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The Monumental Earthworks of Palau, Micronesia: a landscape perspective

Volume I

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A thesis submitted in total fulfilment of the requirements for the degree of Doctor of Philosophy

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September 2004

Except where otherwise stated in the text, this thesis is based entirely on my own research.

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ABSTRACT

This thesis reports on an archaeological investigation of the prehistoric earthworks of Babeldaob Island, Palau, Micronesia. It is focused on a particular area of the landscape, a group of earthworks in Ngaraard State, northern Babeldaob. The specific research question to be answered is: what significance or meaning can be ascribed to the monumental earthworks of Babeldaob, and what insights does this offer in relation to prehistoric monumental constructions elsewhere in Pacific landscape?

The study draws on landscape theory. A review is made of the rather intricate history of the application of landscape theory, and its application in archaeological investigations. This is followed by a discussion of the specific landscape perspective used in this thesis. Here, weight is placed on both social and cultural concerns, which includes conceptual and physical elements of landscape. This includes the identification of diachronic social and cultural processes, and applies the concept of *habitus* or 'Theory of Practice' (Bourdieu 1977).

An essential component of this investigation was the field programme, in which excavation was undertaken at three sites – B:NA-4:11, Ngemeduu crown and terrace complex; B:NA-4:12 Toi Meduu crown and terrace complex, and B:NA-4:6 Rois terrace complex. The theoretical orientation articulates with the methodology through three scales of analysis that stem from this field programme. In the first, interpretations concentrate on elucidating construction methods and past use of the earthworks, while also considering social processes of the people who built them. Both social and environmental elements of the landscape are explored. Pollen and phytolith analysis provide information on changing vegetation patterns in the past environment, and geoarchaeological methods such as soil micromorphology and X-ray diffraction impart data in

which interpretations on taphonomic and anthropogenic processes are made. Formal analysis of pottery recovered through excavation provides information on both social and physical facets of the landscape, and radiocarbon dates from 10 charcoal samples help to determine the chronology of construction for the sites studied.

A shift in the scale of investigation places emphasis on the elucidation of diachronic processes of social change in the landscape of Ngaraard. The earthworks are decentered, and interpretations are formed that extend beyond the material existence of the earthworks themselves. Attention is directed to the identification of prehistoric cosmologies, and the changing role and transmission of *habitus* in the monumental landscape of Ngaraard. The creation of space and place is addressed, and how these units have endured or transformed temporally and spatially, and a landscape history is presented

The scale alters once more, to include an interpretive comparison with an additional district on Babeldaob with monumental earthworks, Melekeok. A final discussion looks at alternative ways in which monumental constructions in other Pacific landscapes can be studied and interpreted.

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INTRODUCTION

The topic of this thesis is the application of a landscape perspective to an investigation of the monumental earthworks of Babeldaob, in Palau, Micronesia. The specific landscape perspective employed in this project (which is detailed in Chapter One) considers both cultural and environmental concerns of landscape theory, embracing the view that "landscape encompasses both the conceptual and the physical" (Gosden & Head 1994:113). Although focused on the monumental earthworks, those cultural remains are viewed as but one cultural unit within the history of the settled landscape of Palau. Therefore, emphasis is placed on elucidating the context/s – social and environmental - that led to the construction of these monumental structures, and these places, and the study attempts to view elements of the cultural context from an emic perspective.

A consideration of the flow of human conduct integrates Bourdieu's 'Theory of Practice' (1977; 1990), which focuses on identifying habitus through the material remains of action and representations (practices). The aim was to elucidate the meanings and significance these monumental constructions may have had to people of the past, and how these meanings were negotiated through social action. An approach such as this entailed consideration beyond the measured construction and 'use' period of the earthworks, through the investigation of precursor and successor evidence of human activities in the study area. Both concepts - landscape and habitus - are complementary in this respect; both are considered as historically contingent, and are shaped by past conditions while at the same time shaping future actions and circumstances.

The project looks at a specific cultural and physical area of the landscape, the State of Ngaraard in northern Babeldaob, and is concentrated on a group of earthworks located in the ridgeline, Rael Kedam, and its associated ridge spurs. As the earthworks are considered the cultural baseline of the investigation, an

excavation programme sampled three sites, and various analytical techniques were applied to the material and environmental remains in order to answer specific research questions. This aspect of the methodology was in a sense the 'bread and butter' of the project, as it generated results concerning both cultural and environmental elements of landscape, and these findings formed an essential component of the historical landscape interpretation that has resulted for the ridgeline of Ngaraard.

The perspective of this study views the earthworks as dynamic, complex, physical and conceptual components of Palauan prehistoric society, and the role of the earthworks at European contact and within current day social organisation is also considered important because the earthworks remain part of current day landscapes. Thus, the earthworks are not assumed to have had static function or meaning through time, and are considered as active components in processes of landscape transformation. With this in mind, this project is not applied within a regional scale settlement model, and it is not centred on elucidating general principles to explain the function of the earthworks island-wide. On the contrary, the aim was to achieve an understanding of the landscape history of a specific locale on Babeldoab. In order to achieve this, the questions posed in this project not only asked why the earthworks were constructed, but entailed consideration of the cultural and social processes involved in the transmission of ideas and culture across time and space; questions addressing *how* ideas and habitus were transmitted, and *what* the earthworks may have represented to the people that built them.

Therefore, the approach adopted in this thesis differs from archaeological investigations of the earthworks by past researchers. While a discussion and critique of these studies is presented in Chapter Two, it is pertinent here to contextualise these research projects through a discussion of the wider issues in Pacific archaeology that have played a fundamental role in the way that the earthworks were, and still are, investigated.

Foregrounding this discussion since the mid-20th century is a concern by Pacific archaeologists for the evolution of complex 'chiefdoms'. This 'stage' in evolutionary development is derived from Service's (1962) fourfold unilinear scheme of classification, in which the categories - band, tribe, chiefdom, and state – are situated on a scale from simple to complex. The central features of chiefdoms as defined by Service (1962) include a settlement hierarchy, redistributive trade networks, and ritual and religious complexity which involve monumental architecture. Pacific island communities are seen to be highly complex chiefdoms, attested to in large part by the complex societies observed by traders and missionaries at European contact (e.g. in Hawaii, New Zealand, and Tonga), and later recorded by early ethnographers in the region (e.g. Krämer 1917; 1919; 1926). In his comparative investigation of Polynesian chiefdoms, the anthropologist Marshall Sahlins (1958) devised a tripartite typology of chiefdoms based upon levels of stratification, and a similar scheme was later devised by Goldman (1970); both have been highly influential on archaeological studies in the region. In sum, great importance has been accorded to 'chiefdom' as a major stage of political development in the Pacific (Earle 1991).

When combined with the idea of "islands and laboratories" (Spate 1965) (a widely accepted view of many archaeologists in the 1960s to 1970s), it was felt that Pacific islands were ideal for the study of the evolution of cultures like chiefdoms (Goodenough 1957). A fundamental idea within such studies was that control of economic resources and the production of surplus was what created differing levels of social stratification in chiefly societies (Sahlins 1958). Subsequently, studies began to focus on the role of agricultural systems and intensification as a process acting on and creating systems of social hierarchy. Leach (1999) points out that, initially, Barrau's (1956; 1958) documentation of Island Melanesian irrigated terraces and drainage systems, erosion control measures, and the construction of compost–rich mounds, played an important

role in the focus placed by Pacific archaeologists on significance of agricultural systems. At this point the term 'intensification' was not explicitly used.

It was Ester Boserup's (1965; 1981) model of intensification that had a profound impact on archaeology. Morrison argues that one of the reasons Boserup's model was readily adopted by archaeologists was that it was "not simply a proposal about conditions of agricultural change but a totalising perspective on social and economic transformation" and reflected principles in common with other cultural evolutionary schemes at that time (Morrison 1996:585). Boserup's model basically proposed that agricultural intensification and political change were the result of demographic growth. Further insight by geographers like Brookfield (1972; Brookfield & Hart 1971) offered a tighter definition of the concept of intensification, and shifted attention away from 'stages' or 'levels' of intensity, to intensification of the *process*, and in so doing reinforced the origins of the concept in economic theory (Leach 1999).

Yet, it was Yen's (1973) publication that proved to be most influential on the application of the concept in Pacific archaeology. Yen (1973) detailed the criteria of intensification as the shortening of fallow length in swidden plots, permanent fields with structural boundaries, and drainage systems as examples of intensification from the swidden slash-and-burn regimes assumed to exist previously (Leach 1999). Population density, land availability and the social environment were all seen as influencing factors in the type of change that followed initial settlement and the processes of intensification (Yen 1973).

With this background in mind, it is clear how the Palauan earthworks, or terraces as they have generally been called, have long been viewed by archaeologists to have been used for agricultural production (e.g. Ayres & Haun 1990; Cordy 1979; Hunter-Anderson 1991; Lucking 1984; 1961; Osborne 1966; 1979). Early investigations of the terraces retained elements of the culture historical approach, and the Palauan terraces were compared with other

agricultural terraces in Pacific cultures, such as the terraces in Java, Indonesia, and the terraces and fortifications of New Zealand (Osborne 1966:150). However, the influence of Boserup's model (1965) is also apparent at this early investigative stage, with the terraces interpreted as having been created in order to increase the amount of arable land for cultivation of dryland taro (*Colacasia* sp.), with population pressure "pushing the regular facilities ..... to the limit" (Osborne 1966:153). The interpretation of dryland cultivation stems from the lack of irrigation channels or ditches on the terraces, and such a system differed from permanent agricultural fields in other parts of the Pacific (see below).

By the 1980s, the influence of the New Archaeology was most apparent as the terraces were situated within a settlement systems approach (e.g. Lucking 1984; Gumerman et al. 1981). When settlement pattern archaeology was introduced to Pacific archaeology by Green (1967a) it was readily adopted by most archaeologists. Within Palauan studies, the settlement systems approach highlighted a new concern for the processes that led to the construction of terraces, and we see a clear concern for terrace construction as occurring because of processes in which warfare and/or agriculture were intensified.

Furthermore, researchers now situated the terraces within models of the regional settlement system. While the terraces were still viewed as evidence of an intensified agricultural system, they were now seen to be indicative of advanced social complexity (Masse et al. 1984). While all researchers up to this time felt that the upper terraces, the 'crown and brims' (Osborne 1966) were more likely to have had a defensive function, the system in which both agriculture and warfare functioned now took precedence in explanatory models. Thus, from this period onwards, the terraces were interpreted as evidence for population pressure causing competition for subsistence resources, leading to political strife, region wide (Masse et al. 1984:122). Such explanations were part of a wider consideration in Pacific archaeology for the role that intensified production played in the evolution of complex chiefdoms. However,

a fundamental difference here is that the Palauan terraces do not have evidence of irrigation. In Polynesia, for example, studies were focused on understanding the irrigated pond fields (e.g Kirch 1982; Spriggs 1981), largely in response to Wittfogel's (1957) "hydraulic hypothesis" whereby irrigation is given the central role in the evolution of centralised state societies. In Palau, taro pond fields were also recorded to have been in use, but in Traditional (late) times only, and they continue to be used today. As such, the dryland terraces appeared to be a form of intensification that didn't quite fit the model.

From the 1980s in particular, evolutionary ecological models have become mainstream in Pacific archaeology, and it is within this theoretical realm that fortifications were, and in large part continue to be, addressed by archaeologists. There is an extensive literature on this subject, and I only seek to highlight how the main points have influenced interpretations of the Palauan terraces. Within evolutionary-ecological approaches, warfare is located within models of competition and cooperation that draw heavily from sociobiological and evolutionary biological models on group formation, the development of social hierarchies, and the founding of settlement strategies and territoriality (see Field 2004). Within the Pacific, studies of fortifications are firmly entwined with economic issues, such as subsistence production. There has been an economic concern since early investigations, with fortifications seen as a response to variations of the man/land ratio (e.g. Vayda 1974).

If we look at a case study in Fiji, forts are seen as artefacts of group formation (Field 1998) and reflective of intense competition over critical resources. Therefore Parry (1987) suggests that it is through direct study of fortifications and settlement patterns that archaeologists can discern the choices made by people concerning subsistence and defense. Defensive settlement systems have been studied within the realm of costs and benefits of competition and warfare, and are seen as particularly relevant for addressing issues concerning the

evolution of subsistence strategies (especially intensified strategies) and social hierarchies (Field 1998).

Evolutionary ecological concerns such as those outlined above can be found in studies of the earthworks in the late 1980s and early 1990s in Palau. In the latter decade there was a definite concern for the 'crown and terrace complexes' as fortifications, but not as permanently occupied fortified villages. Rather, they were considered as refuges or signalling posts (e.g. Liston 1999a). In addition, most of the proposed evolutionary models detailing fortified settlement systems also incorporated political-economic theory (e.g. Earle 1991). The most recent studies argue for clear defensive functions of crowns and ditches in which the fortified complexes form 'small fortified polities.' The terraces are said to have multifunctional roles, one of which is dry field agriculture. The central explanatory model is concerned with socio-political development in which chiefs controlled and enforced labour and legitimised their power through the visible monumental scale of the terrace complexes, with the earthworks also functioning as territory markers (Liston 1999a; Liston & Tuggle 2001). Another important evolutionary model relevant to monumental structures is the 'waste' model (Hunt & Lipo 2001) which relates monumental construction to the diversion of energy away from reproduction. This is seen as an adaptive response to population pressure especially in variable environments. The theory, as yet, has not been applied to Palau. Similarly, other models concerning the evolution of monumental architecture (e.g. Kirch 1990) have not been adopted directly, although the influence of such models is reflected in the idea of the earthworks as symbols of chiefly dominance and hegemony in prehistoric Palauan society. A significant concern in these projects has been to establish a 'developmental model' to explain the evolution of the complex chiefly society observed at European contact in Palau (e.g. Liston 1999a).

Both evolutionary and political economic models have been important in studying settlement systems in the Pacific, and in Palau specifically they have been instrumental in producing models of terrace construction and use. However, the approach taken in this thesis provides an alternative interpretation and means of addressing monumental constructions. As such, it steps outside the realm of 'conventional' archaeological approaches in both Palau and the Pacific as a whole.

Thesis Outline

After this introduction there are nine chapters. Chapter One looks at the history and use of the concept 'landscape', from its popular beginning in Renaissance painting through to its application in the social sciences. The focus is on tracing the multiplicity in its applications throughout various disciplines in order to provide a context in which to gauge its current complexity and 'ambiguity' in meaning within various archaeological approaches. The chapter concludes with a detailed discussion of the landscape perspective adopted in this thesis.

Chapter Two explicitly addresses the theoretical and methodological approaches of archaeological researchers in their investigations of the monumental earthworks in Palau, which have been outlined in this introduction. Various perspectives are apparent, and attention is placed on situating interpretations within the theoretical contexts of archaeology in which they arose. A critique follows, highlighting the interpretative limitations when addressing monumental earthworks within settlement system and political-economic models of complex societies.

The research methodology of this thesis is expounded in Chapter Three. The methodology entails three scales of analysis in which specific research questions were formulated in order to answer an overriding research question. The tri-scale methodology was formed in order to compile a detailed landscape history of a specific area in Babeldaob. As such, the questions 'tack' (after Wylie 1993)

between scales, including the different methodological strategies involved, such as excavation and various types of analyses.

Chapter Four sets the physical and cultural context in which the study is situated. It begins at the regional scale, highlighting the physical characteristics of the archipelago. The discussion works back from the most recent and well-known ethnographic 'present', to the archaeological remains and the cultural sequences that have been proposed for the archipelago. Focus then turns to Ngaraard State, the study area of this thesis. The discussion is structured in a similar manner, looking at social organisation, through to a discussion of the earthworks investigated in this area.

Details of the excavations undertaken at the three sites studied – B:NA-4:11 Ngemeduu, B:NA-4:12 Toi Meduu, and B:NA-4:6 Rois, are provided in Chapter Five. Description includes detailing the provenance and details of the radiocarbon determinations for this project, as well as stratigraphic interpretations.

The next three chapters present analytical results for the project. Chapter Six looks at the analyses of clays from each site. Clay analysis was incorporated in order to help identify *in situ* anthropogenic soil layers of the earthworks, and to recognise any natural and anthropogenic processes that had occurred at the sites. Numerous methods were applied, using a mixed method approach: pH testing, Munsell colour descriptions, and X-Ray diffraction. The method of soil micromorphology was applied to investigate a potential buried surface of Ngemeduu. Analysis was performed by Ann-Maria Hart, and the report is provided as Appendix A.

Pollen and phytolith analyses were undertaken on soil samples from the sites, and the results and discussion form Chapter Seven. Dominique O'Dea undertook the former analysis and related analytical information is included as Appendix B. Dr. Jeff Parr performed the latter analysis and his report is

included as Appendix C. The main results are discussed in the text, followed by a discussion looking at the vegetation history of the ridgeline in Ngaraard.

Chapter Eight details the analysis of pottery recovered from the excavations. A description of pottery making from ethnographic descriptions is provided, followed by the results of archaeological studies of Palauan pottery. The methodology adopted for pottery analysis in this project is then detailed, and the results are presented. A discussion ensues which focuses on an important element of the ridgeline pottery sequence – painted pottery. Temper analysis was carried out by Bill Dickinson and his report is included as Appendix D. The full report of an analysis of the pigment on a sub-sample of painted sherds using GADDS is provided as Appendix E. The chapter concludes with a general interpretation of this pottery in relation to monumental earthwork construction.

A full discussion is found in Chapter Nine. The research questions are situated within a landscape history for the ridgeline as interpreted from both the results of the analytical methods and results of previous studies. The chapter subsequently addresses the larger research question, and concludes with a consideration of future research using the landscape perspective adopted in this thesis.

CHAPTER ONE

A history of landscape theory and its diverse application in archaeological investigations

Landscape is a way to move beyond narrow conceptions of settlement determined by environment and technology. Its explanatory and interpretive power is applicable to a wider range of subjects than that of settlement alone (Campbell 2001:51).

Landscapes are perceived by people within particular social and cultural contexts. The landscapes that people conceptualise both reflect and influence the ways in which they see the world (Tuan 1977; Pred 1990; cited in Cooney 2000:20).

This chapter discusses the development of the word and concept 'landscape' which is essential to the theoretical basis of this thesis. 'Landscape' as a concept has a long and complex history in the social sciences. Within archaeological circles the term has been considered useful in its "fullness and ambiguity" (Gosden & Head 1994:115) on the one hand, and tainted with theoretical and methodological limitations on the other (Llobera 2001:1006; also see Zedeño 2000). In order to understand the pathways that have led to this landscape dialectic, it is important to trace the history of the term up to its current use in archaeology. We can begin by looking at the origins of the word 'landscape' and its meanings in Renaissance landscape painting, followed by its expansion and formalisation within the social sciences in the early 20th century. The focus then turns, tracing the pathways to a 'landscape archaeology.' The resurgence of landscape as an approach within humanistic schools of thought follows, with attention then focused on how this approach has influenced the post-processual, postmodern or interpretive archaeologies of the final decades of the 20th century. A section then addresses landscape archaeology in the Pacific, and the chapter concludes with the landscape approach of this thesis.

1.1 The Origin of 'Landscape'

The semiotic development of 'landscape'

It is important to note at the outset that landscape is a concept with its origins in Western Europe. It is most widely known through the genre of 'landscape painting' during the Renaissance. Before delving further into the rise of the concept of landscape as "'a way of seeing', a way of composing and harmonising the external world into a 'scene', a visual unity" (1984; Cosgrove 1989:121), it is appropriate to discuss its close affiliation with the development of the words 'nature' and 'nation'.

Nature and landscape have had a long and comparable lexical development, the former within the Romance and the latter within the Germanic languages, respectively (Olwig 1993). Indeed, it has been a longstanding practice to use the two words almost interchangeably. This has contributed to an ambiguity of the term 'landscape' within both the social, physical, and life sciences, and within the discipline of archaeology many researchers believe that a single definition and perspective of landscape is not feasible (e.g. Feinman 1999; Gosden & Head 1994; Ladefoged & Graves 2002; Stoddart & Zubrow 1999; Thomas 1993). Nature, "perhaps the most complex word in the language" (Williams 1976:184) is itself derived from the latin *nascere*, meaning 'to be born' and 'to come into being'. In its classical sense it referred predominantly to "a cosmological 'principle' of development, growth or change which takes successive forms so that 'each is the potentiality of its successor'" (Collingwood 1960:43-48; cited in Olwig 1993). Within the Germanic languages, 'scape' (which has undergone various changes in spelling and meaning) has parallels to the original organic sense of the word nature, whereas 'land' and 'landscape' bear similarities to the word nation. Nation, as defined here (after Olwig 1993) is the people into which one belongs by virtue of being born into that population. We see the word 'land' used synonymously with 'nation' even to this day, where it refers to a territory belonging to a people, seen for example in such nations as England (Olwig 1993:311). In its Germanic context, medieval Danish landscape laws were based upon the customary law of particular areas of the country identified

with particular inhabitants. Thus, the landscape was defined as an area "carved out by axe and plough, which belongs to the people who have carved it out" (Olwig 1993:311-312). This also carries the idea of landscape being an area of cultural identity "based, however loosely, on tribal and/or blood ties" (Olwig 1993:311). Landscape, then was seen as identifiable with people, in a territorial sense.[1]

The Renaissance transformation and Landscape painting

During the 15th century, a transformation in the meaning and use of the word landscape occurred in Europe (as well as nature and nation) coincident with a dual division of nature and culture, "one of the most profound philosophical and practical Renaissance legacies" (Setten 2003: 134). The fundamental change at this point was that *nature became scenery* - by a gradual process of reification, nature became one with the environments used to symbolise the natural (Olwig 1993),[2] and the term applied to such scenic depictions was 'landscape'. This change in the meaning of nature is explained more thoroughly by Collingwood (1960:3-13) who identifies three distinct modifications in the European context. The main change is perceptual, with man involved in a process of "ever-increasing intervention in nature" (Hirsch 1995:6). This generated new ideas regarding separation, specifically the separation of subject and object, which ultimately led to the emergence of the Western idea of landscape; thus landscape became object (Marx 1989). This separation is best expressed in landscape paintings of the Renaissance.

The pictorial representation of the visual, scenic, 'natural' world became conventional in Flemish and Italian landscape paintings by the mid 16th century (Hirsch 1995; James 1934:78-79; Ogden & Ogden 1955). Landscape painting was

[1] It is of interest here that before A.D. 1000 the word *landscipe* existed in Old English which also referred to an extent of territory. However, it seems to be replaced by the Dutch term later in the Renaissance.
[2] At the same time there is a change in the meaning of the word 'nation', where it is applied to a politically defined territory, instead of the native race of people who were inhabiting that territory (Olwig 1993:319).

felt to be a "real discovery", and became a 'genre', or institutionalised (Gombrich 1966:107-108). The foundations of this genre are found in an earlier transformation, when the 'mechanical arts' were being revolutionised by the application of formal mathematical and geometrical rules derived from Euclid (Cosgrove 1989:121). The most important application within the realm of painting was the linear perspective.[3] This allowed the reproduction in two-dimensional space of the *realistic illusion* of a rationally composed space of three-dimensions (Cosgrove 1989:121; Daniels & Cosgrove 1988 emphasis added), and as such was regarded as a means of revealing the 'truth' (Thomas 1993:21) by allowing artists to "convey the illusion of objects existing in a defined, recessed, habitable, unified or, in a word, *real space*" (Marx 1989:xvii, emphasis added).[4] Thomas discusses a further aspect, whereby

> [p]erspective art represents a form of visual control...At the same time, perspective establishes not merely a set of spatial relations on a canvas, but a fixed relationship between object and subject, locating the viewer outside the picture, and outside of the relationship being depicted (Thomas 1993:21-22).

Landscape is thus linked to a new way of seeing the world, one also argued to be a penetrating 'male gaze' focused on visuality, with landscapes seen "in terms of the female body and the beauty of Nature" (Rose 1993:87). This demonstrates a perception of landscape as heavily gendered[5] and exclusive of all non-visual senses, which enshrines and exemplifies the ideal value that Western culture placed on the visual medium from this period onwards (Bann 1987:8). Thus, within this 'new politics of vision' (Thomas 1993:22), the experience of the viewing 'subject' becomes one of aesthetic pleasure, with the countryside now a desirable 'object' to behold.

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[3] Hirsch (1995:8) points out that this development was not exactly new, rather that at this time "the value placed on viewing the world in Cartesian terms (i.e. 'non-subjective' geometric space) is part of a project making explicit what had previously, and in other cultural contexts, been more implicit and not necessarily separated out as a distinct way of imagining oneself as placed in the world."

[4] Marx (1989:xviii) makes a further point that English literary works also underwent changes, as landscape description and imaginative writing took on greater specificity.

[5] According to Setten (2003:134) the crucial point is that the landscape's visuality is seen to produce a certain type of gendering, which is firmly rooted in the nature of geographic research from its conception (see Ford (1991) and Nash (1996) however for a alternative views).

How did the notion of the countryside become desirable? Gombrich (1966:108) contends that landscape painting became institutionalised as "an absolute, entire art," in the mid-sixteenth century. Yet, the foundations for this genre can be seen in early 15th century writings. Southern Renaissance art was highly influenced by Alberti's aesthetic theories in the *Ten Books of Architecture* (first written in 1450), where we see a subtle change in emphasis on the role of art; art as decoration or illustration became

> art as an autonomous sphere of human activity, which should be treasured for its psychological effects. One of the ways in which such effects could be generated was through the depiction of pleasing 'sights' such as the countryside (Hirsch 1995:8).

The North, in contrast, placed emphasis on the "craft of empirical representation" (Hirsch 1995:8).[6] The development of landscape painting as "truth" took form when the "dominant 'southern' aesthetic theory" appropriated the "products of 'northern' realism" (Gombrich 1966:114; cited in Hirsch 1995; cf. Setten 2003). Indeed, by the 17th century, the fundamental change was "the triumph of representational modes of thinking" (Livingstone 1992:98) in Europe within all realms of art and science.[7] Henceforth, we see this idea of landscape coupled with a central importance attached to picturing, or mapping, or mirroring; representing the world as the only reliable way of knowing it (Alpers 1989; also Hirsch 1995; Livingstone 1992).

The significant change in the outlook of humans and nature in the Renaissance is reflected in the understanding of nature as a source of wealth, as from the 15th century Europe was undergoing rapid economic development in the form of commercial capitalism (Livingstone 1992:38). Setten (2003:137) remarks that

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[6] Setten (2003) argues the fundamental difference was between Italian heroism and abstraction - people working *on* nature, a 'visual scenic phenomenon', compared to the northern more 'realistic' approach - people working *with* nature, e.g. Pieter Bruegel's series *The Seasons.* These works focus on everyday life and activities of people (Setten 2003:139).

