of water are commonly used in both contemporary traditional plant management and modern garden regimes. Examples from the literature for various parts of Australia show the widespread use of these practices, as detailed in Chapter 5, although their history is not fully known. The gardeners in Central Australia also employed these techniques in their home-gardens.

Use of fire in the landscape continues in the field area and in fact has been used increasingly as people move back onto their country (Cane and Stanley, 1985:47). There have been instances of fire being used in the areas around living places, to reduce the amount of long grass towards the beginning of the dry season. Other reasons for firing the landscape would probably also apply to the area around where people are living. The effect of fire on the regrowth of *Solanum* for example, would be expected. There is no evidence of firing having been used specifically in an established home-garden area, once planting of exotics had been undertaken.

New cultivated varieties have been introduced into the area both officially and unofficially. Mostly exotic species have been brought from other gardens and nurseries in the region. Some exotic species have become established in Central Australia through use by the pastoral industry, e.g. buffel grass. Storage of plant foods has been recorded in relation to traditional plant management whereby certain plant foods are stored for delayed consumption. There are no records of this for any garden produce but there have been instances where people have collected and stored seeds for planting. At New Bore, Tjakamarra collected the seeds from the fruits of his *Momordica balsamina*, Seven year beans and sunflowers and kept them in an old tobacco tin for future planting. Although there is no explicit evidence for this kind of action in the past, records of planting seeds presented in Chapter 5, suggest that it may have occurred.

For most of the techniques used today, there is evidence that they have been applied to certain plants, individually and collectively in traditional plant management, some practices continuing to be used today. Repeated actions of this kind, focussed on a space
around a dwelling created the home-gardens. Table 26 focusses on the similarity between the kinds of techniques applied in traditional management and modern management, but the important difference between the two management regimes is also critical. The actions are focussed on different spaces. If it is true that the actions are the same and the only difference is the location of the culturally significant space in which it occurs, then it can be argued that both actions are examples of gardening.

My definition of a garden (a culturally defined place in which a plant resource is planted, protected and/or encouraged) can be applied to the bush locations where pituri, for example, is managed according to the traditional ways. It appears that the motivation to have this highly desired plant close to where a person has settled is not a new idea, although the sources are tentative about its antiquity. The traditional gardens are in areas which have been exploited and managed using the above techniques for generations, at least. They are visited as part of the overall continuing pattern of resource exploitation. Modern gardens which include this plant demonstrate that the people have increased the availability of this valued resource for their particular lifestyle. Perhaps visits to bush-gardens are more difficult to accomplish given the constraints of modern living, such as reduced travel to some well-resourced places.

Similarly, the management of particular Solanum species demonstrates a continuity of motivation and techniques which resulted in a modern phenomenon of this species in the gardens. The seeds of Solanum chippendalei, removed before consumption were dispersed traditionally around camp sites where the bulk of the fruit was eaten. Future crops were ensured and this did not go unnoticed by Aboriginal people. In fact they scatter the seeds on the ground expecting to gather the future fruit. As Tjakamarra told me, when he threw the seeds into the vegetated but protected corner of his garden, he expected plants to grow there and that he would soon be eating the fruit. In the modern gardens, the plants are watered but this does not mean that the people have suddenly understood the need of plants for water, or
their response to regular watering. The new conditions presented a reason for an adaptation of their knowledge.

The examples of transplanting from the bush to a dwelling space also represent a response to a new set of living conditions. There was little opportunity or incentive in the past to transplant yams (*Ipomoea* sp.) for example, in a particular place, mainly because the people were not staying in that place to encourage and protect the plants. Also there were other desirable resources in other areas which were needed for survival. In some areas, such as south of Yuendumu and Tennant Creek, I observed that yams continue to be fired, dug and replanted in the old ways, as well as being occasionally transplanted to home-gardens in the town (J. Simpson, pers. comm.) These actions have maintained large areas which are known as the places where yams are gathered and for all purposes are gardens for the people who manage and exploit these areas. In most cases, the bush-gardens are some distance from any community and people make special trips to the areas to gather yams there. The likeness of these areas to large gardens is obvious during yam season as several women dig for yams in an extensive patch.