[7] Thus when we consider that nature was no longer regarded as a self-revealing reality (i.e. we just 'know' the truth) we see this representational focus was all encompassing. Descartes then professed that the only way anyone can have knowledge of the outside world is through the process of constructing a picture of it within the mind (Livingstone 1992:98).

"objective nature was whatever could be measured", and "mercantile capitalism viewed nature as a resource to be exploited" (Merchant 1980; cited in Setten 2003). Thus, the new 'politics of vision' developed within rising economic interests which placed land within capitalist bounds - as commodity. This is inherently connected to the altered perspective reflected in landscape paintings; a 'change in sensibility' -

> This heightened trust in the capacity of individuals to perceive the essence of reality through direct observation also was bound up with the mentality of the merchant capitalists who then presided over the economic expansion of Europe.....The convergence of the merchant class's material and aesthetic motives in this period is suggested by the development of its taste for the contemplation of landscape, both in nature and in art. (In Holland and in Florence, where the new genre of landscape painting flourished, merchants were in fact the chief patrons of landscape painting) (Marx 1989:xvii).

While landscape painting and the changing idea of landscape emerged hand-in-hand with capitalism (Thomas 1993:22), elements of commercial enterprise cannot be divorced from the influence that 'independent' political leaders exerted on the patronage of landscape paintings. However, the most extreme materialist position within capitalist enterprise is in the 18th and 19th centuries, particularly in the colonisation of America.

Politics of landscape in the 18th and 19th centuries: the 'Old' and 'New World'

A discussion of landscape painting cannot be detached from politics. In England, for example, landscape painting reinforced class distinctions by visually asserting 'man's' place in the world. In contrast, the landscape mentality in America differed, owing to the application of preconceived landscape *ideas* rather than material representations in paintings. There is also internal divergence similar to that of Northern and Southern European landscape paintings. The history of English and American landscapes is complex, and my discussion picks out matters of relevance here.

England in the 18th and 19th centuries

Barrell (1990:15) sees landscape art in the 18th and early 19th centuries (which was taken from the Dutch) as a means for legitimising political authority, "the claim to the right to participate in the councils of the state". This is because landscape was used to reinforce the distinction between liberal and vulgar, learned and ignorant.[8] Ideas of mankind took the form of universal ideals, beyond the individual within the notion of the wider society:

> On the one hand is the ideal, panoramic prospect, the analogue of the social and the universal, which is surveyed, organized, and understood by disinterested public men, who regard the objects in the landscape always as representative ideas, intended to categorise rather than deceptively to imitate their originals in nature, and so who study, not the objects themselves – not for example the individuals in a society, or their individual occupations - but their relations. They are enabled to do this by their ability to abstract, and by their ability to comprehend and classify the totality of human experience (Barrell 1990:29).

In dualistic tradition, the opposite was the 'occluded landscape':

> representing the 'confined views' of the private man, whose experience is too narrow to permit him to abstract. Such landscapes conceal the general view by concealing the distance.....The characteristic imagery of occluded landscapes – a cottage, for example, embosomed in trees which permit the distance to appear only as spots or slices of light, is emblematic of a situation in life from which no wider prospect is visible (Barrell 1990:29).

Thus, landscape was used as a form of visual *and* social control, "For what was being done.....was indeed a disposition of 'Nature' to their own point of view. If we ask, finally, who the genius of the place may be, we find that he is its owner, its proprietor, its improver" (Williams 1973:123). Not only did space and distance, in both real and abstract terms, become representational of social order, but also the idea of place emerges, as possession, as asserting position,

[8] Women were also classified as ignorant in this sense through their alliance with nature, "and hence 'other' to culture" (Merchant 1980:20, quoted in Setten 2003). However, Nash (1996:167) emphasizes "certain forms of visual representation may support patriarchal power relations, but looking is never only or just masculine." Rather, we must remember the cultural context/s in which they are perceived.

and as points in the landscape. In England an ability to grasp the true interests of society became identified with ownership of landed property – the *landed* gentleman (Barrell 1990:30-31).

The industrial revolution played an essential role in the popularity of this genre, with the growth of the "Romantic cult of nature" taking hold in the 19th century in response to the 'destruction' of nature by industry (Bann 1987:3; citing Wollen 1980).[9] At the same time Gilpin[10] developed a middle-class appeal in landscape art through the idea of the *picturesque*[11]. To Williams (1973:128) this was a "by-product, a feeling for unaltered nature", the rules of which became the habitual mode of seeing by 1815 (Mulvey 1989:103):

> The regions that attracted most attention were, by British standards at least, wild regions but they were to be domesticated and possessed by the process of picturesque perception. Gilpin's rules were a mode of production and the consumable produce was 'landscape'. It was a new way of cultivating the land. *The land so enjoyed did not have to be owned in terms of real estate. The land so enjoyed did not have to be cultivated in agricultural terms* (emphasis added).

By the mid 19th century then, nature as improver had become to nature as original. By the end of the century nature/rural/countryside had attained an idyllic status, and it is the idea of the *picturesque*, the wild, unaltered landscapes of nature, which persist in the social sciences.

A Colonial Landscape: America in the 18th and 19th centuries and the issue of 'scale'

At the outset, the landscape of colonial America was perceived as a 'limitless space' (Bush 1989) with economic potentiality (Gidley & Lawson-Peebles 1989). Indeed, the vast expanses of land in North America that were 'un-used' in the colonial period were seen as value-less because they existed outside the economic system (Marx 1989:xx). The perception of land as economic capital,

[9] K. Clark (1979) *Landscape into Art*, London, provides a good overview of this development from the 14th to the 19th centuries.
[10] See W. Gilpin, 1973. *Observations on the River Wye*, Lyall Sutherland (ed.), London: Richmond.
[11] Although note that Gombrich (1966:116-117) argues that the notion of the 'picturesque' actually began in the 16th century, as evidenced in written works by Paolo Pino and Nietzshe, for example.

rather than social capital, indeed *as money,* dismayed at least one English observer in 1862 (Bush 1989:20).

The vast size of the land also had a psychological impact on early settlers, which is observable in landscape art and literary compositions of the period. Mumford Jones (1965) argued that there was a lack of developed conventions for landscape description due to a concern of pioneers with survival rather than aesthetic response (cited in Clark 1989). However, the problem was also one of scale,

> [i]f American nature was indeed grander, vaster, and more sublime than European nature, as so many Americans in the infant republic professed, then it is hardly surprising that English picturesque conventions did not prove adequate to paint the American landscape. After all, these conventions were developed after landscape gardening became widespread and inculcated a taste for unified, controlled vistas. How could such taste compass the vast extent and powerful impression of the scene at Niagara? Artists were compelled to find new techniques (McKinsey 1985; cited in Mulvey 1989:106).

These came through a different perception of the landscape after the War of Independence in the new nation;

> Nature is the national past, the basis of the national identity, an infinite source of moral regeneration and guarantee of the democratic constitution. In producing this paradigm the nationalistic painters, writers and thinkers of the new nation....adapt discourses that had been formed in response to England's earlier agricultural and industrial Revolutions (Clark 1989:86).

Once America had a specific settlement history, albeit short, people were able to read their landscapes through creating their own *ecriture*[12], in which they could conceive and represent an 'American' landscape. Hence, in the American representation of landscape we now see an iconographic emphasis through creation of a *domestic typology,* a conscious rejection of the English picturesque placing importance on visual agrarian America – farms, fences, cleared fields (Clarke 1989:146-147). Emphasis is on a horizontal rather than a vertical scale of

[12] Marks left on the landscape by human settlement and habitation (after Mulvey 1989:109).

value: the visual expression of post-revolutionary social ideals, by mythologizing the landscape as part of the creation of a nation.[13]

Summary

Landscape had a dynamic, complex history prior to its application and use in the social sciences. Briefly, the transformation is from definition as 'territory,' through scenic depictions of nature, to its use in capitalist enterprise and nationalist representation. A persistent theme is the alignment of landscape with nature, that is, the objective 'natural environment' in which humans are located as either subjective but passive owners, or as dominating controllers and manipulators. Neat ambiguity created a dyadic tension of nature and culture, space and place.

1.2 Landscape in Geography and Anthropology

In considering how landscape became transformed and applied in the social sciences, it is pertinent to draw attention to Livingstone's (1992) emphasis on the role that geography played in the rise of scientific enquiry:

> Geographical exploration, with its associated skills of navigation and cartography, was not merely the principal field of human endeavor in which scientific discovery and everyday technique became closely associated before the middle of the seventeenth century; except for the arts of war and military engineering and (to a very limited extent) medical practice, it was almost the only field; hence its immense significance in the history of science and of thought (Parry 1981:3, cited in Livingstone 1992:32).

In American geography in particular the concept 'landscape' became formally divided under anthropological influences. The geographer Carl Sauer has been attributed as providing the first formal definition of landscape in early 20th century America (Anschuetz et al. 2001; Darvill 2001; Hirsch 1995). His inaugural lecture and subsequent publication, *The Morphology of Landscape*

[13]Although this is was not a homogenous pattern across America, e.g. the Southern states still professed an elitist hierarchy in its landscape paintings, harking back to old-world order of Europe (Clarke 1989:151-152).

(1925) dismissed the earlier, environmentally constructed ideas of geographical study, Friedrich Ratzel's *'anthropogeographie'*. In fact, Sauer's new proposition for geographical study responded to the debate between Ratzel and Emile Durkheim – about the extent to which social groups were the products of environmental forces or collective consciousness. Sauer (1963[1925]:321) asserted that:

> Landscape is the English equivalent of the term German geographers are using largely, and strictly has the same meaning: a land shape, in which the process of shaping is by no means thought of as simply physical. It may be defined, therefore, as an area made up of a distinct association of forms, both physical and cultural.

Here we see an explicit distinction emerging between *natural* and *cultural landscapes:*

> The cultural landscape is fashioned from a natural landscape by a culture group. Culture is the agent, the natural area is the medium, the cultural landscape the result.....The natural landscape is of course of fundamental importance, for it supplies the materials out of which the cultural landscape is formed. *The shaping force, however, lies in the culture itself* (Sauer 1963 [1925]:343, emphasis added).

Sauer was influenced by two streams of thought – from Germany the work of Otto Schlütler was significant. Sauer acknowledged and agreed with the term *Landschaftskunde* ("landscape science") for geographical study (James & Martin 1972). Schlütler was the first to distinguish between *Urlandschaft* - the natural landscape, and when altered by man it was transformed into *Kulturlandschaft* – the cultural landscape (Schlüter 1928 cited in James & Martin 1972:177, see also Livingstone 1992). However, Sauer's other realm of influence was the anthropology of Franz Boas.[14] Sauer adopted Boas's idea of 'anthropological historicism' through intellectual interaction with Robert Lowie and Alfred Kroeber, Boasian students (Livingstone 1992:294; Anschuetz et al. 2001); "the sense of cultural particularism that Sauer imbibed from Lowie and Kroeber

[14] See some of Boas's earliest works, *The Mind of the Primitive Man,* New York: MacMillan 1911; *Anthropology and Modern Life*, New York:W.W. Norman, 1928; also W. Speth, "The Anthropogeographic Theory of Franz Boas, *Anthropos* 1978, 73:1-31.

quickened his dismissal of the American geographical tradition as an unsophisticated transatlantic offshoot of Ratzelian anthropogeography" (Livingstone 1992:294). Thus, Livingstone (1992:297) argues that it was from Boasian anthropology and German *Kulturlandschaft* that Sauer came to conceive of geography as culture history in its regional articulation.[15]

Although Sauer attempted to produce an objective procedure for landscape (thus geographical) study, he still acknowledged that there were areas of meaning in landscape studies that lay beyond science – "[t]o best geography has never disregarded the esthetic qualities of landscape, to which we know no approach other than the subjective" (Sauer 1963 [1925]:344). However, it is the aesthetic and 'visual' elements of landscape that lead a 'lull' in the application of landscape as an approach during the 1960s and 1970s in America (Zedeño 2000). Emphasis turned to spatial analyses that could be quantitatively measured, and landscape in the Sauer sense "defied the boundaries of the scientific method" (Allen & Hoekstra 1992:103; cited in Zedeño 2000:47). Hirsch (1995) asserts then, that a tension explicit in geography is the relationship between the subject-position of *place*, and the non-subject-position of *space* in the way in which landscape has been taken up as an analytical concept.

Anthropology during this time did not really deal with landscape directly, and it has only recently become a central topic of discussion in the discipline (e.g. Bender 1993; Hirsch & O'Hanlon 1995). Hirsch (1995:1), however, does touch upon two ways in which landscape was used indirectly as a 'submerged' aspect of anthropological accounts:

> 'Landscape' has been deployed, first, as a framing convention which informs the way the anthropologist brings his or her study into 'view' (i.e. from an 'objective' standpoint – the landscape of a particular people). Secondly, it has been used to

[15] Livingstone places a great weight on the influence of Boas through Kroeber in explaining the ferocity of his attack against Ratzel, to the point where he suggests that Sauer's biographical entries for Ratzel and his student Semple in the *Encyclopaedia of the Social Sciences* (1934) were influenced by Boas' position on the board of directors, as Boas had to ensure that the 'battle lines' he had drawn against the environmental determinists remained firm (1992:296).

> refer to the meaning imputed by local people to their cultural and physical surroundings (i.e. how a particular landscape 'looks' to its inhabitants).

Of relevance here is the first convention which has its roots in the British school of social anthropology. Dresch (1988:50; cited by Hirsch 1995) discusses Malinowski (1922) as a proponent of the first convention, as he consistently interwove 'terrain' into his monographs of the Trobriand islanders. The people were portrayed as if seen, initially, in a recognizable landscape or picturesque view, a technique repeated by his students such as Firth and Fortes (Dresch 1988:51-2). Hirsch states that this 'objective' view, from an 'outsider', was soon abandoned in order to capture the native's point of view (Hirsch 1995:1). The second convention is only apparent in more recent anthropological pursuits and it is not discussed here.

Discussion

The existence of cultural and natural landscapes as popularised by Sauer signalled a change in the way man and nature were to be studied. Where, before, landscape was essentially natural – earth, trees, watercourses, etc., with the cultural element being one of 'natural' social order (e.g. a man and his dog, his manor in the background beyond his cultivated fields and ordered garden, and perhaps his wife sitting with some needlework), we now see an explicit split between what is natural and what is 'artificial' or cultural. Fundamentally, *landscape has become aligned with science* – no longer is it a representational tool for manipulating and portraying social ideals, it *is* objective physical reality. Yet, landscape as an approach fades from view, with emphasis placed instead on the analysis of space with explicit scientific techniques until the 1970s; "quantitative analysis that focused on spatial analysis of natural and human ecosystems was favoured instead for its more precise and objective results" (Zedeño 2000:103). This in fact occurred as part of the 'New Geography.' There are clear similarities between geography and archaeology in the way landscape is treated from Sauer onwards. Accordingly, the discussion turns to a brief

overview of 20th century archaeology, and in so doing establishes the relationships between geographical and archaeological theoretical developments that lead to 'landscape archaeology'.

1.3 Landscape Archaeology

The term 'landscape archaeology' has been applied to archaeological investigations that utilise various methodological and theoretical approaches to the analysis of human-land relations, such as settlement pattern analysis (e.g. Streuver 1968) and environmental archaeology (e.g. Butzer 1971). In fact, the term is most often applied to archaeological investigations of the last 20 years, with Aston and Rowley (1974) regarded as the first 'official' patrons (Aston 1985; Ladefoged & Graves 2002; Roberts 1987; Wagstaff 1987). Thus, there was no 'landscape archaeology' *per se* in the early 20th century, nor were there studies oriented around 'landscape' as an analytical unit. Like their fellow colleagues in geography, 'landscape' was used predominantly by early archaeologists as a way of specifying the objective 'natural' environment in which cultural material was located.

Precursory developments to an Archaeology of Landscape

As there are many parallel and similar developments within archaeology and geography, it is no surprise to see the dominance of cartographic and mapping traits in early archaeological investigations. Such methods enabled archaeologists to formalise the idea that human activity and culture had a spatial dimension (e.g. Childe 1929). Thus, along with 'pioneering' geographers, early archaeologists used distribution maps, in which they could locate cultural 'sites' (i.e. settlement 'points') in physical space, allowing explanation to encompass both cultural and natural/geographical considerations (e.g. Crawford 1912; 1922; Fox 1923; 1947)[16]. The establishment of relationships

[16] Fox in particular was influenced by the positional geography of Mackinder (1902), and the 'personality' concept of regional geographers like Vidal de al Blache (1928) (see Goudie 1987 for further discussion).

between material patterning and environment, which Clark (1933:232) stated, creates "a synthetic relation with their geographical background," illustrates the influence of environmental determinism in archaeology. However, patterns between sites within spatially defined areas remained undeveloped. The focus, particularly in Europe was on large scale relationships to 'classical' cultures – individual monuments were considered as products of migrations and diffusions on the one hand, or due to universal evolutionary processes on the other (see Renfrew 1973 for a discussion). Thus landscape remained on the periphery of both methodological and theoretical concerns at this time.

Continual developments in evolutionary thinking gave rise to the 'cultural ecology' approach in the 1930s (e.g. Clark 1939; Steward 1937). The belief here is that "societies will more or less be adapted to their material environment" (Johnson 1999:144) and that cultural variability was a response to local ecological adaptations. This marks a major change in the way man-environment relations were to be studied, and in America especially we see the impact of this approach on anthropology in the form of hunter-gatherer studies (Kelly 1995). Landscape in this situation helps constitute different 'ecologies', and is not considered beyond its physical sense as 'land'.

The cultural ecological view is said to have strongly influenced the dominant form of archaeological study in the mid 20th century: the view that considered the natural environment as prime mover, which was modified to include cultural needs as a shaping force in settlement. In so doing, a wider range of sites for analysis were exposed for consideration, with less emphasis placed on major centres (Campbell 2001:39). Thus, in Britain a new concern was on monuments and sites not as single entities, but as integrated into environments and involved in processes of long-term change (e.g. Clark 1954).

In America, Willey's (1953) work in Virú Valley, Peru, has been described as the 'prototype' for settlement pattern studies. He defined settlement patterns as

"the way in which man disposed himself over the landscape on which he lived" (Willey 1953:1). This demonstrates the common view of landscape at this time: as a static, natural phenomenon, on which humans placed themselves – a stage for human action. Willey's systematic study developed a settlement typology with a subsequent framework enabling archaeologists to work on regional scale analyses, and this was facilitated by new resources such as aerial photographs.

Overall, Willey's work in particular added fuel to the new intellectual bonfire questioning the diffusionist paradigm, by contributing to the development of archaeological methods for interpreting long-term social changes within regions based on internal transformations rather than external factors such as diffusion or migration (see Anschuetz et al. 2001). By adding a new analytical unit to the 'on-site' archaeological investigations – the region – settlement pattern archaeology also created new spatial boundaries for the consideration of landscapes.

Returning to Britain, post-war development also produced resources such as aerial photographs and cartographic materials (Darvill 2001). While O. G. S. Crawford, J. K. St Joseph and G. W. G. Allen were among those who pioneered the use of aerial photos in archaeology, it was Bradford's (1957) book *Ancient Landscapes* that provided the first systematic account of the application of aerial photography to archaeology. There were several other key players that influenced landscape archaeology in Britain. Beresford's (1954; 1957) study of medieval settlement and landscape is one, although Hoskins' (1955) seminal work is credited to have had greater affect. Hoskins charted the development of the English countryside, drawing on local history, geography, and some prehistory. Darvill (2001) argues that Hoskins's work provided a context for archaeological sites and monuments, by popularising the term 'landscape history'. Hoskins utilized Crawford's methods for empirical reasoning, describing how the countryside has been constantly reworked (Hoskins 1955), while also making the distinction between a *scenic landscape*, which we react to

aesthetically, and *landscape scenery* which is examined by a trained eye (Roberts 1987:77). In a recent critique, however, Bender (1992) argues that what Hoskins created was a disembodied 'frozen past', invoking a romantic sense of nostalgia, among other things. Her greatest criticism is that he advocated description over explanation (Bender 1992:738), a disparagement also applied to 'diffusionist' archaeology of the period (Johnson 1999, but see Hodder 1986:146-149 for an alternate view). Despite this, an historical school of thought called the 'English Landscape Tradition' exists which takes Hoskins as it founder (see Johnson 1999 for further discussion).

Hoskins work helped to form a context in which settlement archaeology became mainstream (in Britain), in which patterning between sites and across time and space became more of a practical concern. Indeed, his 'landscape history' was soon viewed in direct connection with landscape archaeology, with some seeing no difference between the two (e.g. Roberts 1987).

In post-war Britain, new methods of 'field archaeology'[17] combined later with Hoskins 'landscape history' and environmental archaeological studies, led to "entirely re-evaluated ideas about the character of the landscape, and particularly the degrees of difference between various prehistoric and historic phases" (Gojda 2001:12). However, this period was largely one of discontent, with new developments, such as calibration in radiocarbon dating (Renfrew 1973) leading archaeologists to question the dominant diffusionist paradigm. Thus, the 1960s saw a move towards a 'New Archaeology', whose task, according to Renfrew (1973:79) was to "construct a more effective way of speaking about the past, a new language implying fresh models of the past – a new paradigm." While the 'New Geography' began a decade or so earlier than in archaeology (although both arose in the US), in both disciplines we see a new

[17] The term 'field archaeology' is attributed to J. P. Williams-Freeman, who in 1915 published a booklet on the matter. It was Crawford, however, in 1954 that came to define the term as researchers who left their workplaces to study plants and animals in their living state in the world, rather than in material stored at museums (Crawford 1954:36).

emphasis on systematic studies (Wagstaff 1987). This marks a fundamental shift with a replacement by "positivism coupled with functionalism", in which geography was asserted as a spatial science, and archaeology as a science of the past (Tilley 1994:7). The emphasis of archaeology as a science with nomothetic aims became the dominant paradigm, with 'hard' and universal methodologies invoked in interpreting the past (Hodder 1986). As previously discussed, it is during this time that landscape as an approach in geography 'fell from grace'. A similar picture is found in archaeological investigations of the 'New archaeology'.

The 'New Archaeology' and 'Processual Approach' to landscape

Johnson (1999:21) states that: "the New Archaeology must be understood as a movement or mood of dissatisfaction rather than as a specific set of beliefs." However, it contained certain key elements of theoretical orientation, such as reference to the principles of cultural evolution, culture process, and the search for generalisations through explicit scientific methodology (see Watson et al. 1971). Arising out of the post-war era, the emphasis placed on scientific methodologies was associated with a great enthusiasm and belief in the power of statistical analysis and linear modelling (Wagstaff 1987). The New archaeology followed the 'New Geography' in many respects, and geographical methods at this time had a profound impact on archaeologists from both sides of the Atlantic. A new emphasis was on Hypothetico-Deductive methods, systems theory, locational analysis and the expansion of ecological ideas (Goudie 1987). By the late 1960s the thrust of settlement archaeology had split into two (Trigger 1968:54); one focused on ecological determinism in which settlement was examined as a product of the interaction of environment and technology, and the other focused on social aspects of settlement.

A focus of the New Archaeology was to 'reconstruct' landscapes, particularly through the generation of economic models in settlement analyses, which in

part derived from the earlier cultural ecology of Steward. Goudie (1987:21) highlights the similarities between geography and archaeology, whereby Clarke's *Analytical Archaeology* (1968) is similar to Haggetts (1965) *Locational Analysis in Human Geography*, and likewise *Models in Archaeology* (Clarke 1972) is clearly modelled on *Models in Geography* (Chorley & Haggett 1967). In fact, Clarke specified spatial analysis as one of the central factors in archaeology's 'loss of innocence' (Clarke 1973:17). Clarke's studies incorporated geographical models, predominantly von Thüsen's (1826) model of diminishing returns with distance; Weber's concept of minimum energy/least cost locations; and Christaller's 'central-place theory.' His studies were influential on the rise of palaeoeconomic archaeology in the 1970s, although Clarke admitted that all three models place great emphasis on maximising benefits, and urged the discovery of more appropriate forms of analysis in archaeology (Clarke 1977:23-4; cited in Hodges 1987).

By the 1970s, the formation what has become known as the 'Cambridge Palaeoeconomic school' (Tilley 1989:108) stressed the formulation of models in an attempt to relate population, resources, and technology over the long term, and thus generate natural laws (e.g. Higgs & Jarman 1975). One of the most influential models at this time was 'site catchment analysis' (e.g. Higgs & Vita-Finzi 1972; Jarman et al. 1972; Vita-Finzi & Higgs 1970)[18], which was influenced by the geographer Chisholm's (1962) study on rural settlement and land use, and Steward's cultural ecology. This model formed the basis for later developments such as 'exploitation territories' (Jarman et al. 1982).

Other *modus operandi* that developed along with ecological and economic modelling include optimal foraging theory, which focuses on energetic efficiency to explain cultural variation (Winterhalder and Smith 1981); risk, and seasonality. On the surface, such evolutionary ecological studies appear to be based upon the same principles, i.e. the 'rational' exploitation of resources to

[18] See Goudie (1987:23-24) for a summary of other methods of spatial modelling and analysis.

maximise returns (e.g. Johnson 1999:144). However, optimal foraging theory, as expounded by Anderson (1973; 1979; 1981), is unlike previous economic approaches; it is the way in which behaviour is explained that is most distinctive, and it is also known as 'behavioural ecology' (see Kelly 1995). For example, in his study on shellfish exploitation at Black Rocks in Palliser Bay, New Zealand, Anderson demonstrated that molluscs were selected based on larger size, independent of their species (Anderson 1973; 1981). Ultimately, maximum yield was the contributing factor influencing shellfish subsistence strategies at Black Rocks (Anderson 1981). This evolutionary ecological approach played an important role in future modelling of subsistence strategies.

A related area of analysis is the general extension of an ecological approach to archaeological material (Goudie 1976:9), especially as the potential importance of faunal and floral remains was realised, and so too their recovery techniques (Butzer 1971; 1982; and see Wagstaff 1987).

An evolutionary approach to landscape is seen in Taylor's (1974) "total archaeology", where

> the landscape or townscape we see today is the product of prolonged evolution involving both human and natural agencies and that to understand and decipher the landscape requires, at the very least, the examination of all archaeological related evidence (Darvill 2001:36)

The output of such studies was period-based map overlays summarising the distribution of sites and land-use for each defined phase. Aston's (1985) ecological/systemic analysis is in a similar vein, with "the landscape as a palimpsest of boundaries, mounds, abandoned villages, and field systems" (Thomas 1993:25). In spatial terms, these types of studies were somewhat restricted, because they were defined by reference to modern landscapes (see Darvill 2001:36-37). More recent studies addressing paleaoenvironments and palaeo-landuse utilise similar methods, but include more conventional means

of environmental reconstruction such as analysis of pollen, snail, phytoliths, soil micromorphology, charcoal residues, etc., in order to understand environmental changes in the landscape, although "it remains very difficult to link the rather generalised chronologies of environmental change to the specific points in time represented archaeologically by events such as the construction and use of particular monuments" (Darvill 2001:37-38).

In America, 'New archaeologists' such as Lewis Binford, addressed spatial patterning through ethnoarchaeological studies (Binford 1980; 1982; 1983). Binford's approach stressed the importance of incorporating elements beyond traditional site boundaries; the landscape was to be considered as the *arena* for a group's economic, social and ideological activities. Anschuetz et al. (2001) expand on this 'progression' of settlement systems approaches, with attention paid not only to those variables 'conditioning' culture change, but also an effort to document technology and subsistence patterns in relation to issues of ecological adaptation. In accordance with the dominance of the ecological tradition in America at this time (Stoddart & Zubrow 1999), arose 'landscape ecology' , which according to Zedeño (2000:103) has contributed a biological perspective on human-nature relations. This is expressed through a diverse range of issues that are addressed, using an array of scientific models; matrices of patches and corridors, fragmentation and attrition as processes of landscape change, for example (Stoddart & Zubrow 1999).

A related and more recent approach is settlement ecology. As redefined, settlement ecology recognizes history and cultural perception as contributing variables to the structure, organisation and tempo of culture change (Anschuetz 1998; Anschuetz et al. 2001; Roberts 1996; Stone 1993; 1996). When considering landscapes, the approach emphasizes natural environmental variables, and examines the central issue of dynamic risk management through a community's deployment of its economic, ideational and social technologies (Anschuetz et al. 2001:177). The approach has strong connections with Binfordian archaeology, in

which culture and tradition are described as 'filters' in the way in which groups structure and organize their occupied places.

What has been called a similar 'strand' to British environmental landscape studies (Ladefoged & Graves 2002; cf. Godja 2001, Rossignol 1992), is a continuation of the processual school, defined by a *'landscape approach'*. Of major influence on this tradition was Butzer's (1982a) contextual orientation and 'off-site archaeology' (Rossignol 1992; Gojda 2001; Graves & Ladefoged 2002). Of particular concern to these archaeologists is the reliability of archaeological sites as units of analysis (see Dunnell 1992; Dunnell & Dancy 1983; Foley 1981; Wandsnider 1998). Thus, what has developed is a 'non-site' approach, where one way of distinguishing between settlement pattern archaeology and landscape studies has been the incorporation of the *entire landscape*, not just sites within it (Wandsnider 1992). With an explicit concern for "bringing scientific structure to understanding change in social and economic systems, in the context of theories of adaptation and evolution" (Rossignol 1992:3), their 'landscape approach' promotes:

> the archaeological investigation of past land use by means of a landscape perspective, combined with the conscious incorporation of regional morphology, actualistic studies (taphonomy, formation processes, ethnoarchaeology), and marked by ongoing reevaluation and innovation of concepts, method and theory (Rossignol 1992:4).

These proponents distance themselves from 'landscape archaeology' by clarifying a distinction between the historical emphasis of the British school, and the ecological and geomorphological accent of their 'landscape approach'.

A relatively new aspect of landscape research is termed 'landscape learning,' and it has been invoked to address issues of colonization. One collection of papers (Rockman & Steele 2003) highlights the scarcity of such concerns when considering prehistoric landscapes. Contributors to the volumes address this issue using various perspectives, like cognitive psychology (e.g. Golledge 2003) and evolutionary ecology (Roebroeks 2003). However, as Meltzer (2003) makes

clear in the concluding chapter, the landscape is considered largely in environmental terms, as something to be 'learned' in terms of wayfinding (routes), regimes (primarily climatic) and resources.

Discussion

Situating landscape within scientific 'processual' methodologies exemplifies a theme in North American archaeology at this time - a distaste for historical narrative, indeed "a pronounced antipathy to history" (Peebles 1998). The profound impact of geographic spatial modelling and evolutionary ecology, and the addition of new analytical tools such as Geographical Information Systems, (GIS), as well as the utilization of geomorphological methods and those of the physical sciences, is proven to be integral for addressing 'landscape' as physical environment. With a drive to discover generalizing principles involved in human settlement, landscape is considered for its 'practical' attributes rather than social or symbolic concerns. Additionally, in most of these studies the relationship between humans and landscape is predominantly conceptualised in terms of capitalist economics, e.g. notions of environmental or economic 'exploitation' are prevalent: "these imply a one-way relationship between humans and the landscape in which nature is objectified, detached from history, controlled and manipulated as a means of maximising economic returns" (Brück & Goodman 1999:8). Such approaches contrast with humanistic studies of landscape which emerged in the 1970s and 1980s; the latter played a major role in 'post-processual' or 'interpretive' landscape approaches.

1.4 The humanistic interest and its impact on archaeological approaches to 'Landscape'

The latter end of the 20th century brought with it significant changes in geographical theory, new ideas in sociology and anthropology, and a growing dissatisfaction with 'processual' archaeology. Humanist geography adopted

philosophies and methodologies to explore human values, beliefs, and perceptions (e.g. Buttimer 1974). These proponents pursued idealistic, phenomenological, feminist and existentialist perspectives (e.g. Relph 1976; Soja 1989; Tuan 1974; 1977). Thus it is during this time that we see the return of landscape as an approach. Within geography, Zedeño (2000:103) attributes this 'return' partially to Tuan's (1977) qualitative study of place and space, the sociohistorical research of Cosgrove (1984) and Jackson's analysis of the built environment (1984). It is worthwhile here to outline the dominant themes of both anthropological and geographical landscape approaches since they have had a profound impact on archaeological landscape studies.

Landscape painting has influenced geographer Denis Cosgrove's (1984; 1989) theory of landscape, as he points to a correlation of landscape painting and the view of Descartes, in which landscape was defined as a "cultural image, a pictorial way of representing, structuring or symbolizing surroundings (Daniels and Cosgrove 1988), where the individual is separated from the 'external world'. Indeed, Cosgrove argues that all landscapes carry symbolic meaning as products of the human appropriation and transformation of the environment (Cosgrove 1989:126). A clear connection back to Sauer is evident, as Cosgrove asserts: "[a]ny human intervention in nature involves its transformation into culture" (1989:123). A further theme is of landscape as *text*, which can be read by deciphering its "many-layered meanings" – this is achieved through the application of geographical methods, such as fieldwork, map-making etc (Cosgrove 1989). Cosgrove regards the landscape as dynamic, as a "stage set for the human drama itself" (Cosgrove 1990; 1993a; 1993b; citing Earle 1991).

Ingold (1993) offers a different opinion from a social anthropological perspective. He stresses what he believes landscape *is not* – it is not land, nature or space (Ingold 1993:153). He rejects the 'pictorial' view of nature and landscape in which: "the former is said to stand to the latter as physical reality to its cultural or symbolic construction" (Ingold 1993:154). He argues (after

Inglis 1977) that landscape is not an object to behold, but a living process; it makes men; it is made by them (Ingold 1993:162). As humans essentially dwell in the world[19], Ingold criticises studies that 'imagine a separation between the perceiver and the world' (e.g. Geertz 1964) or that contend that worlds are made before they are lived in, that acts of dwelling are preceded by acts of world making (e.g. Rapoport 1994). Thus, the landscape is not a stage, a separate 'reality' in which we act out our lives – landscape *is* part of our world/s, and is a *cultural process* (Ingold 1994:738, emphasis added). Culture, then is seen as a "framework not for *perceiving* the world but *interpreting* it, to oneself and others" (Ingold 1992:52-53; cf. Tilley 1994).

Eric Hirsch's (1995) approach is akin to that of Ingold. Hirsch believes landscape entails a relationship between the 'foreground', actualities of everyday life, and the 'background' potentialities of social life (Hirsch 1995:3). He argues that what has commonly been called a 'Western' convention of landscape representation is really a more general foreground/background relationship and that this is found *cross-culturally* (cf. Thomas 1993). Several related concepts are grouped by these two poles:

foreground (actuality)	⇔	background (potentiality)	
place	⇔	space	
inside	⇔	outside	
image	⇔	representation	(Hirsch 1995:4)

Hirsch points out that the concepts on the left roughly correspond to the context and form of everyday, unreflexive forms of experience (Bourdieu 1977), with the right-hand concepts equating with the context and forms of experience beyond the everyday (Hirsch 1995:4) – although in a recursive relationship. Thus, what is being defined as landscape is the relationship between these two poles of experience in any cultural context. Landscape emerges as *cultural process* (Hirsch 1995:5, see Ingold 1994:738). Following Ingold (1994), Hirsch

[19] Ingold follows Hiedegger (1971) here on building and dwelling, where "we do not dwell because we have built, but we build and have built because we dwell, that is because we are dwellers...To build is in itself already to dwell....Only if we are capable of dwelling, only then can we build" (Hiedegger 1971: 148, 146, 160).

concurs with Cosgrove's classic 'pictorial' definition of landscape as essentially static, as the denial of process (see Cosgrove 1984). The problem, according to Hirsch, is that only one pole of experience – the representational – is considered which essentially simplifies the meaning of landscape, as it "captures only one half of the experience intrinsic to landscape, ignoring the other half and the cultural processes of which both poles of experience are a part, and through which both are brought into relation" (Hirsch 1995:5). This exemplifies the experiential focus of landscapes.

Other studies, such as Feld and Basso (Basso 1996; Feld & Basso 1996) look at native perceptions and experiences in giving meaning to particular localities, focusing attention on the ideas of place in terms of contestation and social identity (Feld & Basso 1996:4, cited in Anschuetz et al. 2001:167). Landscapes play an important role in sustaining memories and traditions, so the focus is on studying boundaries and borders to define 'place'. Anscheutz et al. (2001) underscore the argument that challenges the common idea that places are defined by static boundaries and relationships based on stable residence. Alternatively, the argument advanced is that in borderlands characterized by fluidity and hybridization, relationships of landscapes can be based on place *indeterminacy* (Feld & Basso 1996:5-6, citing Appudurai 1992; Gupta & Ferguson 1992; Gupta et al. 1992). It is argued that people creatively fashion their landscapes through occupation of spaces, which illustrates the interdependence of physical and ideational realms within human environments.

Historical ecologists such as Crumley and Marquardt (1987; 1990) embrace concerns of humanist geographers and landscape architects (e.g. Jackson 1984; 1994; 1995; Meinig 1979) particularly the idea that vernacular and formally built landscapes reflect a group's essential values and beliefs (Anschuetz et al. 2001). Jackson views variable landscape elements beyond simple relationships to natural space and environment, instead placing emphasis on the *synthetic* characteristics of landscapes, where temporally: "[a] landscape is thus a space

deliberately created to speed up or slow down the processes of nature" (Jackson 1984:8, cited in Anschuetz et al. 2001:166), and history becomes a substitute for "natural processes of growth, maturity and decay" (1984:156).

As historical ecologists, Crumley and Marquardt (1987; 1990) assert a landscape approach that utilises a variety of research tools, such as GIS and remote sensing. They define landscape as "the spatial manifestation of the relations between humans and their environment" in which "people project culture onto nature" (Crumley & Marquardt 1990:73). They argue two types of structures determine landscape: Sociohistorical structures – political, legal and economic, and physical structures: climate, topography, and geology: "In our view, the sociohistorical and physical structures *and their interpretations* (aesthetic, symbolic, religious, ideological) are determinative and mutually definitive of landscape" (Crumley & Marquardt 1990:74, original emphasis). Through investigating movement of social boundaries in Burgundy, they illustrate a focus on landscape *dynamics*, with importance placed on the interactions and effects of such relationships on landscapes.[20]

'Post-Processual,' 'Postmodern,' or 'Interpretive' Archaeological Landscapes

Experience, structuration, memory and the creation of place (within space) are common themes of post-processual landscape archaeologies (Darvill 2001). The key changes in approach are enunciated by Gojda (2001:10) who says that researchers seek:

> symbolic, ideological, and social dimensions in the landscape, attempting with the aid of hermeneutics to determine how prehistoric people perceived and ordered, and how their social memory operated in the selection of settlement sites.....the main subject and theme of post-processual archaeology is *the landscape itself*.....With the abandonment of the physical forms and structural dimensions of the landscape...interest has shifted to its metaphysical and social aspects.

[20] Anschuetz et al. (2001:167) also stress the point that historical ecologists oppose studies in archaeological and ecological landscape analysis that have 'uncritical nesting'.

Furthermore, Godja makes explicit that although the archaeology of the 1960s and 1970s gave priority to the concept of space, at the end of the second millennium the term landscape takes precedence (space being a part thereof).

In post-processual archaeology, the opposition between the *material* and the *ideal* is rejected when considering landscapes. Proponents reject the stress on landscape as a set of resources, ideas of 'rational' decision making and economic models. They argue for multiple landscapes, where different people have different views of what is/was 'real' in the landscape (Johnson 1999:103). In considering the Neolithic English landscape Bender (1992:735) stresses:

> At any given moment and place landscapes are multivocal.....people engage and re-engage, appropriate and contest them, use them to create and dispute a sense of identity – whether of self, group of nation (see also Bender 1999; Clarkson 1998; Cooney 2000).

Likewise, realities of landscape are dependant on age, gender, social position and context (Cooney 2000). Proponents of this view encourage recognition of the archaeologist's own perspective, stressing that a landscape definition is "interwoven with perception, which channels and frames experience" (Clarkson 1998:120) thus acknowledging the potential biases and perceptions of the archaeologist.

In consideration of the idealist view of landscape, it is argued that landscapes are not formed in the abstract, but through movement and experience on the land; through carrying out everyday activities. Phenomenological[21] approaches are applied, such as Heidegger's (1971; 1972) idea of 'dwelling', and Merleau-Ponty's (1962) emphasis on bodily movement, the body being the fundamental mediation point between thought and the world (Tilley 1994; see also Ingold 2000). Activities and practices are of integral importance to the formation of landscapes, and explanations draw on Bourdieu's *habitus*, or 'Theory of

[21] Phenomenology being the study of human experience and everyday life.

practice"[22] (e.g. Bender 1999; Cooney 2000; Llobera 1996; Rainbird 1999; Thomas et al. 2001) and Giddens's "Structuration Theory" (1979; 1984).[23] These theories also invoke issues of active agency (Johnson 1999) and Barrett (1994:5) emphasises agency as "the means of knowledgeable action, and is not reducible simply to the actions of the individual."

We also see a rejection of space as 'static, neutral, passive' (see Soja 1989) as a container or backdrop for social life (Pred 1990). Tilley (1994) provides a summary:

> Space as a medium rather than a container for action, something that is involved in action and cannot be divorced from it. As such, space does not and cannot exist apart from the events and activities within which it is implicated. Space is socially produced ..... The experience of space is always shot through with temporalities, as spaces are always created, reproduced and transformed in relation to previously constructed spaces provided and established from the past (Tilley 1994:10-11).

As such, time and space only exist in relations between things and practices. Practical action produces space and time and this binds social forms: time and space are both produced and producing, they are both the outcome and the medium of social action (Gosden 1994; Gosden & Head 1994). Place is often considered equal to landscape. Tilley (1994:15) states that "without places there can be no spaces" and attributes places as centres that have distinct meanings for people, including personal and cultural identity. Through naming, places are invested with meaning and significance. Natural and cultural places (Bradley 2000) aid remembering because they contain and hold memories (Casey 1987:186; cited in Cooney 2000). Thus landscapes are social products (Gosden 1994:81; Thomas et al. 2001) with movement between the 'foreground' everyday places and activities, and 'background' places and activities, the

[22] There are many parallels between Heidegger and Bourdieu, although one criticism is that both lack a real consideration of material culture (see Gosden 1994 for a detailed discussion).
[23] This theory, which recognizes the mutual dependency of social structure and agency, contends that "structural properties of social systems are both the medium and the outcome of practices that constitute these systems" (Giddens 1979:69). Thus there is a recurrent patterning in the way people do things and relative to one another across space and time (Giddens 1984).

'sacred' and the 'secular': landscape is thus cultural process (Cooney 2000, after Hirsch 1995).

Hodder (1986) proposes that landscapes have to be contextualized (Bender 1993) as they are historically contingent upon past human actions embedded in the landscape (Cooney 2000; Tilley 1994; Pred 1990). As such, past patterns of actions also structure future ones (Gosden and Head 1994, Bender 1998). Following Cosgrove (1984) landscapes and places are seen as *texts* to be read (Tilley 1994). There is never just one, but many anonymous texts to be read and interpreted (Tilley 1994; see Clarkson 1998 for and alternative view).

Although post-processualists have been criticized for considering subsistence and economic aspects of landscapes as "irrelevant" (Ladefoged and Graves 2002), a different line of landscape studies does address this issue. Gosden and Head (1994:116) advocate a methodology which considers both: "The concept of landscape stretches between the physical shape and properties of the land to the human use and conception of that land." In America some studies embrace similar methodologies. Feinman (1999) argues for a dynamic perspective on human-environmental relations, one that views human landscapes also as human constructions. Landscapes are seen as historically contingent, accretionary, and shaped by distinct cultural perceptions and past human actions. Feinman (1999:685) asserts that any study of landscape must examine the physical environment, in which a diverse suite of scientific techniques should be used, provided "social scientific questions are guiding the research" (also see Dunning et al. 1999).

Discussion

Humanist and post-processual approaches to landscapes indicate a concern beyond the environmental, subsistence, and climate-based approaches predominant in American and European archaeology up to the 1980s. This has come about largely through reactions to processualism. Now there is a concern

for relationships between cultural landscapes and social practices. Landscape takes precedence; it is interpreted as representing more than just the visible surface of the earth, or geometrically defined spaces, classified in economic terms. Space becomes defined by place, and landscapes by places, both material and abstract. However, some post-processual approaches are extreme. They deny any importance to subsistence and offer interpretations based merely on subjective personal experience (e.g. Tilley 1994; see Bradley 2000, and Llobera 1996 for critiques on these matters). Feinman (1999) and Gosden and Head (1994) offer more useful perspectives which go beyond materialist, deterministic, and subsistence/economic bound interpretations to consider both the social and physical aspects of landscape.

1.5 Archaeological Landscape studies in the Pacific

Having discussed the major areas in which landscape has been, and remains, incorporated into archaeological analyses in Britain and America, the discussion now turns to the archaeology of Oceania. This geographical area is the home ground for archaeologists from America and Britain, as well as Australasia, and Island Southeast Asia. Subsequently, we see diverse archaeological approaches applied to prehistoric remains, although the dominant treatment of 'landscape' is within environmental and ecological realms. It is only in recent times that investigations entitled 'landscape archaeology' have taken place, with the majority of such studies situated within processualism.

The islands of the Pacific have long been regarded as exceptional in their potential for scientific and anthropological study. This is due in part to the idea of islands as "natural laboratories" (Spate 1965), spatially bounded environments in which the evolution of cultures in isolation and divergent environments could be examined (Goodenough 1957:153). In many respects this view derived from the interests of island biogeographers and ecologists like

Fosberg (1963:559) whose now prominent assertion "the thing that most distinguishes islands, at least oceanic islands ... is their extreme vulnerability to disturbance," had a profound influence upon palaeoenvironmental investigations addressing anthropogenic changes in island ecology and cultural evolution (Kirch 1982; Kirch & Ellison 1994; Olson & James 1984).

The oceanic islands have received attention not only from natural scientists, but also from anthropologists, ethnographers, and linguists. The attraction of these islands for consideration of cultural and social change is that, in Polynesia especially, social systems are perceived to align with one of Service's (1962) 'stages' of evolutionary development– 'chiefdoms' (as discussed in the Introduction). For example, the renowned work of the anthropologist Sahlins (1958) compared different Polynesian cultures on the basis of their degree of social stratification, including levels of ranking and the completing of the ranking system, "but also such variables as the position and function of chiefs in the redistributive network, the role of chiefs in controlling production, chiefly endogamy, *tapu* associated with rank and the degree and elaboration of ceremony surrounding higher ranks" (Campbell 2001:28). In severe summary, Sahlins recognised three stratified groups ranging, Group I societies to the minimally stratified Group III societies. With the organisation of the economy reflected in the structure of the society, Sahlins claimed that it is the production of surpluses that leads to stratification. Although this approach has been criticised for reducing Polynesian cultural complexity to a sole determinant - productivity (and see Campbell 2001:29; Goldman 1970 for additional critiques), his work has been influential on Polynesian studies (Kirch 1984:34), including archaeology.

Island cultures in Oceania bear similarities to North America, in the sense that most island groups have had ethnographies recorded, and have received a great deal of anthropological attention. But a background in the political evolutionary 'stages' of Service (1962) and Fried (1967) reflects a European

influence, along with the consideration and further expansion of political economic theory (e.g. Earle 1987), as well as a major focus on understanding the processes involved in the evolution of complex societies. Thus, models of agricultural intensification were applied (Boserup 1965; Wittfogel 1957), addressing political development within the production and control of subsistence surpluses (e.g. Green 1980; Lepofsky 1994; Spriggs 1981).

While initial studies of the islands aimed to establish culture histories (e.g. Emory 1933), these were interpreted within settlement pattern archaeology. Introduced by Roger Green (Green 1967a; Green 1971 [1963]), settlement pattern studies altered the way Oceanic island cultures were studied, at a time when discontent was voiced against the culture historical approach. Having been a student of Gordon Willey, Green's American based settlement pattern model was initially criticised as being inappropriately applied in the New Zealand case (Green 1971 [1963]:50; 1970), although his study in the 'Opunohu Valley in the Society Islands (Green 1967a; 1967b) is notable because it was the first "study of Polynesia to closely examine the settlement patterns of a small defined study area of this type" along with the impetus placed on comparing different settlement systems in different environmental locations (Campbell 2001:42). The environment played a key part in modelling settlement patterns for Green and others until the 1970s. The idea of landscape, however, continued to represent the land that people inhabited.

It is in settlement pattern archaeology that we see a blend of the various approaches to the study of prehistoric societies, particularly in relation to environmental influence on the patterning of settlements, subsistence, and socio-political concerns, e.g. the study of 'settlement landscapes' and adaptation to varied island ecosystems (Kirch 1985). Most settlement pattern studies in the late 1970s and 1980s had a strong economic component. In New Zealand, for example, there were mixed approaches; some paying more attention to house forms (e.g. Davidson 1984; Prickett 1979; 1987), others to fortified *pā*, addressing

relationships between natural and agricultural resources (e.g. Buist 1964; Prickett 1987) and addressing issues of permanent villages versus temporary camps and subsistence/economic strategies (e.g. Anderson et al. 1996; Cassels 1972). In Irwin's (1985) study of *pā* in Omaha, north of Auckland, the influence of Cambridge is clear with his use of site catchments, central place theory, and site distribution patterns.

The above examples are simply that - examples of numerous studies carried out across the Pacific that incorporate 'landscape' in the form of the environment, the place in which settlements are "dotted" (Kirch 1985:273). The dominant motivation was the analysis of space using economic and evolutionary models in the consideration of island colonisation and socio-political and cultural development. As such, the pattern appears congruent with the era in British and American archaeological history where landscape was not considered analytically useful.

Landscape Archaeology – settlement studies – is there a 'real' distinction?

The dominant form of 'landscape archaeology' in the Pacific integrates settlement systems, agricultural activities, and environmental concerns. For Roger Green and others, however, it appears that such studies do not need to be explicitly couched as 'landscape archaeology': "landscape archaeology for me is the more inclusive term for settlement pattern studies in the Pacific" (Green 2002:128). Campbell (2001:52) points out that Green's understanding and application of 'landscape' was similar to the view of archaeologists in North America, i.e. landscape archaeology as an extension of the processual ecological settlement paradigm. Campbell disagrees, however, and argues that landscape should not be confined to ecological studies; landscape should be seen in a "wider context of settlement studies, not an adjunct to it" (Campbell 2001:52). Despite this general disagreement, there are archaeological studies entitled 'landscape archaeology' that incorporate elements of the British and North

American approaches. Steve Athens for example, (Athens 1993; Athens et al. 1996) adopted a landscape approach in Kosrae, Micronesia, advocating the importance of including 'non-site' data on the environmental context of sites in field investigations, one that Wickler feels provides a "more holistic view of the cultural landscape" (Wickler 2002:65). Other studies have focused on relationships between ceremonial architecture and landforms using a landscape approach, such as Yamaguchi's (2000) study of *marae* on Tongareva, Mangaia and Rarotonga. A project addressing Lapita settlements on Garua Island in Papua New Guinea uses a landscape approach in line with the 'distributional', 'off-site', or 'non-site' approach (e.g. Ebert 1992; Rossignol & Wandsnider 1992) that challenges common conceptions of Lapita settlement and interaction (Torrence & Stevenson 2000).

A recent symposium held in Hawai'i entitled *"Pacific Landscapes: archaeological approaches"* (Ladefoged and Graves 2002) presents a collection of papers aiming to understand prehistoric Pacific landscapes. The papers display many features of settlement archaeology and culture history, and use various archaeological perspectives including evolutionary ecology, cultural evolution, historical ecology and structuralism. As such, a great similarity to North American landscape studies is apparent, and the combination of effects ultimately left a British reviewer rather un-satisfied (see Rainbird's 2003 review). However, the editors (Graves & Ladefoged 2002:6) stress that this volume explores a range of contemporary archaeological research that links landscapes to humans in Pacific islands:

> [w]hile these chapters are varied and reflect a range of approaches to landscape archaeology, they do so, we hope, without losing sight of our shared research interests in understanding how humans have come to distribute themselves (and their artifacts) over time and across expanses of space in relation to each other and the physical environment.

Several chapters address the spatial relationships of people, land, and the nature of interaction across time using architectural analyses (e.g. Cochrane,

Graves et al., Stevenson). Others derive evolutionary and/or historical implications through description of multiple functional relationships between land, groups, locations, geomorphology and resource units (e.g. Field, Anderson and Walter, and Davidson and Leach). A final collection looks at differing social relations through the geographic distribution of non-portable artefacts such as house remains, monuments, and settlements at different times in history (e.g. Sheppard et al., Green, and Wickler). Stephen Wickler's study applies a landscape approach to Palauan prehistory, and I will discuss his study in more detail in the following chapter.