The observers of Australian Aboriginal resource use judged many traditional plant management activities in ways which meant that such activities with plants have been largely misunderstood. People of different cultures have views of the world and ideas about people and places in the world based on their perceptual "filters" or perceptions from their cultural system (Gould and White, 1974:48). So, from a non-Aboriginal perspective, Aboriginal people were not gardening. However, from an Aboriginal point of view, this may be what they have always done and continue to do. The literature does establish that the techniques of cultivation were present in traditional management but there is uncertainty about the people's motivations. The researchers are reluctant to suggest that the people's motivations were related to gardening. I argue that Aboriginal plant resource management activities must be seen in the context of the culture in which they exist.
It is possible, therefore, on the basis of the foregoing discussion, to apply the definition of gardening which I put forward in relation to home-gardens, to include the traditional applications of gardening techniques. My observations of the gardens in Central Australia suggest that Aboriginal people today are gardening to increase the variety and accessibility of culturally significant plants (which includes exotic species with newly acquired significance), given their more sedentary way of living. The management of pituri (Nicotiana spp), Solanum spp., Cyperus and yams (Ipomoea and Vigna) in their original locations also involves techniques associated with gardening, and has the effect of increasing the distribution and abundance of these desirable resources. Such activities can be classified as bush gardening. It is not horticulture or even gardening as is practised by other Australians, but it is the planting, encouragement and protection of culturally significant plants.

In conclusion, the gardens which have been planted around the dwellings at New Bore, Kintore and Mt Liebig are culturally significant for the Aboriginal people living there. Whether these gardens are highly productive or ornamental, permanent or temporary, planned or apparently haphazard, they are examples of plant resource management adapted to today's living styles. Many of the plants and the techniques used to manage them have traditional significance. I have argued that some traditional management strategies can be described as gardening also. A comparison of present management of some plant resources with traditional styles of management from the literature, showed that the same techniques continue to be used. Furthermore, it is arguable that the motivations for these activities are also derived from the past.
Australian Aborigines have been regarded by most observers as hunter-gatherers, who merely appropriate their resources from the environment and who are therefore on the bottom end of the scale of social organisation. However, evidence has been mounting which demonstrates that they use a range of strategies to manipulate the productivity and increase the availability of their plant resources. Although they cannot be classified as agriculturalists or even horticulturalists, I have argued that some of the techniques involved in these regimes are not unknown to Aborigines in their past plant management activities. In other words, there is no clear dividing line between the practices of agriculturalists, cultivators, horticulturalists, gardeners and hunter-gatherers.

People's involvement with plants has many dimensions. There are cultural reasons for eating certain plant foods and not others, for continuing traditional practices with certain resources despite lack of economic or biological needs to do so, and for planting certain species in the garden. Techniques of management identifiable in traditional plant use as well as modern gardens have been explored along with the cultural significance of food in the diet. This data underpins my argument that Aboriginal people are not and never were only hunters and gatherers.

Techniques associated with cultivation, such as digging, transplanting, replanting, and sowing of seeds have been identified as part of traditional management. Care and attention given to favoured resources, such as pituri and Solanum spp. suggested that they are in some senses inappropriately named 'wild' resources. Far from being allowed to grow without interference, these resources were carefully managed in bush-gardens. There are records of both species being planted outside their normal distribution in traditional and modern times.
People are aware of the benefits of firing and use it for many purposes including the management of their plant resources. Controlled burning of the landscape is "the most important aspect of the desert Aborigines' economy" (Latz, 1982:123). As part of the procedure for firing country, certain areas are left unfired to protect fire-sensitive resources there. Other areas are fired to produce a mosaic pattern of country with plant resources at different stages of production. It continues to be important for Aboriginal people to manage their country and maintain access to their resources in this way.