In comparison, post-processual landscape approaches have not really gained ground in the Pacific, although some studies are closely aligned, such as the work of Thomas et al. (2001) which focuses on ritualized landscapes in Nusa Roviana in the Solomon Islands, and Rainbird's (1999) study on the Caroline Islands. While Campbell's (2001) thesis can be classed as 'ethnohistory', it clearly integrates ideas from humanist and post-processual landscape studies in an attempt to draw together common threads in history, settlement pattern and landscapes of Rarotonga in the Cook Islands. An affiliated approach addresses "seascapes', where the sea acts not as a barrier, but in a similar way to land in facilitating the movement of people and ideas (Gosden & Pavlides 1994; also see Rainbird 2004). A final archaeological investigation of note is Anderson's (2003) paper which addresses the issue of 'landscape learning' by colonizers of Polynesia, arguing for a colonizing culture of colonising behaviour founded in an understanding of the broad shape of the oceanic landscape and appropriate responses to its exploration (Anderson 2003).

SUMMARY

Thus far, this chapter has endeavoured to provide a discussion highlighting the intricacies and complex history of the term 'landscape' as it has been used and transformed, particularly in the social sciences. A common thread throughout

the history of landscape has been the visible, physical aspect of nature or environment, in which a recursive relationship appears to have existed for a time between its objectivity and subjectivity. In this manner, landscape only existed in the mid – to late 20th century archaeological and geographical studies as 'background', as the physical environment in which cultural activity takes place, and in many respects this idea of landscape still persists in ecological studies of landscape. A significant factor in the 'ambiguity' of landscape appears to be theoretical perspective, which has led some archaeologists to express disapproval at the way others have applied and defined the term, especially between the positivist (scientific) and interpretive or postmodern approaches where differences in the meaning and application of the term are most palpable. Indeed, the largest disparity and transformation of the term has occurred in the last 20 years, due to the insertion of humanist interests into what constitutes landscape. These go beyond an emphasis on visible and physical 'nature', to social and metaphysical meanings. The fact that 'landscape' as a concept can not be 'compacted' to define a common methodology or theoretical view does not mean that it should be discarded, as some would suggest (e.g. Thomas 1993). Understanding the human past is not simple, nor straightforward, and the many layered meanings of landscape attest to such complexity.

1.6 The landscape perspective in this thesis

Having reviewed the main components and ideas involved in the study of archaeological landscapes, I agree with Olwig (1993:339-40) and Layton and Ucko (1992:2) that it is fruitless to argue over which is the 'correct' approach. One focused on the physical landscape and another viewing landscape as a cultural image, are established uses which have their own merits. The landscape perspective of this thesis, however, incorporates concepts and ideas that address the social and cultural landscape, embracing the view that "landscape encompasses both the conceptual and the physical" (Gosden and

Head 1994:113). As such, it views landscapes as produced recursively through a dynamic interplay between social action and topography (Thomas et al. 2001:547). Hence, social and environmental elements are considered to constitute landscape, and this analysis considers *both* as critically important for understanding human society and culture (see Feinman 1999:685). A focus on the social landscape is pertinent in archaeological investigations, as it emphasises the non-environmentally deterministic. By so doing,

> the concept of the social landscape connects us up with other disciplines, but it also emphasises that prehistoric processes need to be appreciated over much longer time scales than those observed in the present and recent past by anthropologists and geographers (Gosden and Head 1994:113).

Space is considered to be more than a container, or a geometrically measurable stage on which human activity takes place. Space is considered here as a medium for social action, but it is consideration of places within spaces that is of key concern: "turning a space into place is fundamental in constructing landscapes" (Bradley 1997; 1998; 2000; Heyd 2000; Nash & Chippindale 2002; Nash 2001). Places constitute space as centres of human meaning, with knowledge of places stemming from human experiences, feeling and thought. Places in landscapes are frequently seen as having exceptional significance, and continuity of place is suggestive not only of permanence but also as a context for the negotiation of social change (Cooney 2000:78). However, when considering landscapes, it is not merely the places that are of importance, but also the links –physical and social - between them: repetitive movements by people between places create memories, histories that persist through time and space, and it is the identification of such repetitive behaviour in the archaeological record that gives insight into diachronic processes of stability and change in social practice.

One way in which this landscape perspective tackles identification of repetitive behaviour in the archaeological record is through incorporation of Bourdieu's *habitus*, or theory of practice. Habitus can be defined as "systems of durable,

transposable dispositions, structured structures predisposed to function as structuring structures, that is, principles which generate and organise practices and representations" (Bourdieu 1990:53), which essentially enable people to cope with unforeseen and ever changing situations (Bourdieu 1977:72). As a link between past and future, unconsciously transmitted, the principles of habitus are historically contingent, shaped by past circumstances, which are passed between members of a community through sayings and "popular wisdom" (Layton & Ucko 1999:7). Habitus (or dispositions) are embedded in practices, and a significant element of habitus that guides practice are doxic referents – "'unconscious', 'nondiscursive', 'practical', or 'commonsensical' forms of knowledge" (Bourdieu 1977; 1990; Giddens 1979; 1984; cited in Pauketat 2001:80). Habitus and practices are not static; they are open to the potentiality of unpredictable circumstances, and surroundings, along with a blend of participants. Practices, in this larger sense, are always negotiations, to the extent that power, the ability to constrain an outcome, pervades fields of action and representation (Pauketat 2001).

Although Bourdieu's theory takes the emphasis away from individuals, there is a commonality in behaviours between individuals and social groups that forms the habitus, "It is because each agent has the means of acting as a judge of others and of himself that custom has hold of him" (Bourdieu 1977:17, cited in Hodder 1986:75). Thus, a tendency towards a consensus in meaning, and homogeneity of practice occurs through judgements and assessments of the outcomes of what one's self and others in a social group have done (Hodder 1986). A major concern for Bourdieu is to avoid objectivism (social action occurring through mechanical inevitability, where actors are ignorant of processes) and subjectivism (social action produced solely by skilled actors). There is instead a *duality* of structure, as both the outcome and medium of action (Hodder 1986).

Habitus becomes visible in the archaeological record when it is enduring, when practices have created patterns of material residue in the landscape over successive generations. As such the record may demonstrate denotative aspects of past communication (Layton & Ucko 1999:12). Therefore, an aim of this study is the identification of patterns of activity across the landscape, patterns of habitus, in order to understand how people have created space and place through time, and how the transmission of meanings of places within the landscape has endured or transformed, spatially and temporally. This is achieved by taking monumental earthworks as the cultural unit for analysis, to create a spatial and temporal baseline from which to assess aspects of social and cultural change.

Following Pred (1990), landscapes and places are considered in historical context: "Previous activity was not passive background but played an active part in overlaying of new meanings in the landscape" (Cooney 2000:78), or as Feinman (1999:685) declared "when it comes to human environmental relations, history matters, and so does culture". Like habitus, this incorporates consideration of both antecedent and successor landscape activities, which allows changes over time to be investigated and assessed. Landscape is seen as both a medium *for* and an outcome *of* action and previous histories of action; landscape is both created and creating (Tilley 1994; Gosden and Head 1994:114). In this perspective credence is lent to the consideration of human action as both *practical and symbolic*. Activities commonly identified as 'ritual' are essentially practical activities allowing people to deal with and live in the world, through their cosmologies, and cosmological principles that underlie ritual practice also constitute the logic of everyday activities (Bourdieu 1977:96-158; cited in Brück 1999:62). Therefore, analysis of landscape here is not seeking to identify 'abstract belief systems', rather those activities reflective of cosmologies that provide logic for action, practice and everyday existence of prehistoric societies. As such, it includes consideration of the environmental, such as subsistence and

economic strategies, because landscape is also the "relationship constructed between people and the places they inhabit, how they perceive the *physical world* of soil, water, rock, air and make it a lived-place" (Appleton 1986; cited in Cooney 2000).

A framework for interpreting landscapes is found in Hirsch (1995) and Ingold (1993) who posit *landscape as cultural process,* through identification of recursive relationships between foreground actualities of everyday life (see Bourdieu 1977), and background potentialities beyond the everyday (Hirsch 1995:4). Thus, landscape is the relationship between these two poles of experience. This thesis encompasses this view of landscape in order to understand the social and cultural processes involved in living in a landscape encompassing monumental earthworks, physically and conceptually, through time and space.

CHAPTER TWO

Previous archaeological investigations of Palauan earthworks: theories and methods

It is not so easy to determine what a bukl [crown] is ..... Anyway, from these facts, it is my opinion that this bukl is similar to the case of the human figures. That is, they were used by many groups of people, and they ended up having different meanings and purposes for each group (Hijikata 1993:70 discussing the site of Uudes in Ngeremlengui).

Over the last 50 years, there have been several archaeological investigations of the earthworks of Palau. American teams have dominated such research, reflecting the status of Palau as part of the Trust Territory of the Pacific Islands, initiated at the close of WWII, through to 1981 when Palau became a Republic. Certain theoretical perspectives have dominated these projects. Theory, of course, is not always explicit. In many cases a study may appear to be atheoretical, but theory always underlies analysis, whether it is acknowledged or not. As such, interpretation and model-building cannot be detached from a consideration of theory when interpreting the archaeological record.

This chapter, then, addresses the theoretical – and to an extent methodological - perspectives employed by past and present archaeologists in the study of monumental earthworks in Palau. The aim is to illuminate the theoretical, and more broadly the archaeological perspectives employed, in order to make clear the context in which their interpretations and arguments have been put forward.

2.1 Initial terrace[1] investigations – theories and interpretations

In the seminal work The Archaeology of the Palau Islands: An Intensive Survey (1966) Douglas Osborne describes research that took place in 1953-54. This was the beginning of archaeological endeavour in the Palau archipelago (Figure

[1] The term 'terraces' has been applied in most studies to refer to terraces and crowns. I prefer and use the general term 'earthworks.'

2.1)[2]. Osborne[3] aimed to produce an understanding of archaeological remains in the islands, establish "some conception" of the prehistory of the islands, and place this within a broader framework of questions related to the prehistory of the Pacific Islands as a whole, as well as developing a chronology of settlement using the then new technique of radiocarbon dating (Osborne 1966:471). Osborne's survey encompassed site recording and incorporated some small-scale test-pitting. He also undertook the first archaeological investigation of the earthworks. They are concentrated on Babeldaob the main volcanic island, and also found on Koror, Ngerkebesang, and Malakal, small volcanic islands beyond the southern end of Babeldaob (Figure 2.2). He also returned to Palau in 1968 to extend his survey work and carried out further small-scale excavations (Osborne 1979).

Classification

Osborne created a generalized typology of the terraces. He regarded the 'slope terraces' the most common though "least spectacular form", which had no fixed appearance or pattern: "from a few feet high and a few tens of feet in any dimension of tread to far larger" (Osborne 1966:150). The topmost terraces were designated the 'penultimate' and 'ultimate' terraces. Osborne declared their appearance was similar to a 'hat', thus the topmost terrace was called the 'crown' and the one immediately below the 'brim' (after Cheyne 1864)[4]. The brims are described as varying in size, often narrow on the sides of the crown, whilst the crowns are reported to have various shapes, the most common a rough cube with insloping sides. Osborne (1966:150-151) identified further features on some crowns, such as a central depression or pond, and a peak at one end like a small embankment extending across the width of the crown.

[2] Note that he also published a small paper in 1961 on archaeology in Micronesia, in which he speaks of results from his field work in the 1950s. However, his comprehensive 1966 volume is the major publication of his project and is referred to herein.
[3] Osborne was a student of the University of Washington, Seattle.
[4] Cheyne was a trader who lived in Palau in the mid-nineteenth century. His comments on the terraces must have been noticed by Osborne, who refers to his journal briefly in the 1966 volume, although he does not specifically state this is where he obtained the terms 'crown and brim'.

Other types of earthworks include earth walls, and trenches or ditches. Both features are interpreted as defensive with the ditches also called 'foot-catchers' (*chomedoilmach* – "to catch a foot") after local stories which discussed the use of ditches to trap raiding parties during recent times of unrest. Figure 2.3 from Osborne (1966:148) was composed to indicate all the types discussed above, and it is highly idealised.

Theoretical perspective and interpretations

Osborne's interpretations regarding the origins and use of the earthworks are relevant within theoretical perspectives prevalent in the 1950s and 1960s in archaeology. His interpretations reflect a blend of culture history and unilineal evolutionary theory and the terraces are compared to those in other Pacific locations. Osborne also imposed a framework to identify pattern and 'conventional form' which he felt would reflect a planned, sophisticated technology. When the slope terraces were considered within this framework, Osborne (1966:150) professed:

> A lack of planning characterizes the works as a whole.....In any event, Palau terracing never reached the stage seen in the Luzon and Java terraces. It did, however, develop beyond the simple agricultural slope terraces of the Maori. Perhaps the lack of pattern indicates that the socioeconomic needs which the terraces served had not reached an advanced stage of organization, and that terracing in the Palaus may well have terminated before the trait reached a culmination.

In contrast, Osborne states that the crown and brim terraces, as conforming to a widespread pattern, contributed a "spectacular quality" of Mexican pyramids to the Palauan skyline (Osborne 1966:150-151). They are described as *intentional remnants* left over from the terracing operations, indicative of the only planned stage of terrace construction. This is largely based on his theory that hillsides were cut back into terraced blocks, working up the hill, therefore leaving little left once at the top of the original hill. Accordingly, he declares: "One may therefore regard hill terracing that ends in a crown as completed and infer that

such hilltop remnants are monuments to a completed phase of cultural growth on Babeldaob" (Osborne 1966:151).

The placement of terraces within evolutionary stages is also evident in Osborne's functional interpretation of them. As the terraces have been treated on an island-wide scale, his explanations are generalised and reduced to two possibilities: village areas with defensive purposes, or agricultural. The former proved to be least likely, due to a lack of definitive archaeological evidence. Although many pot sherds were found on terraces, they were from the 'Late' period, and recent (Late) use of the terraces for village occupation has been recorded historically. Osborne states that the defensive capabilities are however obvious in the form of the crown and brim terraces, although suitable only for short term or refuge type warfare rather than long-term sieges. His line of enquiry then turns to agriculture. Osborne suggests that the terraces could have been formed to increase the amount of arable land for a particular crop. He invokes population pressure as "pushing the regular facilities, presumably wet taro patches or swamps, to the limit" (Osborne 1966:153). Indeed, he speaks of a near sterile bauxite layer throughout upland Babeldaob, which was not suitable for plant cultivation. Cuts were made into hills, he thought, in order to either remove the bauxite layer or locate more fertile soils, at which point they could have been "efficiently" enlarged into terraces (Osborne 1966:154).

In regard to crops, Osborne contradicts his previous statements, suggesting instead that a late diffusion of wetland taro came into Palau replacing the (supposed) dry land taro crops. Despite uncertainty over which crops were actually or potentially grown, Osborne (1966:155) concludes: "My belief is that the terraces were primarily agricultural but that the crown and brim had military utility and perhaps were associated with a strong local aristocracy". In his 1979 publication, Osborne's ideas are couched further within concerns for the evolution of complex societies, explaining the terraces as "both private (tillage) and public (the crown)," socially and publicly controlled (Osborne

1979:269). In addressing the 'abandonment' of the terraces, an economic aspect is considered as Osborne surmises that a point of 'diminishing returns' would have been met when the terrace soil was exhausted, resulting in the terraces lying fallow and potentially never being used again.

Chronology

Osborne's survey-based project did not yield relevant radiocarbon samples. Therefore, his 1966 chronology is hypothetical and based on relative dating methods. He divides settlement into seven periods (Table 2.1). Terrace construction begins in the Lower Early period, with the 'impetus' for earth-working on a large scale argued to be the result of outside influences; he favours the Philippines.[5] Indeed he claims that the whole "development" of the sequence is dependant upon contact and influence from outside locations (Osborne 1961:160), reflecting a normative view of culture, where change occurs only through diffusion or migration. Terrace building is claimed to have continued until the "period of strife, disease or cultural fatigue or decay" – the Lower Late period, c. 1400 – c. 1600 AD (Osborne 1966:461). Several radiocarbon dates stemmed from his 1968 survey (Table 2.2). A recent chronological review for Palau concluded, however, that only one of his dates for terrace construction was reliable, 1170 (960) 790 cal. 2 sigma BP (1762G) (Phear et al. 2003:239, Table 2/2).

An Archaeological Investigation of Prehistoric Palauan Terraces

Laurie Jo Lucking, of the University of Minnesota, carried out field research in Palau for her PhD dissertation in the early 1980's. This involved pedestrian reconnaissance survey and some small-scale excavation of terraced areas in six out of the ten states on Babeldaob (Figure 2.4). The goal of the project was to

[5] Osborne argues for support for this argument through other evidence for Philippine contact, such as drifts and intentional voyages from the Philippines to Palau, the similarities of stone adzes, Palauan money beads, etc.(Osborne 1966:464-465).

"locate, describe and try to ascertain the use of these terraces" (Lucking 1984:1). She makes clear her dissatisfaction with Osborne's research (Lucking 1984:9):

> Because of Osborne's vague and possibly erroneous descriptions of soil stratigraphy, his lack of detailed mapping, and my uncertainties about his pottery sampling and identification, it was felt that this survey was essentially a new beginning in the study of the terraces.

Her approach illustrates one within New Archaeology and emergent Processual approach in America at this time. Her research proceeded using a hypothetico-deductive-nomological model (HDN) (Johnson 1999:39) where specific hypotheses are tested and generalised explanations produced. Following on from Osborne (1966;1979), a small-scale investigation by Cordy (1979) and a previous small-scale survey (Lucking 1980), she developed three hypotheses: 1) the terraces were built for agriculture and gardening surfaces should be present; 2) construction and abandonment of the terraces was related to their agricultural use, and 3) living surfaces might be present on the terraces but the distribution of house platforms and pottery *in situ* would not show extensive occupation in a nucleated pattern (Lucking 1984:4).

Methodology

Lucking used several new methods as well as survey and small-scale test-pitting to test the hypotheses. These included examination of aerial photographs to help locate sites, and consultation of oral histories and early ethnographic observations.[6] Stratigraphy was examined during test-pitting and through description of recent road cuts (when present) to address questions of construction. In addition, Lucking made detailed records of vegetation and

[6] Augustin Krämer, a German ethnographer famous for his work on the *Ergebnisse der Südsee-Expedition 1908-1910* (1917), is most commonly referred to. His ethnographic descriptions provide discussion of some terraces and associated features he encountered during his time on Babeldaob. Lucking also uses Cheyne's (1864) brief descriptions. She also makes the point that other early ethnographies did not identify the terraces as man-made. Similarly, when questioned, the Palauan people referred to the terraces as having been formed during the great flood in the Origin Story of Milad, not as human creations. Cheyne (1864) described the terraces as being made by another 'race', probably Chinese.

collected soil samples for scientific testing at the University of Minnesota Soil Science Department.

Classification

Hypothesis formulation was a key component of the New Archaeology, incorporated to clearly express the problem to be tested, or establish the *problem orientation* (see Johnson 1999 for further discussion). Another important measure was the creation of typologies. Lucking developed what she regarded as a 'more accurate' typology of the terraces to Osborne, dividing them into four categories. The crown and brim classification was separated, the crown retaining its name as the ultimate terrace. Brims became Type 1 terraces. 'Slope terraces' were divided into Type 2 step-like and Type 3 short, shallow, backsloping terraces. Other earthworks and 'foot-catchers' were considered part of a terrace 'system' and were "always noted" but not categorised (Lucking 1984:36).

Theoretical orientation and interpretations

A highly functional approach to the terraces, viewing them as part of "terrace systems" led Lucking to form generalised explanations for the use of the terraces in Palau. Lucking concedes that she did not find any direct evidence to confirm agricultural use, and uncovered little support in botanical surveys and Palauan land-use terminology. However, one terrace site yielded potential indirect evidence. A buried A1b/concretion/mottled soil horizon-combination was interpreted as an agricultural soil[7]. The backsloping nature of Type 3 terraces and the brimmed Type 1 terraces were also considered to be 'ideally suited' to agriculture, and comment on the water-holding capabilities of depressions in crowns implied their use for agriculture. Yet there is circularity

[7] Lucking acknowledges a variant interpretation which highlights its potential as an *in situ* soil formation, but elects to follow the conclusion of soil scientists in Palau who identified it as an A1b soil horizon (Lucking 1984:131).

in this argument, illustrated by her use of current day observations of potential agricultural elements to support the implied function.

This line is pursued through Lucking's self-acknowledged 'speculative' proposition that the terraces were formed to grow dry-land *Colocasia* taro species, while the wetlands supported *Cyrtosperma* taro crops. Lucking concurs with Osborne that the terraces did not function as villages or areas of long-term occupation (Lucking 1984:162).

A defensive role for the terraces is also maintained, with foot-catchers (ditches) present at most sites she surveyed. Lucking does question the defensive function, as she suggests that not all ditches were impeding – some actually facilitated access to the crown. An alternative explanation is offered in their potential use as storm drains (also see Lucking & Parmentier 1990). All told, Lucking agrees that the crowns and brims were defensive, used for temporary refuge rather than long-term occupation (Lucking 1984:164).

Processes leading to terrace construction are argued to be either intensification of warfare, intensification of agriculture, or a mix of both. Lucking proposes a theory of migration, proposing movement of people from the rock islands to the high islands as the cause of intensified warfare.[8] When considering agriculture, she advocates population pressure as the "single greatest factor leading to an intensification of production methods" (Lucking 1984:167, citing Bronson 1977:34). She suggests that ancient Palauans may have chosen terracing as a more "ecologically sound" method of cultivation compared to swamp agriculture, although this proposition is speculative. In addressing the 'abandonment' of the terraces, her argument focuses on the degradation of terrace soils for agriculture, and invokes the same processes for terrace construction: "changes in the political structure, warfare or large scale migration". Alternatively, she suggests that the terraces became used less

[8] This interpretation is largely based on oral histories which speak of migrations from the rock islands *eou el daob* (the lower sea) to *bab el daob* (the upper sea) (Lucking 1984:23-24).

intensively when the coastal swamplands were developed (which now occurred *after* the terraces, *not before* as she suggested previously), because the "higher yields of taro and less labour-intensive management may have proved a greater attraction" (Lucking 1984:169). Lucking concludes that the terraces were used for agricultural and defensive purposes, although any temporal relationships between the two suggested functions could not be discerned. Like Osborne, she is uncertain about which crops might have been grown.

Chronology

Lucking did not obtain many reliable charcoal samples for dating to establish a firm chronology for terrace construction. In the revised chronology of Phear et al. (2003) only one of her dates was considered reliable: 1290 (1060,1030,1020) 790 cal 2 sigma BP (I-11, 956).

Archaeological Investigations: the Southern Illinois University at Carbondale (SIU)

A number of books on Pacific settlement have included references to the Palauan terrace investigations (e.g. Bellwood 1979; Kirch 2000; Morgan 1988; Rainbird 2004), but Bruce Masse, David Snyder and George Gumerman of SIU were the first to address the prehistory of Palau directly within a Settlement Systems (Johnson 1999) approach. They produced a synthesis of both historic and pre-historic settlement patterns in Palau (Masse et al. 1984). Their investigations drew on the earlier work of Osborne (1966, 1979) Cordy (1979), and Lucking (1981), and also on rock islands research by Japanese investigators (Takayama 1979; Takayama et al. 1980; Takayama & Takasugi 1978). These studies were considered together with results from their own research in 1979 (Gumerman et al. 1981; Masse & Snyder 1982) and a 1981 field season which focused on village remains in both the volcanic and rock islands. Initially, their 'settlement systems model' (after Flannery 1976), incorporated two levels: village settlement and regional settlement system. This was based on "what

appears to have been the settlement system operative in Palau from at least 1783 to the period of Japanese administration", characterised by a "number of regional centres of power, sometimes called "chiefdoms" (after Service 1962; 1975), (Gumerman et al. 1981:17-18). This was later modified to include the 'household' which is discussed in detail by Snyder et al. (1983). The earthworks are discussed predominantly within the unit 'regional settlement system'.

The Terraces and the Settlement history of Palau

Masse et al. (1984) formed a Three Phase settlement chronology for Palau. As archaeological evidence for early settlement at this time was minimal, they attributed colonisation to some time before A.D. 700. They then suggested a tentative settlement scenario beginning with terrace construction A.D. 800-1000 in the volcanic islands, and settlement in the rock islands circa A.D. 1200-1600 (including temporary habitation at Uchularois Cave circa A.D. 850-900), and Traditional villages circa A.D. 1600-1900 (also see Masse 1989; 1990) (Table 2.1).

Discussion of terrace construction referred to Osborne and Lucking's studies, reaffirming their conclusions of agricultural and defensive use. Masse et al. (1984) make the point, however, that these earlier analyses have treated the defensive and agricultural aspects of the terraces as contemporaneous within an integrated system. They note that this may not have been the case; "the defensive features may actually be a late development associated only with the terminal period of agricultural usage" (Masse et al. 1984:120). Villages associated with this terrace period had not been located. It was assumed that such villages must have been situated away from the terraces in unknown positions. There was only one such potential site noted by Osborne in 1966, Badrulchau in Northern Babeldaob, but it did not possess features to classify it as a village with any confidence.

Masse et al. (1984) discuss terraces primarily within the regional settlement system. This model was based on the socio-political situation observed at contact. As such it illustrates the use of the *direct historical approach,* an important element of traditional archaeology in North America where "one started delineating groups of Native Americans in the present and then tried to trace their cultural antecedents to effectively prehistoric groups" (Johnson 1999:61). Masse et al. (1984) regard the terrace period as a time of agricultural intensification. If the terraces were in use contemporaneously, then terrace construction may have been a response to population growth outstripping the productivity of wetland pond-fields. Perhaps social pressures were also responsible (Masse et al. 1984:122).

Other archaeological remains in possible association such as stone pillars and stone faces were argued to indicate *advanced* social complexity, with the defensive terrace components testimony to a regional system "imbued with competition and political strife" (Masse et al. 1984:122; also see Snyder & Butler 1990). This illustrates a new consideration of elements that distinguish chiefdoms – competition, warfare, high social complexity (e.g. Carneiro 1981; for earlier foundations see Service 1962). Also reflected in this discussion were middle range assumptions which connect static 'defensive' terrace components (ditches, steep scarps) to the dynamics of prehistoric Palauan society – competition and elite transformation. When one considers the use of a regional scale settlement system approach, and the paucity of archaeological evidence, the SIU team could only form generalised conclusions. As such, their explanatory method is consistent with the New and Processual archaeologies of the 1970s and 1980s.

2.2 Recent Investigations: Cultural Resource Management (CRM) projects and subsequent research projects

Palauan archaeology has been dominated by CRM investigations in the last 10 or so years.[9] There have been some smaller projects related to the terraces and earthworks (e.g. Pantaleo 2000; 2002; Titchenal et al. 1998), but the most comprehensive research has been carried out by International Archaeological Research Institute, Inc. (IARII). A wealth of new data on terraces and Palauan prehistory in general has been produced by them, including new interpretations of settlement history. IARII's main undertaking was (and remains) the Compact Road Project, which concerns a 95 km United States Corps of Engineers-designed road circling Babeldaob. IARII was enlisted to monitor and survey the project (including data recovery) with field investigations initiated in 1996.[10] The new road passes through various different environmental zones (see Figure 2.5), and a diverse range of site types, including historic sites, have been identified. Moreover, four Babeldoab States with high concentrations of earthworks are impacted by the road; Melekeok, Ngiwal, Ngaraard and Ngatpang. The latter two possess the most extensive terrace complexes[11]. As the road demarcated specific boundaries for archaeological investigation (i.e. within the road corridor), this has affected levels of interpretation for some sites. Overall though, IARII research has provided important revisions on terrace function, use and chronology.

Research objectives and methodologies for the terraces

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[9]The Division of Cultural Affairs (DCA) Republic of Palau, have also carried out a number of archaeological surveys and projects to obtain oral histories in Palau since the mid-1980s. The reports have recently been updated, and recorded with the aid of a Geographical Information System (GIS) and ACCESS database. This includes maps specifically of traditional villages and their related features, which in some cases has included sites with earthworks. Although the surveys do not provide detailed discussion or analysis of the earthworks, they do illustrate the type of methodological tools and outside influences utilised.

[10] Other small projects which have also looked at terraces include Liston et al. (1998) and Olmo (1998).

[11] The phrase 'terrace complex' is used throughout this thesis to mean a group of earthworks that include a crown/s, and terraces. It does not imply temporal consistency with all earthwork features, nor a homogenous 'function' between different earthwork features.

Reports containing data and syntheses of the Compact Road project have been produced by IARII in two Phases. Phase I intensive survey identified a number of new sites in forested locations to add to those in savanna areas. Excavation methods employed were mechanical trenching, controlled test units, sampling of exposed deposits and small test-pitting. The general interpretation from the Phase I survey "appears to support the proposed shift from agricultural to defensive to residential use of the terraces over time, although when and how this happened is still unclear" (Liston 1999a:24).

It is the detailed synthesis in the Phase II report on which I will focus here (Liston 1999a; see Wickler et al. 1998 for the Phase I report). Four major research objectives were formulated. These were: 1) to establish the range of morphological variation between terraces and investigate potential functional correlates; 2) to refine the chronology for terrace construction and abandonment on Babeldaob; 3) to examine evidence for a shift over time from agricultural to defensive and residential use of the terraces; and 4) to determine the temporal and spatial relationship between habitation evidence from terraces and traditional village sites. Phase II analyses aimed to provide answers on chronology and "mechanisms that precipitated settlement pattern transformations" (Liston 1999a:226). Other methods include oral historical research, and the use of past ethnographic studies.

Classification

IARII (Liston 1999a:331-332) group the earthworks together as "modified terrain" which is split into two main groups: 'modified hilltops' comprising crowns, crown and ditch, and large modified hilltops[12], and 'modified ridges and slopes' defined by ridge-cuts or ditches, earthen walls, earthen knolls, and terraces. Lucking's (1984) typology is not utilised. Instead IARII suggest two

[12] Note here that modified hilltops are generally considered those with encircling ditches but not crowns. Such sites were not recorded in the Compact Road corridor, but during the Capital Relocation Project (see Liston et al. 1998; Pantaleo 2000).

basic forms for the terraces: wide with low steps and deep terraces with low steps (Liston 1999a:354).

Theoretical perspective and interpretations

In line with a common critique by New and Processual archaeologists, Liston (1999:336) makes clear that the purpose is to provide more than "just another descriptive cultural history" for Palau. She states that "models need to be proposed for the *evolution of the complex sociopolitical system* recorded at contact.....Palau's rich and complex culture history has undergone a *lengthy developmental process*" (Liston 1999a:336, emphasis added). Thus, a cultural sequence highlighting general processes is presented for Palau within a settlement systems approach, based on results and interpretations from data recovery and palaeoenvironmental research. Individual sites are discussed by IARII separately in reports. My purpose here is to draw attention to the generalised interpretations and models, in order to highlight dominant themes within the cultural sequence as a whole.

Modified hilltops

The earthworks are analysed from a functional perspective based in part on their structural forms. As such, crowns and terraces are addressed separately. Based on a collection of dates from crowns and cultural deposits indicating cultural activity on crowns, IARII (Liston 1999a:349) conclude crowns were constructed early during landscape modification, and were not later additions (contra Osborne 1966; Masse et al. 1984). Functionally:

> defense was the primary function of crowns, based on their topographic positioning and the nature of encircling ditches, which are generally deep (much deeper than needed for drainage) and strategically positioned to impede access to the top of the crown. There are also ditches cut perpendicular to the ridgeline leading to a crown (Liston 1999a:352).

These views echo propositions made by earlier researchers, where crowns were thought to have been used as sentry posts or lookout positions or as places of refuge during times of unrest (e.g. Osborne 1966; Lucking 1984).

In a more recent paper, Liston and Tuggle (2001:8) propose a settlement system of "small fortified polities" based on Compact Road Data Recovery (CRDR) results, yet they themselves admit that evidence for villages in the terrace era is *very limited*[13]; thus their model has been proposed as a "best fit" for existing data (Liston & Tuggle 2001:8, footnote 19).[14] With the defensive argument in mind, they suggest that:

> Although they could have done so, Palauan societies never became hilltop chiefdoms *sensu stricto* (Earle 1997), but they became something equivalent, where the ridges and hilltops were used as a defensive perimeter for each cluster of agricultural terraces, dispersed non-terraced dryland fields, villages and associated sites (Liston & Tuggle 2001:8; emphasis in original).

They acknowledge significant problems in both archaeological evidence and chronological control in several footnotes. As such, it is hard to assess whether their model is a 'best fit.' In addition, the model is highly conjectural in places. For instance, Liston and Tuggle (2001:8) speculate: "This defensive system was related to dispersed resources and relatively scattered habitation complexes, but was feasible because the polities were relatively small." Evidence of occupation that could be interpreted as representing 'polities' is so limited that it is not clear how justification of a 'feasible' defence system can be made. Another relevant point here comes from Kirch (2000:190) who states that the construction of the earthworks may *not* have been carried out by a centralized form of organisation, but by local groups incrementally over time; this argument is not addressed by IARII, although it is indirectly refuted.

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[13] Welch (2001) indicates that IARII have found ridgeline structures that appear to predate terrace construction, and it is these that are argued to be 'villages' by Liston and Tuggle (2001). However, the published data is sketchy with few provenance and other such details, thus there are interpretive constraints at this stage.

[14] Liston and Tuggle do apply their model on a smaller scale, in Ngaraard. As this is the area in which my study is focused I will discuss it in detail in Chapter Nine.

Three sites with ring-ditches were also uncovered by IARII and, as discussed by Welch (2001)[15] are argued to be fortified hilltops. This view is based predominantly on the 'encircling' ditch and the geography of the sites. Only two of the three sites also have a crown, and Welch makes clear that there is still debate as to whether the sites pre-date or are part of the initial phase of terrace construction (Welch 2001:181; see also Wickler 2002 in the next section). In any case, they are still argued to be defences, along with crowns and ditches.

Terraces

Terraces are argued to have had multiple functions: agriculture, habitation, ritual and burial[16], and also symbolic functions: "by indicating the social status of high chiefs and legitimizing chiefly property claims" (Liston 1999a:353). The radiocarbon determinations from the project are said to indicate possible terrace use from the latter half of the first millennium BC, and that terraces were *continuously utilised* up to the AD 1200s (Liston 1999a:353; Table 2.1).

As stated previously, the terraces are classified into two basic forms. The wide low stepped terraces are split further - one group is characterised by stonework villages (later habitation), and another by location on the slopes of squat hills. The deep high stepped terraces are found in isolation, although more commonly within vast and elaborate terrace complexes (Liston 1999a:355).

Construction of each of the complexes is proposed by IARII to have occurred as a single event - in one massive effort - rather than over hundreds of years. This interpretation is based upon the sediment profiles and evidence in palaeoenvironmental cores (see Athens and Ward 1999). Taking the evidence for stonework village settlement further, IARII also assert that defensive terraces and crowns were linked with village settlement; the villages

[15] David Welch was the Principal Investigator for IARII on the Compact Road Project.
[16] Prehistoric burials were located during trenching in Ngaraard in the Rois Terrace complex (B:NA-4:6). It is posited there were 5 burials, some with grave goods such as pottery, in the top terraces of the complex. Also a crown and terrace site, Roisingang, also had what appeared to be burial remains. As these sites are within the study area of my landscape project they are discussed in detail in Chapter Four.

intentionally located to exploit those terraces and crowns "located in strategic positions," protecting them from inland invasions (Liston 1999a:353).

Consideration at a regional scale

Although IARII argue for "multi-functional" purposes for the terraces over time, they treat this as a problem, seeing the earthworks as a "riddle" to be solved (Liston 1999a:361). They believe the answer can be found by placing the earthworks "into a larger interpretive framework emphasizing regional settlement models" (Tuggle & Liston 1998). Those terraces displaying evidence of non-agricultural use are said to indicate "community settlement" (Liston 1999a:361), although the theoretical and methodological parameters of such settlement are not clear. What is reinforced is the sociopolitical contention which places great emphasis on the terraces as *territorial boundary markers* in a "social system with intensive conflict," with boundary definition a "critical element in the competitive process" (Liston 1999a:366). This argument focused on conflict, power and control is expounded: "The scale and volume of construction in a given polity might then symbolize the state of its highest chief and his ability to *command* the *labor* of his clan and his neighbours" (Liston 1999a:366, emphasis added). In this viewpoint, different subsystems within chiefdoms are linked by function: territorial markers linked to competition, size and scale of the earthworks linked to scales of chiefly power. A statement by Liston (1999a:369) reflects the functional role of earthworks as working for the regional settlement system: "the long duration of terrace use (ca. 1,500 [yrs]) suggests the strong possibility of *functional roles evolving* to suit the needs of changing communities over time" (emphasis added).

Chronology

Table 2.1 presents the chronology constructed by IARII (Liston 1999a) for Palauan prehistory. Of note is that terrace construction is said to begin quite early in Phase III, ca. 400 B.C., with construction extending through to Period V

Phase A, although Liston and Tuggle (1998) do state that the first *reliable* archaeological evidence is actually ca. 200 A.D. (also see Phear et al. 2003; Wickler 2002b). In any case, earthwork construction and use has been more securely dated by the efforts of IARII.

Examination of IARII results using a 'Landscape perspective'

In a paper echoing many of the conclusions discussed above, Stephen Wickler places terrace archaeology into a "cultural landscape study" (Wickler 2002). This is focused on exploring the "development and transformation of earthworks and villages both as individual elements of the cultural landscape and in relation to one another" (Wickler 2002:66). Wickler aligns his landscape approach to the earlier work of Butzer (1982b) as well as Ladefoged and Graves (2002), concentrating on the "interrelation between people and the land on which they build and undertake their activities and the role that environmental and social factors played in the use of that landscape" (Wickler 2002:65). As such, Wickler's paper expresses consideration of "both environmental and social aspects of long-term transformations of the cultural landscape." However, the underlying theme is one of modelling 'landscape use' - essentially land-use – which regards landscape as an 'arena' or 'stage' where social and economic activities take place.

Methodology

Wickler synthesises IARII results regarding early land(scape)-use; from potential early settlement sites, to the three hilltop fortifications discussed previously, to early terrace construction and use (including the terrace burials and Welch's limited ridgeline site information). He also uses the palaeoenvironmental research of Athens and Ward (1999; 2001) in dealing with early land use, and patterns in "surge and decline" savanna indicators when addressing aspects of terrace construction (Wickler 2002:69). The most informative methodological aspect of Wickler's paper relates to his use of a

local-scale 'case study.' This addresses the transformation of the terraces and terrace complexes into stonework village systems in Ngatpang State, utilising results from IARII investigations on the Compact Road Project.

Theoretical orientation and interpretations

Wickler's approach is one which, like those of Masse et al. (1984), Liston (1999a) and Liston and Tuggle (2001), uses a settlement systems approach with political-economic concerns. This assesses the earthworks within a conceptual framework of socio-political development in complex societies, specifically in chiefdoms. Wickler focuses on the visual aspect of earthworks, placing importance on their role as "social constructs in the cultural landscape," and like Liston (1999a) describes them as "tangible expressions of chiefly power" (Wickler 2002:82). Wickler also makes an assessment based on 13 radiocarbon determinations for terrace *expansion* around AD 600, "when terrace complexes attained their maximum size and complexity," although Wickler does not present evidence to support this assertion. He suggests that this was a time of conflict characterised by the struggle for sociopolitical hegemony and power between competing polities (Wickler 2002:82). Wickler's interpretations seem to be based on an assumption that the terrace complexes functioned as integrated systems once they were built, and as such he has defined them as 'polities', although their boundaries are not specified. He goes further and suggests that the period of terrace expansion was one of "display oriented construction", and "public works" which were likely constructed over a relatively short period of time (Wickler 2002:82). He argues that such terrace expansion would have required a "large, well organised labor force" (Wickler 2002:82), which suggests that reasonably large villages must also have existed. However, archaeological evidence for such villages remains elusive in Palau.

In relation to the 'abandonment' issue, the case study in Ngatpang is of particular interest. Wickler illustrates the 'transformation' of terrace complexes

into systems of traditional stonework villages. In Ngatpang, three village sites – Ngimis, Ngerumlol, and Ngeredubech – are situated on terraces that are part of a large complex or terrace system. Although the original functions of the terraces are not clear, "there appears to have been a shift to more intensive habitation use within the village site boundaries by the early second millennium AD leading to the development of stonework villages" (Wickler 2002:87), an interpretation reminiscent of the earlier work of Liston (1999a). He proposes that a decline in terrace construction (citing palaeoenvironmental evidence) and more restricted use of terrace complexes at this time is indicative of a widespread trend across Babeldaob. He suggests that the focus moved away from political display with a shift in the means of expressing power and status – moving to "village organisation and stone architecture" (Wickler 2002:83).

Wickler (2002:89) proposes that the situation in Ngatpang attests to "complex and multifaceted" relationships between terraces and later stonework villages. As the overall interpretations concerning earthworks based on IARII investigations point to sociopolitical mechanisms and processes, it is interesting to see that the idea of terrace 'abandonment' has been reconfigured, with a new concern for the integration of the earthworks within later settlement systems. As Wickler's study reflects, there is a new-found awareness of earthworks within a 'cultural landscape'.

2.3 Landscape and Colonisation

One other study has looked at the earthworks of Babeldaob. Through investigation of Lapita versus non-Lapita origins for colonising settlers of the Caroline Islands, Rainbird (1999) argues that by looking at patterns of landscape use it is possible to obtain a general idea of the direction of colonisation. Settlement of Remote Oceanic Islands is suggested to have been characterised by a 'transported landscape' (Kirch 1984) of domesticated

animals, cultigens, and knowledge of their re/production. Rainbird (1999:455) makes further comment on first settlers:

> their aim was to alter the very nature of the landscape by manipulating the vegetation so as to cause erosion and thereby lay the foundations for the farming systems in a landscape transported as much by mind as by seacraft.

In his study of the Caroline Islands, Rainbird looks for patterns in land use and land alteration by colonising settlements as a way of assessing potential directionality of settlement, particularly addressing Lapita versus non-Lapita origins. He looks at archaeological evidence for settlement and subsistence patterns, using Osborne (1966) and Lucking (1984; and Parmentier 1990) for Palauan prehistory.

He claims the Palauan 'sculptured landscape' reflects an approach to landscape management focused on remodelling inland soils, worked *in situ*. For the Eastern Caroline Islands, a different approach is evident, one that he terms more "dynamic" but also "high risk", in which moving soil from the hillsides to the coast created coastal lowlands for subsistence crops and habitation (Rainbird 1999:457).

Archaeological evidence in the form of stilt-houses in the early east Carolinian sites, as well as site location, is argued by Rainbird to supply additional evidence of similarities with Near Oceanic sites. Thus, when the evidence of landscape modification and settlement pattern are considered together, a pattern of 'human interaction with the environment' is purported to be "similar to that which initially occurred in the expansion from Near to Remote Oceania to the South and South east of the Carolines" (Rainbird 1999:457). It is particularly similar to sites bearing Lapita pottery.

An important theoretical element incorporated by Rainbird is Bourdieu's (1977) *habitus*. Rainbird contends that the differences observed in landscape use also reveal differences in habitus, that "communal historical consciousness

inculcated within the individual and revealed in practice, between the earliest settlers of Belau in the West and those of Chuuk, Pohnpei and Kosrae to the east" (Rainbird 1999:457). Ultimately then, Rainbird claims Lapita ancestry for the East Carolinian settlements, but the Palauans, "given their approach to landscape, originate elsewhere" (Rainbird 1999:458).

Since Rainbird published this paper, however, it is apparent that settlement occurred in Palau at least 1000 years prior to earthwork construction (see Phear et al. 2003). That indicates a significantly large gap between application of the proposed land-use strategies and habitus 'derived from their ancestors'. In addition, the focus on agricultural explanations for terrace construction has also been challenged, with the mode of subsistence still not entirely clear for Palau prior to the formation of taro pond-fields characteristic of traditional village subsistence. Thus the question here concerns the longevity of practices, and therefore habitus, once practicing 'agents' have translocated to a different island environment. In Palau landscape transformation in the form of earthworks occurred long after initial settlement, so can this be related to the habitus of the actors' original homeland, or could we expect it to have changed after 1000 years of living and undertaking daily activities and practices in a different place? If we return to Bourdieu's theory of practice, we see that habitus guides practices, and practices are in a sense always negotiations (Bourdieu 1977). Therefore, the form of landscape transformation in Palau is likely the result of negotiated practices over time, and therefore may be different to that of the original founders of the island settlements. The implication here is that looking for direct correlations with other island societies, when considering the origins of colonisers, is most likely to be unsuccessful when considering elements of landscape transformation that have been made long after initial colonisation of an island or island group.

2.4 Discussion

The previous studies have adopted a number of theoretical perspectives and methodological techniques with mixed methodologies, including field programs, ethnographies, oral histories, palaeoenvironmental research and aerial photography, reflecting a comprehensive approach in trying to understand the past at various scales. When considered together, the use of a settlement systems approach and an interest in political economies and evolutionary theory, have steered interpretation away form direct environmental interpretations to consider some aspects of the social and political realms of prehistoric complex societies. In the recent investigations questions of earthwork function still remain at the fore, although there has been a desire to situate terrace functions within the development of complex chiefdoms, particularly in IARII investigations.

However, there are certain limitations in studying the earthworks using the above approaches. The earthworks are essentially considered as a sub-system within the settlement system as a whole. As such, their specific function within the system is seen to have come about through adaptive processes. In the earlier investigations, great emphasis was placed on the earthworks as illustrating intensification of the subsistence system. However, in this sort of explanation change can only derive from outside the system, from independent variables. In this case it is population pressure or migration. Therefore, functionally, the earthworks are seen to work for the system by providing the adaptation needed for that society to continue to exist. Thus this view ignores historical context as playing any role in social and cultural change, and essentially denies any impetus for change occurring within a culture, i.e. change from within social groups. People are thus seen as 'ciphers', where their behaviour is controlled by adaptive processes over which they have no control.

A related point is the use of political economic theory to explain the earthworks. The use of a Direct Historical Approach (i.e. analogy) can be useful in studying prehistory. Yet, it also structures the type of evidence to be investigated. The evidence gathered must be that which is related to the development of the complex chiefdoms observed at contact and which can be explained through adaptive processes e.g. competition, social stratification, religion, warfare. The earthworks are thus fitted into a developing system by explanation largely derived from their form. For example, the earthworks are seen as defensive because some have ditches, are located on highpoints in the landscape, and have excellent visual coverage. Thus, they are interpreted as fortifications. For fortifications to be present in a society, it is then conjectured that there was high social stratification, competition over resources, territorial disputes, and thus active chiefdoms. This is then expanded further, with the proposition of 'fortified polities' protecting resources (economics), and being positioned to protect territories. While these assertions are not unreasonable, they are in large part conjectural (due to a lack of archaeological evidence), but are argued to be plausible because in evolutionary terms they illustrate how the complex chiefdom observed at contact developed, i.e. the 'developmental process' (Liston 1999a).

This brings us to the issue of scale. The interest in forming generalised explanations has led to explanations of the earthworks within a regional settlement system. This is not an unusual approach when studying Pacific islands, because islands have limited terrestrial space for people to inhabit, and whole islands are sometimes seen as one big archaeological site (Graves and Ladefoged 2002). However, one limitation here is that the earthworks are seen within the 'organic whole' – they are viewed within a framework of island wide cultural uniformity, which implicitly implies the earthworks were built in different parts of the landscape for the same reasons, for the same purposes, and were used in the same way. Although it is clear that a high level of

variation exists across the island, this approach denies any consideration of variation beyond the descriptive. Thus, explanations do state that some terraces were used for burial, some for defence, and some for agriculture. Yet, there is no exploration of questions about why this variation exists and what it tells us about the construction and reproduction of the earthworks. It does not consider the cultural and social processes involved in the transmission of ideas on how and what the earthworks represented to the people that built them. Evidence of cultural 'non-conformity' seems to have been considered as 'noise' when establishing generalised explanations about the earthworks of Babeldoab.

Another issue of scale concerns the assumption that the earthworks were built as 'complexes,' and that the central aim was to transform the land to build clear indicators of territories and symbols of chiefly power. The criticism here is that there is a clear preference for the importance of form over process. The dominant view is that the end result, the visible, physical form of the earthwork, was the sole reason why the earthworks were built. In an agricultural explanation this of course fits the bill, as the terraces were of the form to grow taro crops, and in the case of fortifications, the geographical elements are seen to reinforce the use of a ditch for defence; thus the earthworks were built to be forts. The inherent view is that the earthworks were legitimating structures within chiefdoms: legitimating power, prestige, and territory. However, this "systemic bias in Western thought" (Ingold 1993:160) leads to the denial of any role that the actual *processes* of building the earthworks may have played. The earthworks were not built overnight; their construction involved a great deal of time and the action of groups of people, throughout the island; yet the possibility that it was *the coming together* of people in smaller settlements to build that was important is completely discounted. This is again related to the absence of consideration for historical process and contingency, and the treatment of earthworks within an adaptive system.

Additionally, the earthworks are viewed as representing a phase of cultural development that had a clear beginning and end, in contrast to the view of the ethnographer, Hijikata (1993:70):

> ..it is my opinion that this bukl is similar to the case of the human figures. That is, they were used by many groups of people, and they ended up having different meanings and purposes for each group (discussing the site of Uudes in Ngeremlengui).

The earthworks have been considered to have been 'abandoned' by many researchers, their function ceasing at a particular time. Explanations have focused on the intensification argument, with the claim that the soils became infertile, and that when the substrate for pond-field taro production was formed, the terraces were abandoned. Others have maintained that socio-political changes were responsible, by arguing for a change that preferred monumental architecture in the form of stonework villages. Some recent investigations are now expanding their interpretive frameworks through consideration of the earthworks as playing an active role in the traditional village settlement system. This shows some interest in historical processes, and movement beyond the concept of 'abandonment'. However, the interpretations are still couched within political economic theory. The earthworks are treated as homogenous entities, having the same general purpose in the regional settlement system. There is an absence of consideration of issues concerning changing social structures and the structuring principles that must have been in place in order for such a transformation to have occurred.

One of the main differences in the theoretical perspective adopted in this thesis, then, is that it is not focused on elucidating terrace function or use within a settlement systems approach. While this popular mode of research has dominated studies of the earthworks in the past, and has led to some useful expositions related to function of chiefdoms – both practically, and as part of a complex settlement system – there has been a tendency to view the material evidence - earthworks - as "more real than the society which produced [them]"

(Thomas 1993:26). This is in large part due to 'top down' analysis which takes the whole functioning system as its baseline, in which the earthworks and other structures (e.g. sociopolitical) are placed. This emphasis has created a void in interpretation, where there is no real sense of understanding the people who built these constructions, or of relationships between the earthworks beyond concerns of the 'system', of how they formed and impacted on everyday human conduct.

The application of a landscape perspective incorporating practice theory aims to help fill this interpretive void. This entails consideration of the precursor and successor evidence of cultural practices, thus habitus, in the landscape (as detailed in the preceding chapter). Evidence of change in the meaning and significance of the earthworks, and of habitus, is suggested by the formation of stonework villages which post-date earthwork construction, and which persisted to the time of European contact. The location of most of these villages illustrates an alteration in spatial considerations: from a focus on the uplands with earthworks, to a focus on the lowlands. There was also an essentially different mode of monumental construction involving the use of basalt cobbles to make platforms, paths, etc. Consideration of this movement is important in assessing socio-political changes, but also for understanding the ways people experienced and structured space and place, and ultimately the landscape in the Ngaraard ridgeline.

I would like to make a final point. The application of the specified landscape perspective in this thesis has been facilitated in large part by the wealth of fieldwork and data of the earthworks produced by past analyses, which is combined here with the results of my own field research. I believe that a landscape analysis of this kind is most useful when a large amount of archaeological information is available for consideration. Thus, like the formation of landscapes, my thesis is historically contingent and shaped by past analyses and interpretations of the monumental earthworks of Palau.

CHAPTER THREE

Research Methodology

The methodology adopted in this research incorporates an array of evidence-gathering strategies to answer the over-riding research questions: What significance or meaning can be ascribed to the monumental earthworks of Babeldaob, and what insights does this offer in relation to prehistoric monumental constructions elsewhere in Pacific landscapes?

The use of landscape theory allows questions to be applied at various scales: "we can move from the intimate, very small-scale scene of daily human activities, to the scale at which communal interactions are carried on, and in turn to the looser, wider world of human connections between different regions" (Cooney 2000:6). Previous studies have focused on regional scale analysis, using a settlement systems approach that encompasses all of Babeldaob. This thesis focuses on compiling a detailed landscape history of a particular area of Babeldaob. Analysis focuses on more than one scale, from the local to a larger scale of the landscape. As such, a diverse methodology is required, one that allows "tacking", in which various lines of argument are developed "on vertical and horizontal tacks in both source and subject contexts" (Wylie 1993:24-25). To achieve this, the methods exploit a range of independent sources.