The history of Pintupi people's diet from the period in which they were mostly dependent on bush foods until today, demonstrates the cultural significance of foods derived from the bush as well as the growing importance of introduced foods. Cultural choice is operating in people's choice of food resources. Both in the past and today, people are not driven primarily by the need to eat anything which is edible in the environment in order to survive. The importance of plant food resources which are used today is derived from their traditional cultural significance.

Modern Aboriginal diets are a combination of bush foods and store foods and dietary preferences are based on traditional likes and dislikes. Bush meat and honey are the most favoured foods. Although people continue to hunt and gather bush foods in an emerging pattern of weekend hunting and gathering the community stores provide the staples, such as flour, tea and sugar and other desirable items. The overall diets reflect the available choices.

Hunting and gathering is significant in modern lifestyles for many reasons. These activities hold economic, ecological, ritual and social value for people, as well as being important for promoting health, well-being and cultural identity. People make trips in the bush ostensibly for hunting but gathering plant food and other resources are an integral part of the multi-purpose trips. Travelling in the bush to hunt and gather is culturally significant in some ways which continue on from the past. Biological survival no longer depends on bush food resources, and so people are able to pursue the resources which they most desire; those which are
most culturally significant. Women showed that they choose to hunt and gather because they believe that knowledge and practice of their traditions is important for cultural survival.

The extent to which these people make trips into the bush suggests that:

1. they continue to value bush foods as important parts of their diets;
2. they value other resources from the bush, such as firewood, timber for shelter and artefacts, seeds for sale in bulk and for making artefacts;
3. they are concerned to maintain the productive state of their country in terms of traditional resource uses, by using many management techniques. They look after the country to the extent that they use those resources; and
4. they are concerned about the maintenance of their cultural identity.

In short, living on their country and looking after it in ritual and practical ways is an important part of being Aboriginal today.

My data and analysis relating to home-gardens at Kintore, New Bore and Mt. Liebig demonstrate that, following my definition of gardening, which is the planting, protecting or encouraging of a plant or plants in a culturally defined space, people were gardening in a culturally significant way. People have been relatively settled in these communities for less than fifteen years. They have been housed for varying periods in different types and grades of shelter and have only been in 'permanent' housing for less than seven years. During that time some people planted a range of indigenous and exotic species around their living areas. Contemporary developments in treeplanting and landscaping have occurred in these communities. In some ways these activities have meant that Aboriginal gardening has been relatively unrecognised.

In home-gardens, trees, vines and grass were planted for environmental regulation. Shade has very high cultural significance for people who spend most of their time outdoors in
such a harsh climate. Fruits and some vegetables were also incorporated into the gardens. The primary motivation for the gardens seems to have been to create more comfortable living areas, to provide favourite fruits and to have certain species of traditional cultural significance close by their homes.

From analysis of the home-gardens, I conclude that the garden environments which the people created were valued for both traditional and modern significance. The traditional significance of some species remains strong and also exotic species have become established as useful and desirable resources. This has come about as people have chosen to live in houses for an extended period of time and moderate their environment according to their needs.

Although my observations relate to the gardening around houses, I argue that the gardening techniques were known previously and were part of traditional management techniques, many of which are still practised. The identification of comparable practices in modern Aboriginal gardening and traditional Aboriginal land management implies a continuity of practices. Just as people used to dig, transplant, sow and weed annuals and thin out clumps of perennials, water and fire their resources in the past, now they apply these techniques to plants in their home-gardens, as well as in the bush locations of their endemic resources, or bush-gardens.

The history of gardening in Central Australia has two main implications for my argument that Aborigines were never only hunter and gatherers. Firstly, it seems that Aboriginal people, generally were not interested in market style gardening for the production of fruit and vegetables for sale or consumption. Moreover, this is not sufficient reason to dismiss them as incapable of similar activities.