3.1 Tri-Scale Research Methodology

The first scale of analysis places emphasis on the earthworks as analytical units in the landscape (as 'places'), to answer practical considerations related to their construction. The questions are:

1. How were the earthworks physically constructed?

2. Does material/artefactual evidence give insights as to how earthworks were used?

3. How do sites relate to each other temporally?

Consideration of social processes is also important. Thus, further questions aim to understand more about the people who built the earthworks:

1. What does the evidence relating to construction suggest about social organisation of the people that built them?

2. What sort of movement would have been involved in a landscape of earthworks? What can this tell us about the social structures of groups that built them?

The methods employed to answer these questions are primarily field-based, and represent the data-gathering phase of the research project.

The second scale of analysis includes the environment of the monumental landscape. This incorporates specific methods of data-gathering to answer questions on the nature of the environment, before, during, and after earthwork construction. Evidence of vegetation patterns and geomorphological aspects of the environment are important, along with cultural information derived from evidence of past human activities. This directly addresses issues of historical contingency and past human actions in shaping construction activities in the formation of a monumental landscape. Thus, the questions here address various activities:

1. Is there evidence of subsistence activities?

2. What does the environmental evidence tell us about physical landscape transformations in the area?

3. What sorts of activities are reflected in the environmental evidence, and what social processes can be adduced from such activities?

4. Does the environmental evidence suggest certain places may have had special meaning and significance prior to earthwork construction?

The third scale considers the social landscape of this area in Ngaraard, and focuses on identifying processes of social change. This involves decentring the subject, namely the earthworks, and requires interpretation beyond the material existence of the earthworks themselves.

1. Can we identify past cosmologies of the prehistoric inhabitants through time and space?

2. Is there evidence of changing *habitus* and landscape, and what does this mean?

3. How do perceptions of space and place change through time, and what does this tell us about changes – social, socio-political - in the activities of past inhabitants?

At this point, the methodology draws on previous earthwork studies, comparing a well-researched area with dense monumental earthworks, Melekeok, with the study area. The aim is to identify patterns and variability in the social landscape, and understand the processes involved in the transmission of ideas, habitus, and culture through time and space, between different social groups.

3.2 Methods employed

Two methodological strategies are employed to address the three scales of analysis and their constituent questions. The first entails methods of data gathering, through a field program of excavation, and resultant analyses. The

second strategy involves consultation of external resources such as palaeoenvironmental investigations, oral historical and ethnographic histories, as well as past archaeological investigations. Interpretations are made once all data and information has been gathered and considered. The three overriding methodological scales are comprised of elements relevant within both methodological strategies, and as such, 'tacking' between methods and resources occurs in multiple directions.

Excavation Programme

A key element in this landscape investigation is the traditional excavation program. Excavation is centred on the earthworks as cultural units – as analytical units. Extending upon the conclusions of previous archaeological studies on methods of construction and use, the excavation program had the aims of:

a. Elucidating construction methods.

b. Obtaining relevant materials for radiocarbon dating to address questions of chronology.

c. Gathering a sample of material cultural remains to give insight on how the earthworks were used.

d. Obtaining soil samples for archaeobotanical, geochemical, and soil micromorphological analysis; also the identification of subsequent environmental (taphonomic) processes from soil samples which may be obscuring evidence of past use.

Site Selection

Several archaeological studies have voiced concern over the use of the term 'site' to classify cultural remains (e.g. Dunnell 1992). Alternative approaches, such as off-site and non-site designations, have thus been offered (see Dunnell

& Dancy 1983; Rossignol 1992). Although recognising the limitations and concerns of the classification 'site' expressed in those studies, sites in this analysis are deemed useful in large part due to the type of cultural remains under investigation; namely non-portable artefacts, clearly distinguished in the landscape. Therefore, this study uses the established archaeological site numbering system first instituted in 1981 by the Division of Cultural Affairs (DCA), Bureau of Arts and Culture, Republic of Palau.1

In determining site boundaries for earthworks, three sources of information were of importance in DCA investigations. First, the DCA consulted oral histories in which traditional Palauan names identified and established the boundaries of some sites. Second, the points where earthwork components or terrace sets physically end in the landscape are interpreted by DCA to mark site boundaries. The third source, which applies to all site types, relates to natural boundaries in the form of hydrology (rivers, streams) and geological components (cliffs, escarpments) (Olsudong et al. 2000).

Location

The selection of sites for sampling involved a number of considerations. The sites had to be located in:

1. An area that had been previously researched, providing archaeological information pre- and post-earthwork construction.

2. An area containing sites with a range of earthwork components.

3. An area that could be logistically studied within the time and budget restrictions, which included accessibility to local labour.

[1] The numbering system has a four part code. The first is B for Palau, the second a two letter designation for the state, the third a number for a village or region within a state, and the fourth a number designating a site in the village or region. A feature number can also be added after the feature number. An example is B:NA-4:9 F.34.

Sites located in Ngaraard State, in northern Babeldaob appeared to fit these criteria perfectly. In considering the first point, activities associated with construction of the Compact Road have had a significant impact on earthworks in Ngaraard, as well as the surrounding traditional villages. Through archaeological investigations within the Compact Road Project, however, IARII have provided a large amount of information on many of the impacted sites. Other small investigations have also taken place, such as Osborne's survey (1966), Masse & Snyder's (1982) reconnaissance survey, and surveys made by DCA (Olsudong et al. 2000).

Secondly, while many previous earthwork investigations entailed small-scale excavation of multiple sites throughout the island, this study was restricted to a specific area. Three out of six earthwork sites in the Ngebuked village area of Ngaraard State were selected: B:NA-4:6 Rois Terrace Complex, B:NA-4:11 Ngemeduu Crown and Terrace complex, and B:NA-4:12 Toi Meduu Crown and Terrace Complex (Figure 3.1).

Earthworks, particularly terrace and crown complexes, contain multiple components e.g. terraces, crown, ditch, peaks. However, it has been difficult in the past to assess the temporal relationship between these components at an intra-site level (e.g. see Wickler 2002). This is partially attributable to a deficiency of dating material in relevant contexts when excavation has occurred. However, it is also due to sampling strategies where few components at any one site have been excavated. A further issue concerns the differential purpose or use of distinct components within a complex. In order to address both these issues, sampling in this project focused on a number of components: terraces, crowns, a ditch, a peak on a crown, and two depressions. In addition, IARII have excavated certain components of the three selected sites that are located within the Compact Road corridor. Thus, when considered together, the results of this research and previous investigations such as those of IARII

combine to produce a detailed understanding of the monumental landscape at various temporal and spatial scales.

I was fortunate to have gained employment for three months with IARII on the Compact Road Project in 2001. This resulted in part from my trip to Palau in the previous year as part of the field team involved in the Palau 2000 project (see Wickler 2000) During my thesis fieldwork, I lived in Ulimang village in Ngaraard for most of the time and worked with locally trained field crew on the Compact Road. An aspect to village life was meeting with the Governor of Ngaraard for IARII business, as well as attending monthly meetings in Ulimang village. As a result, I established a good relationship with the people and my interest in the earthworks became known. Undertaking research of any kind in Palau requires permission from local and senior government, down to the inclusion of local people in the research, particularly in the field. So in relation to the third point, Ngaraard was ideal for logistical reasons due to my previous work in the area, and the willingness of local villagers to become involved in the project. Accommodation was also readily available, and as Ulimang village is located close to the ridgeline, access to the sites each day was quick and facilitated by dirt roads and a four-wheel drive vehicle.

Field Seasons

Two field seasons were undertaken. The first season took place at the end of my work period with IARII in 2001. Unfortunately, a storm associated with Typhoon Uta struck the island and impacted on my field program, cutting it short. Therefore, I did not excavate as many earthwork components as I had anticipated. I returned for my second field season in November 2001 with a more thorough excavation plan, which focused on B:NA-4:11, Ngemeduu. This was accomplished, but the plan to complete excavation at B:NA-4:12, Toi Meduu, was frustrated by financial constraints.

Environmental Methods

Clay Analysis

It is clear that clay was transported to build the earthworks through previous studies that identified a terrace 'fill' material, which was generally comprised of C horizon (saprolite[2]), red A and B soil horizons, and various cultural residues (e.g. Lucking 1984; Osborne 1966). Consideration of the results of these past studies suggested the following points.

1. Strata of the three sites in this study were likely to be structurally and physically complicated.

2. Natural soil processes have most likely altered and masked certain minerals, chemicals and cultural materials within each site.

In general, tropical soils tend to weather at an increased rate due to high rainfall (see Mason 1955) and high acidity levels can affect the preservation of organic materials within certain soil types.

Of interest in studying the earthworks, then, was the identification of *in situ* soil layers and anthropogenic layers in order to understand methods of construction, and movement in the landscape of both materials and people. Another aim was to illuminate natural and anthropogenic post-depositional processes that had affected the sites, and thus indicate any transformations that could affect interpretation. Hence, a diverse set of methods was required, at various scales.

Specific on-site analysis was necessary, such as stratigraphic descriptions using standard soil terminology. A geomorphologist was enlisted to provide detailed stratigraphic descriptions, as well as the identification of any natural processes that had occurred within the earthwork stratigraphy.

[2] Saprolite is a soft, clay-rich, decomposed rock formed in place by chemical weathering. In Palau is through weathering of basalt-andesite.

The majority of analyses, however, required off-site testing under laboratory conditions. A "mixed method approach" to analysis was adopted based upon geoarchaeological guidelines (after Canti 1989:193):

1. Methods to distinguish 'gross' information by testing disaggregated soil samples. Information of this type was used to interpret soil processes and taphonomic conditions, to identify minerals, weathering of minerals, and address questions related to clay transformations. Techniques include X-Ray Diffraction (XRD), pH readings and consultation of the Munsell soil colour descriptive handbook.

2. Methods that test undisturbed samples, such as soil monoliths. Detailed microstratigraphic information on pedological, taphonomic, and anthropogenic formations within stratigraphic horizons is accessible here. Methods developed in soil micromorphology were applied to study soil samples at this micro-scale.

Pollen and phytolith analysis

Pollen and phytolith analyses were undertaken in order to identify indicators of anthropogenic and natural vegetation (after Morrison 1994). The aim of pollen analysis in this thesis was to identify vegetation from various soil strata within the earthworks, in order to give insight to questions of land clearance before earthwork construction, i.e. whether there was savanna present or forest, and the time of clearance. Identification of direct and indirect evidence of agriculture was another aim, although obtaining evidence of the former (e.g. *Colocasia spp.*) is problematic due to factors influencing dispersal and long-term preservation of *Colocasia* pollen in soils (Haberle 1995).

Phytolith analysis provides an indication of plants growing in the immediate area of sampling, because phytoliths are returned to the soil through decay-in-place deposition of parent-plant material. With this in mind, the technique was applied in this study to identify evidence of cultivated crops in earthwork

stratigraphy, a successful result elsewhere in Oceanic archaeological studies (see Pearsall 1990; Pearsall & Trimble 1984). Additionally, this method was applied to provide information on other indicators of human interaction with the environment, such as the incidence of secondary growth related to clearance (Pearsall & Trimble 1984).

The disaggregated soil samples were used for pollen and phytolith analysis. As the Pacific is renowned for fire regimes in preparation of land for agriculture (Maloney 1994), charcoal counts were also completed during analyses of these soil samples. Fluctuation in charcoal counts can provide evidence to discriminate between intensified fire use versus a low incidence of fire, which is relevant when addressing questions of land clearance and cultivation activities.

Other resources on the environment

In order to obtain a solid environmental baseline for interpretation, palaeoenvironmental information from previous studies in the area is incorporated (Strategy Two). The palaeoenvironmental reports on the Compact Road Project (Athens & Ward 1999; 2001) provide results from a palynological analysis of the 'Ngerchau core'. This core was taken from a taro pond behind Ulimang village in Ngaraard, approximately 200m from the lower foothills of the ridgeline. Information relevant to landscape alteration in the uplands of Rael Kedam is apparent in these studies, such as recurrent changes in vegetation patterns from forest to savanna, rates of erosion, and a chronology of these interpreted events.[3]

Other resources consulted were geological and vegetation reports for Palau (Mason 1955; Merlin & Keene 1990; Mueller - Dombois & Fosberg 1998).

Cultural Material: methods and analysis

[3] Note that further analysis of the Ngerchau core is currently underway.

The only artefactual material found in the sites was pottery. High acidity levels of latosol clays are not favourable to the survival of bone and shell midden, so it is hard to know if this type of cultural residue once existed on the earthworks. Pottery is therefore the only cultural material for analysis.

Pottery Analysis

Pottery recovered from earthworks can be difficult to interpret contextually, as most of it has been redeposited with the clay during construction. In some cases, it is difficult to discern if mixing has occurred between different-aged sites from which the soil derived. However, formal analysis enables some of these limitations to be resolved, particularly when detailed stratigraphic and chronological information is provided. The main use of pottery analysis is that it can provide an array of information of how prehistoric cultural groups lived and interacted, on multiple levels.

In the field, pottery was collected and sorted into diagnostic and non-diagnostic sherds, and analysis took place at a later date under laboratory conditions. The pottery analysis in this study had the following aims:

1. The identification of pottery assemblages from the sites through formal analysis i.e. pot forms, styles, decoration and fabric and temper (after Desilets et al. 1999; Summerhayes 2000).

2. A comparison between earthwork pottery assemblages and non-earthwork assemblages, looking at manufacturing techniques, stylistic attributes, and chronology.

3. The identification of patterns in movement of materials within Babeldaob through petrographic examination of pottery fabric and temper (after Descantes et al. 2001).

4. Interpretations on both specialised and utilitarian aspects of Palauan pottery production, in relation to various scales of the monumental landscape.

Radiocarbon Dating

Establishing when the terraces and other earthworks were constructed is extremely difficult. Recently, Phear et al. (2003) re-assessed many radiocarbon determinations relating to the settlement sequence in Palau, including those proposed to date earthwork construction and use. Phear et al (2003:255) reiterated the need to critically evaluate the integrity of charcoal samples proposed for dating (also see Anderson et al. in press.), particularly in relation to what sort of cultural deposit, if any, the sample is derived.

For earthworks specifically, the above issues are of prime importance. Following Phear et al (2003:256), charcoal samples in this analysis were considered for radiocarbon dating when they were firmly associated with cultural remains such as features or deposits on the original hill surface or within underlying or overlying fill layers. Also, samples from features within the sites were considered stratigraphically reliable.

All charcoal samples were submitted for radiocarbon dating to the Australian National University, Research School of Earth Sciences Radiocarbon Dating Laboratory[4]. Ten charcoal samples were submitted in total, with a mixture of AMS and conventional dating methods (see Table 3.1). The Rois Terrace Complex (B:NA-4:6) was the only site that did not have relevant charcoal samples for dating. Ideally, many more samples would have been dated, but a scarcity of material prevented this.

Ethnographic sources and Oral Histories

Consultation of multiple resources is important in archaeological analysis. Ethnographies and oral histories give insight into the perceptions of cultural

and natural phenomena from the European contact period onwards in Palau. Such information gives relatively synchronic insight into the meanings and significance of phenomena, here specifically the earthworks. Meanings are dynamic, and "are more likely to change than remain constant"(Layton & Ucko 1999:14). Therefore, studying recent meanings of the earthworks can help uncover the processes that led to diachronically transformed meanings, and as such the processes transforming *habitus.*

Three main periods of ethnographic research are most useful. Those from the contact period include Augustin Krämer's famous ethnographic study, explicated in the *Südsee Expedition* of 1908-1910 (1917; 1919; 1926). Others include Karl Semper (Semper 1863) and Johann Kubary who arrived in Palau in 1871 (1873). European traders provide journal-like descriptions of the earthworks and social life at that time. These include the Englishman Captain Andrew Cheyne (1864), and Keate (1788) who reported on the experiences of Captain Wilson and his men. Their ship, *The Antelope,* was wrecked on the Palauan reef near Ulong Island.

Later studies, such as the collective works of Hijikata Hisakatsu, are relevant. Hijikata spent many years in Palau, from 1929 to 1942, although his monographs have only recently undergone translation to English (1993; 1995; 1996). His ethnography provides many details of the life and society of Palauans during Japanese administration, including details on the earthworks and local perceptions of them. Other studies include Force (1960) and Barnett (1949).

The final period of research is from the 1980s onwards. A substantial amount of ethnographic investigations occurred in this time. DaVerne Reed Smith (1983) provides a useful ethnography focused on social structure, with insight into the life of Palauan women. Parmentier's studies (1985; 1987) present a wealth of

[4] Radiocarbon determinations from this lab have the prefix: ANU-

information on sacred and religious aspects of Palauan society. Nero (1992a; 1992b) presents two studies that address origin mythologies and relationships between Palauans and Europeans in the 1800s.

Internally, the government of Palau formed the Division of Cultural Affairs[5]. They instituted a cultural program in the 1980s that entailed survey and recording of archaeological sites. More recently, the DCA set out to record oral histories for each state of Palau, and this research was undertaken in 2000 in Ngaraard state (Olsudong et al. 2000).

Summary

The methodology employed in this thesis includes traditional archaeological methods, such as excavation, through to the application of various scientific techniques, and the consultation of ethnographic and oral historical research. The methods therefore focus on the physical environment as well as analysis of cultural materials. By concentrating on three scales of investigation, analysis of the landscape considers change through both time and space, and allows interpretation of the meanings or significance of the monumental earthworks in this particular area. This allows comparison between the Ngaraard earthworks and others at various scales, in order to identify processes related to the cultural transmission of ideas and habitus.

[5] Now known as the Bureau of Arts and Culture.

CHAPTER FOUR

Setting the Scene: a cultural and physical background of Palau

Palauan history is the history of transformation, of re-creation out of the structure and essence of the past. The physical world, the cosmological sequences of worlds – even the gods themselves – are created out of their precursors (Nero 1992:236).

4.1 Introduction

Palau's political history has been varied. This is due in large part to a high level of interaction with external cultures. Western 'contact' with the Palauans began in 1579, with Sir Francis Drake and his ship the *Golden Hind.* This was followed by numerous other 'discoveries' of Palau. One of the most famous was by the crew of the English ship, the *Antelope,* which ran aground in 1783. Events following this shipwreck represent the first "sustained interaction" of Palauans with Europeans (Nero 1992b:44) (I will discuss how interaction with the *Antelope* crew tipped the political scales within Palau in section 4.3).

By the mid 19th century Palau had become the focus of commercial entrepreneurs, most notably Andrew Cheyne and Edward Woodin. Interactions with the Palauans by such figures were motivated by prospects of monetary reward (Parmentier 1987:46). Cheyne represented the extreme; he manipulated his relationships with Palauan chiefs in an effort to achieve his own "Pacific trading empire" (Nero 1992b:53)[1]. These traders signal a change in European-Palauan interactions. Before, the Palauans were able to control foreign residents on their shores, but the 'new' breed of Europeans ignored local customs and the sovereignty of the chiefs, proffering themselves instead as 'equals' (Nero 1992b:45).

[1] See Nero (1992b) for a detailed account of Cheyne's deeds and misdemeanours in the Palau islands (including his execution by the Ibedul (chief) of Koror, and the subsequent (supposed) execution of the Ibedul as punishment by the British).

By the end of the 19th century, commercial (and political) competition between Britain, Spain, and Germany was manifest in Micronesia. Britain, however, lost its stronghold in the region, and Spain was the first European nation to 'occupy' Palau, from 1855-1899. The Spanish focus was on establishing missions to carry out religious (re)education. It was not until Spain relinquished control to Germany in 1899 that the economic circumstances of Palau took a turn. The German administration was one of "economic colonialism", focused on obtaining phosphate, copra, and trepang and shells from the lagoon (Parmentier 1987:47). The succeeding administrative power, Japan (1914-1947), had already established commercial businesses in Palau during German administration. Thus, a major concern for Japan was to both sustain and bolster their economic growth in Micronesia through Palau (Parmentier 1987:48). The close of WWII led to additional foreign management, this time by America. Palau became a district of the Trust Territory of the Pacific Islands, along with most Micronesian islands. Over 30 years later, Palau became a Republic (1981), with a Compact of Free Association established with the United States in 1994.[2]

Evidence suggests Palau's prehistory was characterised by migrations and interaction with outside populations. Linguistically, Palauan speakers had contact with Oceanic languages, first Yapese, and then Trukic speakers. In fact, Ross (1996) has made clear that the Yapese language has borrowed heavily from Palauan. I will return, however, to linguistic reasoning in section 4.3. Palauan oral histories also draw attention to migrations from Yap and islands beyond (Hijikata 1993; Olsudong et al. 2000). Fragments of Palauan money/valuables originated in China or mainland Southeast Asia (*bachel)*, as well as East Java (Francis 2002), and there is a recorded history of drift and accidental voyages, both to and from, Palau, Indonesia, the Philippines, and the Caroline Islands to the north (Osborne 1966, 1961; Solheim II et al. 1979). Others claim there are close similarities between particular artefact types and those

[2] See Parmentier (1987) for a detailed account of the 'contact' and colonial period of Palau's history.

found in the Philippines (Osborne 1966, 1961), Malaysia (Yawata 1942) and the Ryukus in Japan (Kokubu 1955).

Together, this eclectic evidence suggests Palauan culture has a complex history, which has likely experienced many changes through time. Further details, however, are required in order to grasp fully the nature of settlement history in these unique islands. This chapter, then, discusses the main themes concerning the history and prehistory of Palau, and in particular, the study area of this thesis in the State of Ngaraard.

4.2 Palau: Physical background

Micronesia is a geographically defined area located in the western Pacific. There are several island groups considered part of Micronesia: the Marianas, Carolines, Gilberts, Marshalls and Southwest Islands (as well a four individual islands), which in total contain over 2000 islands (Rainbird 1994; 2004)[3]. Yap and the Republic of Palau, *Beluu er a Belau,* form the Western Caroline Islands (Figure 2.1), and the Palau archipelago contains over 300 islands, extending along a 150 km arc (Figure 2.2). Situated about 7° north of the equator, Palau is 900 km east of Mindanao in the Philippines, and 650 km from New Guinea in the south (Snyder & Butler 1997).

The majority of islands in Palau are of uplifted coralline limestone, known locally as the 'Rock islands.' They are located in the centre of the archipelago between Koror and Pelilieu. While Pelilieu and Anguar are also made of limestone, they are classed as platform islands and thus considered separate to the Rock islands. Some Rock islands are reasonably large with high points over 200 masl, but they have poorly developed soils with no surface drainage

[3] Alternative titles to the standard divisive terms of the Pacific islands have been proposed. Rainbird (2004:40) discusses the suggestion by Green (1991) for the term 'Remote Oceania,' which includes 'Polynesia' and Micronesia islands under one name. Rainbird also argues for use of the "less historically loaded label" of 'north-west tropical Pacific' for Micronesia (Rainbird 1994; see Rainbird 2004 for a detailed discussion of issues related to specifying 'boundaries' in and of Micronesia). However, the term 'Micronesia' is retained in this thesis, as defining the geographically grouped islands, without implying cultural consistencies or "diachronic maintenance of the boundaries" (following Rainbird 2004:40).

systems. Comprised of karst topography, solution fissures and sink holes, they have steep sides and 'v' shaped valleys. Regular features are marine lakes and many of the larger islands extend below sea level. The islands have distinctive undercuts caused by wave action, and these cuts eventually trigger smaller islands to collapse (Fitzpatrick et al. 2003).

Babeldaob, the largest volcanic island at 363 km^2, represents the majority of Palau's land mass (Figure 2.2). It has a series of ridge systems that extend north-south, which are characterised by small, narrow valley systems and coastal plains, with tidal flats and dense mangrove forests. The highest peak on Babeldaob, Rois Ngerekelehuus, is 240 m above sea level, and the volcanic soils are heavily weathered and form loose, and somewhat unstable, hill slopes.

An extensive blanket of limestone originally covered the volcanic strata of Babeldaob. In the Cenozoic, however, the limestone was stripped off by erosion following uplift, leaving only a few remnants along the south and southeast shores (e.g. Oikull), which overlap the volcanic and volcaniclastic strata of the ancient volcanic edifice (Corwin et al. 1956; Easton & Ku 1980). The other volcanic islands, Ngerkebesang, Koror, Malakal, and the Rock islands, are less-uplifted remnants dissected from the formerly extensive blanket of Palau limestone (Easton & Ku 1980:200). This uplift occurred in the Miocene, and younger limestone forms the chain of islands extending south to Anguar.

Barrier, fringing, and patch reefs, comprised of inner and outer reef flats, encircle the islands (except Anguar). The barrier reef, 1-3 km wide, stretches north-east to south-west off the west coast, and is 120 km long. A 15 km wide lagoon separates the islands from the reef, where many of the patch reefs are found (Kayanne et al. 2002:49). The reef systems of Palau are considered to be the richest in the Pacific, with the highest species diversity (UNEP/IUCN 1988).

Climate and Vegetation

The tropical climate of Palau undergoes minor changes throughout the year, and has an average annual rainfall of 3, 730 mm. Temperatures range from 27° C with a mean fluctuation of no more than 7° C, and a relative humidity of 90% at night and 75-80% during the day. Although not situated in the typhoon belt, Palau does endure storms and high winds associated with such severe tropical disturbances.

Compared to the rest of Micronesia, Mueller-Dombois and Fosberg (1998) describe the volcanic half of Palau as possessing a floristically and physiognomically rich array of vegetation, although Yap possesses a similar level of diversity. Together, these two island groups form a "distinct phytogeographic unit, with many endemic species and the easternmost extensions of several others from the rich Indo-Melanesian flora" (Mueller - Dombois & Fosberg 1998:278). The deeply weathered ancient volcanic islands, which are highly leached, and whose original structure is mostly lost, reflect differing topographical vegetation patterns to limestone islands.

Currently, forest covers 75%, and grassland or savanna covers 18% of Babeldaob.[4] The volcanic islands also have mangrove and freshwater swamp forests, strand and lowland vegetation, interior upland forest, and ravine and Riparian forest. The limestone islands are characterised by closed and diverse evergreen forests (Mueller - Dombois & Fosberg 1998:278-280). These various vegetation zones are home to numerous fauna, including the estuarine crocodile (*Crocodylus porosus).*

Babeldaob has one freshwater lake, which is located in Melekeok. Lake Ngerdok has an area of 3.4 ha, and is situated in the largest water catchment in Palau. Its swamp vegetation contains an array of species. Ngerkall Pond in Ngaraard also holds fresh water, though its area is much smaller - 1.3 ha, and it is renowned for its rich aquatic vegetation.

[4] Savanna in the Micronesian context are not flat nor do they always have scattered trees, but are comprised of specific grassland flora (see Mueller –Dombois and Fosberg 1998:228).

4.3 Traditional Histories and Ethnography

A number of ethnographic studies have been undertaken in Palau, particularly in the early 20th century by German scientists and scholars. When combined with studies from the later 20th century, predominantly by American anthropologists and local historians, they sketch a rich and intricate picture of social organisation, relationships, interactions, and material cultural expressions. The following section seeks to highlight the dominant themes of Palauan social and political life. The final section includes a discussion of anthropological insights regarding the structures and mechanisms evident in the complicated social system embodying the traditional cultural landscape(s) of Palau.

Village, District and social organisation

When Westerners made the first sustained contact with Palauans, their descriptions refer to a complex chiefdom society in which two highly competitive polities were to the fore: Koror (Ngereklдeu) and Melekeok (Ngetelngal). The foundations of all the polities were villages, organised by hierarchical processes into ranked social divisions. Parmentier discusses traditional political organisation[5], and delineates four levels of multivillage association:

> *village complexes,* consisting of satellite hamlets surrounding a dominant village; *districts,* which group together member villages around a focal capital village; *subdistrict,* divisions within a single district; and shifting *federations* of villages from different districts (Parmentier 1987:55).

As an intrinsic structuring component of the Palauan "social universe" is dualism (Smith 1983:18, 31), we see villages divided into two competing and cooperating sides, and a physical feature such as a stream or road ideally

[5] By 'traditional' Parmentier (1987:55) specifies "those customary practices described by my informants as "authentic" (*mera el tekoi*) or "ancient" (*tekoi er a irechar*), uncorrupted by foreign influence", which roughly corresponds to the polity described in documents recorded by Westerners in the early 19th century.

indicating the divide. The term ascribed is *metiud a belu,* "split of the village," (Force 1960:34), and each side of the village known as *bital taoch ma bital taoch,* "one side of the canal and the other side of the canal" (Smith 1983:18).

A further division is apparent within the village halves. Before addressing this further, it is pertinent first to outline the essential elements of Palauan social organisation. It is helpful here to quote Smith at length (1983:3-4):

> A Palauan land-based kin unit consists of a generational hierarchy of cross-sibling sets. Rights to membership are determined by tracing descent from the apical cross-sibling dyad that originally founded the unit by obtaining land. Birthright membership is the unit and authority over resources belonging to the unit are accorded to those matrilineal descendants who are "children of the women" (*ochell).* Conditional membership is granted to those classed as "children of the men" (*ulechell*) as long as they provide services to the matrilineage. This dual means of tracing descent from an apical cross-sibling dyad thus serves as a means of recruitment and initial internal alignment.

Accordingly, villages were comprised of ranked kin-groups, which can be considered as four social units: *ongalek,* a "nuclear family," *telungalek,* the property holding unit, and *kebliil* and *klebliil,* polysemous terms which can mean 'clan' or 'supersib.'[6]

Dominant villages were surrounded by lower ranking ones, where we see:

> The dual organisation of Palauan society is clearly demonstrated by the over-all arrangement of the village council and the distribution of power positions. The council was divided into two sections. One of the sections was headed by the hereditary leader of the senior village sib, the other by a counterpart from a second-ranking sib (Force 1960:36-37).

Parmentier (1987:60) feels that districts[7] (*renged,* from *merrenged,* "tie together") played a vital role in understanding Palau's political history than villages.

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[6] Smith (1983:38) emphasises that "part of the problem in the literature on Palauan social organisation has been the tendency of researchers to equate Palauan group units with descent and/or unilineal terminology and concepts," such as 'clan' or 'sib'. Some terms, like *kebliil* and *klebliil* have a number of definitions depending upon differing contexts. Thus, following Smith, I have included the Palauan terms rather than just 'clan' or 'sib' to highlight the complexities within the group level of the Palauan social organisation.
[7] Districts were later called "Municipalities" during the Trust Territory administration. The current referent is "States", in line with current constitutional political organisation (Parmentier 1987:60).

Districts can be viewed as a larger version of villages, whereby dependant villages are affiliated with a central capital village. There is a notable difference, though, "member villages are fully distinct entities with titleholders, houses, and clubs that are not merely subservient to the corresponding institutions at the capital" (Parmentier 1987: 61). Often there were subdistricts, each controlled by a different chiefly house at the capital, or by chiefs from co-capital villages.

Districts followed natural boundaries in general on Babeldaob, and can be compared to similar structures in other Pacific islands, where each district has access to major resources (Parmentier 1987:61). Certainly, trade and exchange was paramount at both the village and district levels. An important relationship here is "ties of mutuality" (Smith 1983:18). If we begin with relationships between people, we see a dual distinction whereby people are *tae r tir* ("one of them"), or *kauchad* ("mutual persons"). Smith (1983:18) elaborates further:

> Ties of mutuality are commonly established through concepts of shared blood, shared land, shared exchange, and/or shared ancestors who once behaved as "mutual people".....Villages strive to establish mutual relationships with other villages, as clubs once did with other clubs across the dual division within the village or in other villages, and as individuals did with other individuals and with land groups within a village or throughout Palau.

Thus, this mutuality extended to the district level, where both trade of 'necessity' items and specialised goods took place between other villages and districts. A fundamental connection here is with land, the "most secret of all Palauan knowledge" (Smith 1983:39). Land was seen as both a means of wealth and a social marker, binding people to both land 'units' and land histories. While land could be won and lost during warfare, for example, it retained a special relationship to "blood" groups and lineage, and we will see in the 'origin mythology' section below how some land-blood relationships were solidified through oral histories.[8]

[8] See Smith (1983) for a detailed discussion on land and land relationships in Palauan society.

While the 'territorial' boundaries of districts were quite cohesive, the arrangement and extent of districts did change as a result of warfare and instability within political relationships. Nevertheless, Parmentier (1987:61) asserts: "the fact remains that most of Belau's districts have retained their political identity and geographical integrity for at least 200 years." European reports in the late 19th century name ten districts on Babeldaob, which coincide with those in existence today. Each of these districts were situated within a geographical division: *You el Daob*, the 'upper ocean' and *Bab el Daob*, the 'lower ocean' (Force 1960, Smith 1983, Parmentier 1987).

This brings us back to Koror and Melekeok, the two districts and federations holding power in Palau in 1783. Parmentier (1987:65) states that federations:

> consist of networks of shifting alliances among villages from several districts..... are the product of military expansion of a powerful village, the temporary solidarity of villages allied against a common enemy, or the result of kinship and marriage ties shared by local representatives of high-ranking house affiliation networks.

As federations, Koror and Melekeok had 'allies' in other districts, who provided both physical and financial support in times of war. I will return to interrelationships between villages in the next section.

According to oral history, Koror (led by an *Ibedul*[9]) and Melekeok (lead by a *Reklai*) had been feuding for many generations. When Captain Wilson and his men from the *Antelope* arrived in Palau in 1783, the location of their wreck was within the district of Koror. The *Ibedul* requested English help in the battle with Melekeok, and after agreeing, the English supplied some men and guns (muskets and swivel guns). A battle ensued, and the result tipped the political scales in favour of Koror (which is not surprising considering neither Melekeok nor any other village or district had access to western weapons). From this period on, Koror became a dominant district in Palau, although it never

[9] Keate (who recorded the Antelope's journey) initially mistook the meaning of Ibedul, interpreting it as meaning the "King" of Palau, and thus accorded Ibdedul reign over all of Palau. He later realised his mistake, however.

controlled the entire archipelago[10]. With a deep natural harbour, Koror housed nearly all foreign visitors when they entered Palau. This gave Koror direct access to not only firearms, but also other western goods for trade.

A final transformation in Palau's social organisation, the "sides of heaven" division, is argued by Parmentier to have arisen at this time. According to most classic histories of Palau, *bita el eanged,* "sides of heaven" was said to organise the districts into two balanced halves (e.g. Barnett 1949:177-178), with the 'upper and lower seas' geographical ordering equated with the "sides of heaven" (Force 1960:34). Yet Parmentier claims the latter only occurred once Koror and Melekeok's relationship had intensified. He explains:

> [m]y argument is that the presence of foreign commercial interests and imported firearms stimulated the rigidification of local alliances, and that this favoured the selection of the sides-of-heaven model as the dominant conceptual metaphor. Roughly, villages on the east coast *(desbedall)* were allied to Melekeok's chief, Reklai, and villages of the west coast *(kiukl)* as well as villages on the southern islands of Ngeaur [Anguar] and Beliliou [Peleliu], were allied to Oreor's [Koror's] chief, Ibedul.

Alliances were of utmost importance during this time, as in earlier periods of unrest. In order to understand the workings of these relationships, though, we must explore the origin myths of Palau.

Origin Mythology: In the beginning.....

Two central creation myths have been detailed for Palau. Numerous versions abound in the literature, which can be explained by the independent nature of village districts prior to the historic period[11], and the time the stories were recorded (i.e. before and after colonial administration). Nero highlights the

[10] The permanence of Koror's triumph over Melekeok in this battle, by use of firearms, is disputed by Nero (2002:14) who states that it was short-lived, based on the Hockin *Supplement* (to Keate's account).
[11] The point needs to be made that there were no overarching district councils in Palau, no all-encompassing central hierarchy (Nero 1992:43). Each village and district did remain somewhat independent until foreign administration. Therefore, there were no fixed versions of legends, and consequently, there are many versions of creations stories of Chuab and Milad. Additionally, Nero (1992:43) makes clear that there is "no one history for a contemporary polity, but a series of local histories that together *may* sometimes give a coherent whole."

transformative component in the histories of the 'time of the gods', where the rebirth of gods is a recurrent process in the long period of creation (Nero 1992a:238). In order to follow this process, I have included a rather detailed version of the story of Chuab, though it is by no means 'long' in Palauan terms:

> Long ago there were no Palau islands. There were just two islands, Ngeaur [Anguar] and Beliliou [Peleliu]. In the Palau islands there once was a women from Ngeaur. Her name was Latmikaik. She bore a baby girl, whole name was Chuab. The next morning when Latmikaik got up she found that the baby could crawl. Then after she got up the following morning she found the baby could walk. Chuab continued to grow very rapidly, and on the fifth day she had grown still larger. She could consume the amount of food ordinarily sufficient for four men. Her height would increase so rapidly that in order to feed her, her food was tied to the end of a long bamboo pole and lifted up to her mouth. She grew so tall that it was now impossible to get food to her. So she now had to obtain food and water for herself. So at times she would reach in somebody's pig pen and grab one of the hogs and eat it. Sometimes even young children were just snatched up and eaten to satisfy her hunger. In order to stop this the village people gathered and went to her mother to tell her about it. Her mother couldn't face the village people, much disgraced, so she told them it was all right it they killed Chuab. The people decided to gather a lot of wood to start a fire. Chuab thought this was rather unusual, so she inquired of her mother why the village people were gathering so much wood. The answer was that since she, Chuab, wasn't having anything to eat everyday, the wood was gathered to start a fire to cook food for her. Now that enough wood was gathered they, the village people, went to look for coconut leaves. After the wood and the coconut leaves were gathered it was all placed at the foot of Chuab and a fire was started. The Chuab fell and died and her body became the Palau islands as follows:
>
> Ngerechlong village: head
>
> Arrenged village: neck
>
> Imeliik [Aimeliik] village: vagina
>
> *desbedall,* east coast: back
>
> *kiukl,* west coast: stomach
>
> Oreor [Koror]
>
> Ngamelachel islands: burned legs
>
> Ngerekebesang

Ngeruktabel

> After Chuab fell her mother asked the village people to cover her with a mat. There weren't sufficient mats to cover the entire body since it was so enormous so branches had to be used. Even the branches and mats couldn't cover but half her body. So the Palau islands are half forest and half plains. And the people of the Palaus are the worms which were born from her rotted body. So the names of these islands should really by Blelau (meaning fairytale) instead of Palau (Parmentier 1987:151-153, citing the Palau Museum n.d. [Belau National Museum]).

This "first world" (Nero 1992a:242) or "archaic world" (Parmentier 1987:153) of Chuab establishes certain key themes in Palauan socio-political organisation. The story describes the initial formation of villages in Palau, emphasising their geographical differentiation. Governance of these first villages was by the seven "sons" of the gods (Nero 1992a:242). Parmentier (1987) points out that in the Ngeremlengui Chuab story emphasis is placed on the *path* the gods took on their journey around Palau. This type of migration is central to understanding interrelationships, because it reflects the importance placed on connectedness between different villages, lineages, and land. A fundamental component of social organisation is migration histories, where each lineage is traced to a specific migration from other lands or villages. So the story of Chuab serves to indicate how the gods settled Palau, and subsequently serves to link 'human' settlement to the movement of the gods.

A fundamental transformation occurs in the 'second' creation myth. Palau, as created by Chuab, is destroyed. We see the rebirth of Milad, who establishes the 'second world'. Here I have included Kubary's (1969 [1888])version of the legend:

> In olden times, before the present-day men existed, the inhabitant of the Palau Islands were probably all *chelid* [gods], for they were strong and performed marvels, and the *chelid* went around on earth like other men. One of these *chelid* by the name of Temdokl, who was one of the Obechad [group of gods], came to Ngerechebukl in what is today Irrai [Airai] and was killed by the inhabitants there. The rest of the seven allied gods went to look for him and came to the same place; the

> inhabitants of this region were known to be generally proud and spiteful. The gods were received ungraciously everywhere with a single exception – an old woman by the name of Milad received them in her house and informed them of the death of Temdokl. Full of grief and anger, the gods decided to avenge him, but in order to reward the friendliness of the old woman, they decided to save her. They advised her, therefore, to prepare a raft and to fastened it to a tree with a rope made from vines of the forest. About the time of the full moon, a monstrous flood set in and covered the whole of Palau, but the good Milad cruised around on her raft until finally even her rope was too short and she met her death in the deluge. Her body drifted around and finally became entangled by the hair in a thicket of the Roismlengui. When later the gods came to earth to visit Milad and found her dead, they regretted her fate so deeply that the oldest of Obechad determined to call her back to life. He did this by blowing his breath into her chest, but he also wanted to make her immortal, and for that he needed water of immortality which one of his comrades was supposed to get for him. But one of the gods, Terriid [White-browed Rail], whose totem is the Railus pectoralis, was malicious and did not wish to have men immortal. So he persuaded the *cheremal* tree (hibiscus) to perforate the taro leaf in which the water was carried; this the tree did by means of a withered, unpretentiously protruding branch tip. Thus, Milad lost her immortality and the *cheremal* received such a lasting life that the smallest piece of it, when laid in the ground, germinates and grows into a tree. But the enraged Obechad punished Terriid, and even today he bears the traces of it in the broad red streak which he has on his head. Since then, the *terriid* [bird] is considered the symbol of malice and envy. Milad remained in Ngeremlengui and became the mother of modern men (Kubary 1969 [1888]:32-33; referenced in Parmentier 1987:161-162).

Although not detailed in the above version, Milad gave birth to four children that formed the four major villages at European contact. In the excerpt below, Kubary illustrates his understanding of the political implications of the myth:

> The differences in the rank of the lands [i.e., districts] is based on the tradition which runs as follows: "A woman named Milad bore four children, three sons and a daughter. This woman was the *chelid* [god] who created Palau, and the children were in order Imiungs in Ngeremlengui, Melekeok in Ngetelngal, Oreor [Koror] in Ngereklдeu, and Imeliik [Aimeliik]." These are the four largest lands in Belau [Palau] (Kubary 1873:211, cited in Parmentier 1987:163).

Multiple versions of these creation myths can be found, and they are by no means straightforward; they serve as an outlet for both moral, social and

political lessons essential to understanding Palauan social and political organisation.[12] An imperative meaning of the story of Milad relates to socio-political matters. The four villages are understood as being tied through siblingship, and as such they had mutual responsibilities to each other at times of unrest (organised in a hierarchical manner). They formed the four cornerposts of Palau (a symbol of the meeting house, the *bai*), what Parmentier (1987:196) calls 'quadripartition,' a "metaphor for historical process." He elaborates: "the story of the flood and the birth of the four stone children [the stone cornerposts] is a highly condensed way to express basic ideas about internally generated stability, structural maturity, and presupposed rank" (Parmentier 1987:196).

Nero adds further detail. She maintains that the most common way for social groups to incorporate current events is through structures of the past (Nero 1992a:242; citing Sahlins 1981). When change is too great to be contained within an existing structure, there might be a structural and symbolic transformation. Hence, both of the above myths "capture one such transformation, so great that it is coded as a shift between worlds," from the first world of Chuab to the second world of Milad (Nero 1992a:242). This change is apparent in what appears to be a time-lag between the establishment of the four strong villages (the structural change), and the creation of the story of Milad (the symbolic interpretation). In 1783 the story of Milad was not told to the English. Yet by the 1860s, all foreign visitors had recorded versions of this story (Nero 1992a). Thus, a process of 'inventing tradition' is evident, where the myth "validate[d] the power of the strong new consolidated villages" (Nero 1992a:242-243).

[12] The origin myths and other oral histories were the means of educating children, as well as adults. An example is discussed by Nero (1992a) with the Breadfruit story. Here, the woman of Meduuribtal is an earlier manifestation of the goddess Milad, but this is not known by most young people. Nero (1992a:242) explains: "In the past the histories were known by the male and female elders, who drew upon them to make particular points or admonitions.....In the oral histories the stories exist as discrete units, some as small moral tales known by the general public, others as more serious clan and village histories controlled and told only by the proper ranking elders who alone knew all their interconnections."

Discussion

Palau's traditional culture history is one of complexity. By the 1800s it seems clear that the socio-political landscape was imbued with hierarchical structures, from the individual through to the district. The form of organisation was reiterated in both local (specific) and creation (general) histories, and maintained through alliances and mutuality in all realms of social life. This suggests a system(s) of structural processes where change could be both regulated and resisted depending on contextual situations. In her study of social structure in Melekeok, Smith highlights where (within the social system) these processes operate. It is most apparent in the relationship between structure and event, although Smith argues that structure and event are not discontinuous or contradicting, but *interactional*, "each level shaping and being shaped by interaction with the other level" (Smith 1983:8). She continues:

> The Palauan system of social organisation is a complex one in which the lines between kinship, marriage, politics, and exchange are so hazy that it is almost impossible for boundaries to be drawn. In fact, Palauan social categories, kin unit boundaries, and social relations *are deliberately imprecise and ambiguous*. Secrecy, imprecision, and ambiguity are mechanisms that permit the manipulation of principles; structure may guide, but it also may be used by the actor as justification for his actions (Smith 1983:8; italics my own).

This is fundamental to understanding how change occurs within social groups in Palau, and the avenues in which the processes take place.

Another notable point regards perspective. Smith makes clear that structuring principles differ in function according to context and alignment. Indeed, she argues that models to speak for all social systems are unattainable, because of the changing meaning of principles (such as descent), particularly when viewed in a diachronic framework. This point is relevant to archaeological study, as archaeologists have to recognise that change occurs through the operation of structural mechanisms within social groups, not through the occurrence of a particular 'event.' When change is so great that it cannot be dealt with by

current structures, both structures and symbols may be transformed. For example Nero's comments above, where the number of important villages is reduced to four dominant villages: the structural change is in leadership, and the symbolic is in the origin myth.

Another key point concerns boundaries. Smith has made clear that boundaries are blurred within social organisational levels. The principles behind social structures are not static, but fluid, with multiple meanings depending on context, such as age, rank, and descent. Therefore, Smith could not specify a singular model of social structure. The link here is with landscape. These points apply in the same manner, whereby there can never be one landscape model. Different contexts of social group activities equate to different meanings of structuring principles, and as such different perceptions and meanings of landscape. These extend across social and physical boundaries, etic and emic, and are the result of processes of interaction rather than isolation or contradiction.

4.4 Archaeological remains of settlement

Traditional Stonework Villages

Stonework villages have commonly been called 'Traditional Villages' as they are made from basalt cobbles formed into platforms for houses (*blai*), and meeting houses (*bai*); into docks (*diangel*), stone paths (*chades*), wells and bathing areas, as well as stone faces (*klidm*), sitting posts (*btangch*), and ceremonial display tables (*oleketokel*). As such, they represent the youngest and the form of settlement most easily documented archaeologically in Palau. Most Traditional Villages were occupied in the 1800s and in 1910, Krämer (1919) recorded 235 Traditional Villages in total on Babeldaob and Koror, although 151 of these were abandoned.

Recent archaeological studies suggest that Traditional Villages may have been built and occupied as early as AD 1179-1400 (Liston 1999a:378). However, there have been difficulties relating some charcoal samples contextually to stone features. A review of radiocarbon determinations suggests Traditional Villages were occupied closer to ca. 500 BP (Phear et al 2003). The earlier radiocarbon determinations may indicate activity at the sites prior to village settlement.

Pre- Traditional Village settlement

Traditional villages represent the only direct form of evidence for village organisation in Palau, in terms of actual physical remains. As discussed in Chapter Two, the terraces and monumental earthworks are argued by IARII and others to represent a socio-political system maintained by highly structured chiefdoms. Earthworks are thought to have functioned as fortifications, territorial markers, and symbols of chiefly power (e.g. Liston 1999a; Liston & Tuggle 2001; Wickler 2002). However, occupation residues for villages during this time remain elusive. The majority of cultural remains that have been recovered are pottery, small quantities of chert flakes, and charcoal. There is evidence for temporary settlement in the limestone Rock islands dated to 1000 – 500 cal. BP, with two early outliers at 2300 and 1800 cal. BP (Phear et al. 2003:257). As many of the sites are located in caves, these remains most likely represent temporary camps used during fishing excursions, rather than village occupation.

Upland occupation deposits represent settlement on Babeldaob before earthwork construction, at ca. 2400 – 1550 cal. BP (Phear et al. 2003), although IARII assert that "definite" midden deposits associated with thin black-ware pottery are as early as 2800 - 2400 BP (Athens & Ward 2001:165; Welch 1998; 2001). Such deposits, uncovered predominantly during IARII excavations, include buried and exposed paving, platforms, postholes, pits and burial pits, and pits with ceramic vessels, and most sites are in northern Babeldaob:

Melekeok, Ngiwal, Ngaraard and Ngerchelong. In Ngaraard, there appears to be a period of overlap between upland occupation and earthwork construction. I will return to this in section 4.5.

IARII also claim to have discovered a new site type in the uplands, "Fortified Hilltop Sites" (Welch 2001:180) or "Hilltop Ring-Ditch Fortifications" (Wickler 2002:74). Excavations on Ngerulmuud Hill (B:ME-11:1) in Melekeok disclosed a ring-ditch and occupation deposits containing thin black pottery and chert flakes, with dates ranging from 2300 – 1600 cal. BP (see Liston et al. 1998; also Pantaleo 2000). However, the age of the ditch is unknown, and may not be contemporaneous with the occupation deposits (Welch 2001:180; Phear et al. 2003:260).

Two sites with crowns and terraces also have encircling ditches - Engoll Hill (B:ME-6:T1) a crown with a ring-ditch in Melekeok, and another crown with a circular ditch in Ngiwal (B:NI-1:T2). They have age estimates of 1600-1500 cal. BP (Phear et al. 2003:257). IARII situate them within the fortified hilltop site category. As the dates overlap with the upper end of Ngerulmuud Hill's time range, however, it is quite possible that construction of the ditch on Ngerulmuud Hill actually took place around 1600 BP, rather than 2000 BP (*cf.* Wickler 2002). Yet, the relationship, if any, (*cf* Rainbird 2004) between hills with ring ditches and modified hills with crowns and ring ditches needs further investigation before making a firm classification as a separate site type. Hence, Phear et al. (2003) consider both Engol Hill and the site at Ngiwal within the monumental earthworks category rather than in the separate functional category, 'Hilltop Fortifications'.

Colonisation Issues

Establishing the origin of colonisers to the islands of Palau, as well as Micronesia, has been a problematic affair. For Palau specifically, Osborne originally proposed that founding populations derived from the Philippines or

Indonesia, based on stylistic similarities in material culture, and records of drift voyages from these islands (Osborne 1961; Osborne 1966). While these two 'homelands' have remained popular in archaeological discussions, neither can be confirmed based on current evidence, although some favour the Philippines (e.g. Athens & Ward 2001; Bellwood 1979; Craib 1999; Kirch 2000; Wickler 2002b). Others have proposed colonisation of Palau and Yap from the Marianas, where Micronesian settlement was argued to have begun (e.g. Intoh 1992). However, evidence to support settlement of Palau from the north is limited to similarities in pottery types, which is by no means definitive of colonisation 'relatedness'.

Another line of evidence invoked by researchers is linguistics. An interesting relationship exists between Palauan and Chamorro languages (the latter is spoken in the Marianas in the northern chain of islands), where ties are strongest to the Austronesian languages of the Philippines and Indonesia than to neighbouring languages, which are predominantly Oceanic. Initially, Blust (1977) proposed a Malayo-Polynesian (MP) subgroup of Austronesian, based on phonological, lexical and grammatical innovations. Palauan and Chamorro were classified further to Western Malayo-Polynesian (WMP), which contains all languages not included in the Central-Eastern Malayo-Polynesian (CEMP) language group (see Figure 4.1). However, Zobel (2002) has recently proposed a revised classification using verb morphosyntax. Palauan and Chamorro are here classified as a subgroup of Nuclear Malayo-Polynesian (NMP), along with Western Indonesian languages (see Figure 4.1). The implications of this new classification for Palau is that Sulawesi is proposed as a "good candidate for the center of Nuclear Malayo-Polynesian dispersal," (Zobel 2002:431-432), suggesting a possible homeland, for the language at least. [13]

[13] Zobel does add that NMP languages may have been spoken in other areas such as the Philippines, which may have later been replaced by focus-retaining languages. Therefore Palauan and Chamorro speakers could have come from areas outside of the present day NMP area (Zobel 2002:432). Also see Szabo and O'Conner (in press.) for a discussion of the limitations of ethno-linguistic models to archaeological interpretations.

A veil of uncertainly still shrouds the origin/s of Palauan colonisers. In the Pacific, Lapita settlers are believed to have colonised Remote Oceania around 3500 – 3400 cal BP, and then expanded outwards to the east. Their movements are characterised most famously by dentate stamped pottery. Yet, in Palau and most other Micronesian societies, there are no comparable defining elements in the material remains to establish a clear link to a colonising group or groups (although see Wickler 2002 for a discussion of similarities to the Lapita mode of dispersal, cf. Clark 2004).