Secondly, non-Aboriginal people who have been encouraging the introduction of agricultural and horticultural practices to Aboriginal people have largely misunderstood Aboriginal attitudes to these activities. They made the assumption that Aborigines were not aware of the relevant relationships between plants and people and as a consequence, they imposed an outsider's resource management regime upon them. Aborigines
were generally reluctant to pursue European gardening practices without the persuasion and involvement of Europeans.

Essentially market gardening failed because the main priority was the bulk production of fruit and/or vegetables for economic and not subsistence gain. It required many resources and periods of intensive work by a number of people who needed to co-operate towards a common goal. These schemes were partially successful when people were organised and coerced into performing the tasks required.

Modern Aboriginal gardening calls for a different kind of commitment in which the priorities are for environmental regulation around living areas and proximity to culturally important plant resources. In home-gardens, both indigenous and exotic species are used in significant ways and the production of food is important for some species because of their particularly desired tastes. There is little concern for producing large quantities as an important contribution to the overall diet of the gardeners. In the bush-gardens, people continue to exploit their most favoured resources in traditional ways.

Given the apparently long period of close associations between Aboriginal people and some plant resources, it is possible to speculate on the changes in the genetic make-up of the plants that may have come about or be in the process of occurring. There is no evidence to suggest that the people’s involvement with plants has led to the creation of any domesticates (Yen, 1989). However, it is possible that some genetic or morphological changes have occurred. In other parts of the world, this has been demonstrated for accepted hunter-gatherer populations. More work needs to be done to ascertain the extent if any, to which people have changed their plant resources at a genetic or morphological level. Even if it could be demonstrated that Aboriginal people are involved in the domestication of species, it does not necessarily mean that they are moving towards agriculture.

My major conclusion that Aboriginal gardening does exist, opens the way for further work on Aboriginal plant resource management. This argument adds fuel to the notion that Aborigines were never only hunters and gatherers and that
fundamentally they have been misrepresented by this categorisation. Particularly in reference to Aboriginal resource use today, it must be emphasised that they are involved in more than one way of using resources. Even when choosing some items from the community store, people are making choices in favour of certain items based on cultural preferences and availability of resources.

It is important to observe people's plant-related activities in order to understand what they actually value and understand of their resources. I observed that Aboriginal people in Central Australia were gardening in a culturally significant way and that their activities are based on traditional practices, motivations and beliefs. In their home-gardens, people included culturally significant species either because they were traditionally significant or because they fitted some modern criterion of cultural significance, such as shade or edible fruit. Furthermore, many techniques applied to the plants in the home-gardens were identifiable in traditional management of other plant resources.

Aboriginal people in Central Australia are not farmers or horticulturalists; they are not gardeners in the same way as the Puerto Ricans or New Guinea highlanders. However, their plant resource management activities do not fit with the hunter-gatherer category which restricts people to one style of interaction with their resources. To label Australian Aborigines as solely hunter-gatherers oversimplifies their traditions of plant management to the extent of misrepresenting their knowledge, skills and worldview. For the gardeners at Kintore, New Bore and Mt. Liebig, their plant resource use represents a complex integration of traditional and modern resources, techniques and cultural values.


Ashwin, A. C. 1927. From South Australia to Port Darwin with sheep and horses in 1870/1. *Proceedings of the South Australian Royal Geographical Society of Australasia* 32 : 47-93.


Arbor, Michigan: Museum of Anthropology, University of Michigan.


Harris, D. R. 1989. An evolutionary continuum of people-plant interaction. In Foraging and farming: the evolution of plant


NTA, Northern Territory Administration. 1971/72. *Part VII, Special reports: Locating an outstation site for Papunya's Pintupis*.


Hawks, R. N. Lester and A. D. Skelding. Linnean Society Symposium series, Number 7. 171-189.


Veth, P. M., and F. J. Walsh. 1988. The concept of "staple" foods in the Western Desert region of Western Australia. *Australian Aboriginal Studies* (2) : 19-25.


Watson, P. 1983. This precious foliage. *Oceania Monograph* 26