Archaeological evidence of colonisation

In the 1960's Osborne suggested a 'stepping-stone' model placing Palauan colonisation some 4000 yrs BP, in line with the Marianas and Yap (1958:164; Osborne 1966:464). Supported initially by archaeologists (e.g. Takayama 1979; Takayama et al. 1980), this sequence was later revised by Masse and his colleagues, when they concluded that there was little evidence for settlement beyond A.D. 700 (Masse et al. 1984:120). Masse (1990:223) later modified this supposition and suggested that settlement occurred "no earlier than the Christian era, and perhaps as late as A.D. 200-400". With settlement of the Marianas placed around the second millennium BC, Masse (1990:224) rejected the idea that Palau was a 'stepping-stone' to the north (see Rainbird 1994 for an overview).

Projects initiated in the 1990s, such as research by IARII on the Compact Road Project (CRP) revised these sequences. The first new sequence spanned beyond 2000 BP based on 16 radiocarbon determinations from the Survey Phase of the CRP in 1996 (Wickler et al. 1998). When combined with research in the Data Recovery Phase, radiocarbon ages on cultural deposits congregate around 3000-3400 cal. BP (Liston 1999b). Colonisation of Palau was extended back to about 4500 BP, though, on the results of IARII's palaeoenvironmental investigation (Liston 1999a:386; Welch 2001:179), notably at Ngerchau. Pollen from a

domesticated crop (*Cyrtosperma chamissonis*), and disturbance indicators were identified in association with radiocarbon determinations. In sum, the evidence was interpreted as indicating human presence at ca. 2500 BC in the Palau archipelago (Athens & Ward 1999; 2001).

A critical review by Phear et al. (2003) addressed archaeological age estimates for settlement in Palau. Their results denote a cluster of dates on human remains from burials in limestone caves, at ca. 3000 BP (e.g. Fitzpatrick 2002a; 2002b; Reith & Liston 2001). Excavations on Ulong Island (Clark 2004; Clark & Wright 2002) have also produced age estimates from a cultural deposit placing human occupation at the site from 3000-2650 BP (Clark 2004:27). These latest determinations support the proposition made by Phear et al. (2003) for colonisation of Palau by at least ca. 3000 BP.

A compounding factor concerns possible contamination of dating samples by lignitic deposits containing old carbon. This issue was taken up in a recent analysis where the discrepancy between the palaeoenvironmental and archaeological evidence for colonisation of Palau is directly addressed (Anderson et al. in press). While Athens and Ward (1999) did consider the potential problems arising from lignite contamination in swamp deposits, they were unable to distinguish contaminated materials at a fine-grained level (Athens and Ward 1999:102). Results of the recent study have determined that lignite contamination can be identified by measuring the carbon-content of dating samples (Anderson et al. in press). The Ngerchau core is being re-examined in light of these results, in a joint project between IARII and the ANU.

Summary

Palauan prehistory is complex and multi-faceted, and represents a range of settlement patterns in a modified landscape. Palau appears to have a long history of contact and interaction with external cultures, which has no doubt affected social organisation, and transformed elements of Palauan culture and

traditions over great time depth. Indeed, the diversity seen in Palauan material culture and language is considered by Parmentier (1987:39) to illustrate "in the end, its [Palau's] culture has molded and been molded by diverse external influences."[14] Furthermore, Rainbird (2004) places significant accent on interaction in his study of Micronesia, in an effort to break down the long-standing perceptions of island cultures as static, and bounded. He argues for processes of fluidity and fusion, moving within and between the spatial and physical boundaries of cultures (Rainbird 2004:1). Rainbird defines the complex history of the Micronesian islands as "a history of contact and communication continuing processes of fusion and revealing little evidence of isolation" (Rainbird 2004:245).

When considered together with evidence for colonisation in the Marianas, human dispersal into these western Micronesian islands appears to have occurred concurrently with, or just after, Lapita dispersal into the Bismarck Archipelago (see Clark 2004:31). Although linguistic evidence establishes some similarity between Chamorro and Palauan languages, linguistics cannot pinpoint a particular homeland for the prehistoric colonisers of Yap and Palau.

4.5 The study area: Ngaraard State

Physical and geographical attributes

The bulk of Ngaraard is located in the north where Babeldaob narrows to a thin neck, which is less then 1 km wide at its most narrow point (Figure 4.2). Its northern border is with Ngerchelong, and its southern boundary extends ca. 2.5 km into the main body of Babeldaob, where it meets the northern limits of Ngardmau on the west, and Ngiwal on the east.

[14] However, Parmentier does not seem to think these 'influences' came from other Micronesian islands. After reviewing the evidence for pottery manufacture, he states, "Belauan pottery bears little resemblance to the pottery of its Western Micronesian neighbours, Yap and the Marianas; and its unique simplicity and stylistic continuity suggest a long period of cultural isolation and panarchipelagic uniformity" (Parmentier 1987:36; *cf* Rainbird 2004).

The topography is dominated by the central ridge system of Babeldaob, Rael Kedam, which divides the east from the west. Many smaller spurs extend off this central line into the lowlands, swamps, and taro pond-fields. The highest point in the landscape reaches nearly 200 m above sea level.

Unlike most other States, Ngaraard encompasses land on both east and west coasts. The east coast is distinctive for a rare feature of the Babeldaob landscape - a sandy beach zone. Estuaries drain into this beach zone, and to the south there is a large mangrove population. The reef is very close to the shore and the water is shallow, although a small number of deep channels run into the deeper water. In contrast, the west coast is characterised by dense mangrove forests, and the reef edge is a significant distance away. This section of the coast also has more fresh water drainages than the east.

Vegetation History

A palaeoenvironmental investigation of the Ngerchau Core by IARII suggests that the district was originally forested. At ca. 4500 cal. BP the presence of grass pollen and fern spores indicate openings in the forest canopy, as these plant types require plenty of sunlight to survive (Athens & Ward 2001:168). Small mangrove populations are suggested by a low level of *Rhizophora* and *Sonneratia* pollen grains (Athens & Ward 2001:168). An abrupt change is clear from ca. 4500 – 2700 BP, where mangrove pollen rapidly increases, and sedge and grass levels are low. Human presence is argued to be evident through identification of eight grains of *Cyrtosperma* (swamp taro) which is known to be an introduced crop in the Pacific (Athens & Ward 2001:170-171). Athens and Ward (2001:170) argue for a near three-fold increase in charcoal counts at ca. 4200 BP, "implying a significant change in the fire history of the Ngerchau catchment," which is used to reinforce the argument for human presence during the 5th millennium in Ngaraard.

The greatest change in vegetation occurs from 2750-2650 cal. BP. A peak of tree and shrub pollen, the presence of *Areca,* which only occurs in this zone, and a strong signal of *Cocos* pollen is argued to represent agroforestry and forest clearance (Athens & Ward 2001:170). Pollen from *Pandanus* and grasses, which also peak in this zone, are said to indicate a "landscape conversion from forest to grassland/savanna," and charcoal counts are very high: "this abundance level coincides with peaks in key savanna indicators suggesting landscape clearance, transformation to savanna formation, and fire maintenance for vegetation control" (Athens & Ward 2001:170). The cause of these vegetation changes, according to Athens and Ward, is human agency.

Current Vegetation

Savanna, or *ked,* and lowland forest have remained dominant in the environmental landscape of Ngaraard. Savanna grasslands cover most of the ridgeline, and typical species are sword grass, *Miscanthus floridulus (banga ruchel* or *medecherecher bokso),* club-moss, *Lycopodium cernuum (oleichula beab),* pitcher plant, *Nepenthes mirabilis (meliik),* screw pine, *Pandanus tectorius (ongor),* and a white-flowered shrub, *Melastoma malabathricum (matakui).* Secondary vegetation is also found in the grasslands, e.g. a successional tree, *Macaranga carolinensis (bdel),* wild hibiscus, *Hibiscus tiliaceus (chermall),* and ixora, *Ixora casei (kerdeu).*

The majority of forested areas are located in the lowlands and coastal plain, extending upwards to the foot of terrace complexes in the ridgeline, although there are exceptions such as the Traditional villages, Ngetecherong and Desengong, which are heavily forested. Dominant species in the uplands include the endemic tree *Campnosperma brevipeliolata* (*kelela charm* of *kiu),* sumac, *Rhus taitensis (eues),* and the tree fern *Cyathea lunulata (eluu).* In the coastal plains – the endemic tree *Horsfeldia amlkaal, (emeklachel),* betel nut, *Areca catechu (buuch),* banana, *Musa* spp. *(tuu),* the ti plant, *Cordyline fruticose (sis),* and the coconut palm, *Cocos nucifera.*

Wetlands with large taro pond-fields are located on the east coast of the State, and not on the west. To the Palauans, *"A mesei a delal a telid"*, "the taro patch is the mother of our life" (Merlin & Keene 1990:15), and the crops currently grown in Ngaraard include both *dait* or true taro, *Colocasia esculenta,* and *brak,* the giant swamp taro *Cyrtosperma chamissonis.*

Cultural background

Socio-political organisation and Ethnography

According to Parmentier (1987:62), the "poetic" name of the region was Kerradal, and the "archaic" name was Ngerringal. No one appears to know how, why or when the name was altered to 'Ngaraard' (Olsudong et al. 2000:9). Comprised of five regions (Figure 4.2), the village Chol (B:NA-5) represents the northern boundary. Located immediately to the south is Chelab (B:NA-3), then Ngebuked (B:NA-4), Ulimang (B:NA-2) and Ngkeklau (B:NA-1) (Olsudong et al. 2000). In times past, each of the five villages were independent. However, a chief, *Mad er Ngebuked,* has ruled the district since historic times, in the capital village of Ngebuked (Olsudong et al. 2000:9).

When Krämer visited Ngaraard in 1911, he recorded 478 occupants, 12 villages, and 20 extinct villages (1919:56). Each of the villages have numerous legends and stories pertaining to their creation and history. According to both Hijikata (1993) and Krämer (1919), one of the oldest and most important villages in Ngaraard is Chelab, traditionally a child of *Lild*[15]. Krämer (1919:71) claims that this village was known far and wide, "[w]hen we discussed the history of the Ngarard district, we mentioned the fact that Cantova had heard of Yalap [Chelab] through his Caroline natives even before Palau was discovered." In 'ancient' times, Chol was initially one of the 12 sub-villages of Chelab. It was

[15] The "Children of Lild" is another creation story reported by Hijikata (1993), possibly an intermediate stage between Chuab and Milad. Lild is bamboo, and the story is specific to Chelab village in Ngaraard.

known as Eim el Chol, which means "five Chol", as it was composed of five villages (see Olsudong et al. 2000 for further details).

Ulimang village has a similar history to Chelab. Oral histories describe it as dominant at one time in Ngaraard, and it was constantly at war with Ngebuked. This caused numerous changes in boundary location, moving further into Ulimang territory each time. After the fourth war,

> the warriors from Ngerutoi of Ngardmau combined their forces with Ngebuked and swept down upon Ulimang, killing a brave man of the place by stoning him to death.....Ulimang was no longer a threatening force and Ngebuked took Ulimang under its wing (Olsudong et al. 2000:29).

Henceforth, Ulimang was considered a child of Ngebuked, and both villages are presently close. Ngaraard in general has legends describing intense warfare with neighbouring villages and districts.

According to migration histories, the people of Ngkeklau are from Yap. The Yapese are said to have settled in the region on a journey to obtain limestone to make their stone money (Olsudong et al. 2000:62),

> Those who landed at Ngkeklau were too tired to travel any further and so they decided to settle in the area. Since they were the first to settle the area, they named it Ngkechelau after their place in Yap. The later settlers could not pronounce Ngkechelau, and so the pronunciation .....was transformed to Ngekechelau and then to Ngkeklau

The highest standing village of Ngaraard is Ngebuked, and the three sites focused on in this thesis are located in this village area. According to legend:

> Ngebuked was said to be the first born of Imeliik [Aimeliik](Ngerbung), the daughter of Milad. Being the first born, Ngebuked gets to sit with the other cornerposts of Palau. The four cornerpost[s] of Palau are the four children of Milad, Ngeremlengui, Melekeok, Imeliik, and Oreor [Koror]. But because Imeliik is a girl, she can not sit in the *bai* with her brothers. Therefore, her first born, Ngebuked gets to sit at Imeliik's seat in the *bai*. And because Palau is a matrilineal society, children of the women are the heirs. Therefore, Ngebuked is entitled to take his mother's place among her brothers in the *bai* (Olsudong et al. 2002:22).

When Krämer (1919:64) visited Ngebuked in the early 1900s he commented:

> Ngabuked [Ngebuked] was a stately and attractive place. The principal stone road from north to south is just about one kilometer long; the arrangement shows that the village was rich and that it has conducted many successful wars.

In 1860 Semper (1863:138) recorded warfare with Koror, and according to Krämer (1919:62) "Ngabuked seems to have been very quarrelsome."

Ngebuked is situated between Ulimang and Chelab village areas, and contains a number of historic and prehistoric sites located and extending from the central ridgeline, along with sites located on the east coast. The villages of Ngebuked were Ngetecherong, Ngeskii, Ngerdesang, Klou el Taoch, Desengong, Ngermedei, Ngertuker and Ngeteluang. These are now abandoned. Fifteen sites have been recorded by DCA, and only two of the seven villages outlined here have been located and recorded. Six out of the fifteen sites are called terrace sets, and four are stone features. Two docks and a taro patch have also been identified. IARII have undertaken further survey in the area, and some new sites have been identified (Jolie Liston pers. comm.), but the details are not yet available.

The Prehistory of Ngaraard

Numerous archaeological researchers have studied Ngaraard (Beardsley 1996; Blaiyok 1989; Henry et al. 1996; Liston 1999a; Liston & Kaschko 1998; Masse & Snyder 1982; Olsudong et al. 2000; 1966; Osborne 1979; Snyder & Butler 1990; Snyder & Butler 1997; Wickler 1994; Wickler et al. 1997). While Osborne's investigation was predominantly survey-based, the remaining studies were undertaken as contractual investigations and/or CRM projects. The largest body of recent information comes from research by the International Archaeological Research Institute Inc. (IARII).

In 2000, the DCA listed 99 sites in the Ngaraard region, 39 of which are designated terrace sets. Other features include 25 traditional villages, seven

docks, as well as individual stone features, taro patches, petroglyphs, and historic sites. However, 21 Traditional Villages were built on or incorporate terraces, but have been classed as Traditional Villages.

Ngaraard is home to several of the earliest sites recorded on Babeldaob. As previously discussed, palaeoenvironmental evidence suggests human presence ca. 4500 BP. However, this is not supported by the archaeological record. The earliest potential settlement site in the lowlands is in Eoulbeluu village in southern Ngaraard. Excavated by IARII, a charcoal sample that was associated with numerous thin black pot sherds was submitted for dating. The age estimate was 2500 ± 70 BP (Kaschko 1997:534-538). However, Welch (2001) reports that the site was disturbed. A sample derived from further to the south has a radiocarbon determination of 356 ca. BC - cal. AD 70 (cited in Wickler 2002:73), but it too seems to be the result of slopewash.[16] Liston (1999a:52) asserts "[a]lthough internally out of sequence, the assays indicate cultural activity in the area by ca. 2, 500 years ago." The most secure determinations are significantly later, within the first millennium AD (Liston et al. 1998b).

Ridgeline sites

Securely dated sites in the uplands of Ngaraard indicate early settlement on the ridgeline, although these sites are generally not considered to represent colonisation. At present, the two village areas with land and sites in the ridgeline are Ulimang (B:NA-2) and Ngebuked (B:NA-4) (Figure 4.3). In total, both village areas have 17 sites classified as terraces, and 10 Traditional stonework villages.

Imengel (B:NA-2:T4), a site located in the ridge saddle, sits above the stonework village of Ngerdermang (B:NA-2:10) (Figure 4.3). A platform at the site is associated with the stonework village occupation. But deposits beneath the

[16] The Palau 2000 Project of the ANU returned to Euolbeluu and was unable to locate an original occupation deposit (see Phear et al. 2003).

platform (Feature 1) date to an earlier period. One of two dates seem reliably linked to a cultural horizon, 2470 ± 70 BP (Liston 1999a; Liston et al. 1998a; Wickler 2002b, see also Phear et al. 2003). Although the type of activity represented by this deposit is not apparent at this stage, IARII argue that the site records human presence in the uplands some 2000 years BP.

More definitive evidence is found on the ridgeline between Toi Meduu (B:NA-4:12) and Roisingang (B:NA-2:5), another crown and terrace complex (Figure 4.3). IARII monitored the construction of a dirt road as part of the CRP and numerous sites were uncovered. Some had complete buried ceramic vessels, or portions of vessels, and were located at regular intervals along the ridgeline in depressions in the soil (Welch 2001:181; Wickler 2002:78, citing Jolie Liston and David Tuggle, Pers. comm.). The pots are associated with small stone-faced terraces, stone alignments and pavements, low earth platforms and artificially levelled surfaces. Welch (2001:181) asserts

> although it was difficult from the exposed remnants to define the shapes or sizes of the former structures, there is no doubt that each of these mounds was once the location of some type of structure.

It is reported that some sites had distinct "ceramic caches" over which a platform was constructed (Welch 2001:182). Three ceramic types are named: thin bowls like thin black-ware pottery, deep bowls and collared bowls that both have thicker walls, and were frequently found with the latter inside the former. Although neither human remains nor residues were recovered, burial is high on the list of possible explanations.

Ten radiocarbon determinations on samples associated with the pottery (David Tuggle pers. comm.), cluster between 1860 and 2150 BP, which highlights an overlap with some early terrace sites in the area (see the discussion on Rois, next section). These deposits are interpreted as evidence of ritual activities. Liston and Tuggle (2001) also maintain that these deposits represent villages. However, the field reports with the details of these sites have yet to be

distributed outside of IARII and associated institutions to the Compact Road Project. As such, it is difficult to acknowledge these remains at this stage as representing 'villages'.

In addition, prehistoric remains have been found on Roisingang (B:NA-2:5) (Figure 4.3). Roisingang has a small crown and terraces, a stone platform, and a retaining wall on the southern terrace made from coral. Liston and Tuggle (1998) suggest a burial in the crown or 'knob' of Roisingang, as a fragment of human bone was found on the surface near a buried coral boulder exposed by erosion. Other burial pits are said to be located on the topmost terrace that may date earlier than the earthen platforms discussed above (David Tuggle pers. comm.). As in the case of the upland sites, we await release of the reports on Roisingang to obtain further details.

Earthwork sites investigated in Ngaraard

While many sites have been described through survey, excavations have provided the most valuable information. Excavations have only recently been carried out in Ngaraard. IARII excavated at four terrace sites during the Data Recovery Phase, of which two are situated in Chelab. The crown and terrace site, B:NA-5:9, has a ditch that cuts horizontally across its southern slope (Liston 1999a:51). Two test units were placed at the site, in which no cultural deposits were recovered. The site's function is said to be defensive, as a lookout.

Utaol (B:NA-5:T1) was another site investigated. It is a small crown with a ditch on its northern side. Three trenches and two test units were excavated, and a dense cultural deposit (LIII) was found. The base of this layer is described as a "trash pit," and a charcoal sample produced a date of AD 1161-1398 (WK 5907) (Liston 1999a:52).

The site named Tund, B:NA-3:1, is located in Chol. Excavation at this crown and terrace complex with a partial encircling ditch provided a large corpus of

information. An excavation on the crown suggests three phases of construction, within AD 650-1000 (Liston 1999b:42; Liston et al. 1998a:198). Two outlying dates may indicate early occupation in the second millennium AD, and a final construction date is posited to be ca. AD 1282-1437 (WK 5912). The final site IARII investigated was Rois, which I will detail in the following section.

Investigations by other researchers include that of Henry et al (1996) in Chol and Ngekeklau villages. Of particular note is site B:NA-5:7, a crown and 'brim' terrace. Excavation on the surrounding 'brim' terrace revealed a hearth, and charcoal samples dated to 1030 ± 80 BP (Beta 92160). A cultural deposit in Layer II of the terrace appears slightly older, 1260 ± 50 BP (Beta 92165). The oldest date, in association with pottery and lithics, came from Layer III and has the age estimate of 1640 ± 50 BP (Beta 92164) (Henry et al. 1996:22-24). The hearth especially suggests potential use for habitation, although it may have been only of a temporary nature. A terrace site in Ngekeklau, B:NA-1:4, also revealed a cultural layer that produced a radiocarbon determination of 950 ± 80 BP (Beta 92159). It is unreliable, however, because a bullet in the deposit suggests disturbance.

Beardsley (1996) undertook some small excavations as part of a contractual investigation. She provides a discussion of B:NA-5:7 and B:NA-1:4. Most useful are her descriptions on construction techniques. For B:NA-5:7 she describes the technique of cutting into the hill slopes, with the fill representing a series of deposits with an increase in saprolite chunks and sizes throughout (Beardsley 1996:43). Beardsley placed two trenches on B:NA-1:4, where she claims to have identified gouge marks on the surface of the saprolite (Beardsley 1996:68). B:NA-1:3, a terrace complex, also revealed saprolite fragments which Beardsley (1996:76) maintains "is an expected by-product of the construction process."

Summary

The landscape of Ngaraard is rich in prehistoric cultural remains. The physical landscape is one plentiful in marine resources, with easy access to the reef as well as deep sea species. Prior to the formation of the taro pondfields in the Ulimang village area, a small embayment would have existed. This may have been highly attractive to early settlers, as well as the high ridgeline with clear views of Babeldaob and beyond. The ridgeline in particular represents an exciting area in which to undertake archaeological investigation, as the foregoing discussion has shown. The selection of Ngemeduu, Toi Meduu and the Rois complex for investigation in this thesis was due in part to this evidence for earlier settlement. The following section presents a synopsis of previous investigations at these three sites.

4.6 Previous investigations of Ngemeduu, Toi Meduu and Rois

Krämer was the first to describe Ngemeduu during his ethnographic survey of Ngaraard in 1919. In general, he described earthworks as either "pudding hills" or "terraced mountains," and Ngemeduu is classed as one of the latter (Krämer 1919:58; 261). When questioned by Krämer, Palauans called the earthworks something quite different, *delu siaog*, which means 'coconut palm steps'. It is possible that this is a localised term for earthworks.

Krämer gives an interesting description of Ngemeduu, having climbed to its summit:

> It is 130 meters high and consists of red loess; it is covered with grass and small shrubs. The upper part of the mountain has six terraces. The horizontal areas, which encircle the mountain almost entirely, and the vertical areas which slope down at an angle of 45 to 60°, measure as follows, from the foot to the peak: the topmost peak has an area of about 12 square meters. In its center there is a rectangular depression, 8 by 18 meters, which somewhat resembles the foundation of a house (Krämer 1919:261-262).

With a clear view of the entire region, Krämer regards Ngemeduu as striking, in part due to its barren *ked*. Of interest, however, are his descriptions of the site,

which do not correspond with the appearance of the modern-day Ngemeduu. I will discuss this disparity further in Chapter Five.

In contrast, Hijikata (1993:64) views *ked* as unforested hills, some of which have *bukl:*

> ..on the tops of mountains or small hills there is a dome- or trapezoid-shaped protuberance. Islanders call it *bukl. Bukl* means something that is swollen, or a lump. It is not a specific term for *ked.* There are several types of *bukl.*

Hijikata illustrates eight *bukl,* which are now commonly known as 'crowns' (see Figure 4.4). Like Krämer, Hijikata does not describe Ngemeduu as a *bukl,* but as a *ked,* and so too with Toi Meduu (Figure 4.4). Unlike Krämer, it does not appear that he traversed the site.

A noteworthy observation by Hijikata is his description of stone monoliths with human faces (Figure 4.6 a) which are located on the ridges that connected Ngemeduu and Toi Meduu:

> Figure 3-(g) [4.6b.g] is located on the ridge of Toielmeduu [Toi Meduu], which has a gentle slope and is rather low, next to Ngemeduu. Figure 3-(f) [4.6b.f] is some distance from the top of the *ked* of Tabremedei, which is a hill beyond Toielmeduu. Therefore, most of the human figures remaining here and there in this style were probably originally located at such places (Hijikata 1993:62).

Hijikata offers an insightful study on the stone faces, or *klidm,* of which he identifies two types on Babeldaob– the oldest representing human skulls, and the later monoliths, human faces (Hijikata 1993:23-24) (see Figure 4.6 b). A significant correlation is between the *klidm* found in association with Ngemeduu and Toi Meduu, and a hill called Roisang near Elab (Figure 4.7). This hill, which Hijikata attests was likely a *bukl,* had chunks of coral placed on top of it as a platform known as *Bailechelab,* and two skull-like stone faces. This is not an isolated occurrence in Palau as there are similar hills to this one throughout Babeldaob.

In addition, Hijikata specified the term *rois* to mean hill or mountain (Hijikata 1993:56). He recorded some *rois* as being places for the gods, particularly those involving *rois* in their name, such as Roisang, discussed above. All told, Hijikata thus used three terms describe earthworks: *ked, bukl* and *rois,* interchangeably at times.

Osborne (1966:237) surveyed the ridgeline as part of his study in the 1950s. His site descriptions are tricky to decipher and he classified all three sites in the ridgeline as either B 22 or B 35. A compounding factor is that he did not include the local names for the sites. Yet he did make the following notable observation regarding the spatial relationship of the sites:

> [t]here seems to be no dividing line, either a physiographic one or a cultural boundary area in the long series of terraced hilltops between Ulimang and Ngrard [Ngaraard].....the separation between the Ulimang terraces and the Ngrard ones is not clear; it is probable that there was none.[17]

Like Hijikata, Osborne identified a stone monolith present in the saddle between Ngemeduu and Rois, but it is uncarved. The stone faces must have either been relocated, or else overlooked by Osborne.

His commentary on Ngemeduu suggests a preoccupation with defensive fortifications as the function for these sites: "On this hill itself is an example of the deep cut and high crown that looks like a defensive measure, at least on Babeldaob" (Osborne 1966:237). The long ridgeline was perceived by Osborne to terminate in the south "near the probably fortified terrace front" (Osborne 1966:238).

The most detailed information on Rois stems from IARII research. As well as excavation, IARII conducted oral historical research on the site. Contrary to Hijikata's definition, IARII's informants reported that the name 'Rois' derived from a family/clan named Rois that used to live there. To quote Liston et al. (1998:326-327):

[17] Ngrard here is the village of Chelab. It was formerly known by this name and also Galap.

> One story describes Rois as the former home of a *meteet* (high clan) and brave man. A large stone platform with many *bluks* once occupied the site. The area below and to the north of Rois is called Chesur (a noun meaning 'to slap the faces of'), due to the many loud children that used to live there. The high ranking man, when awoken from his afternoon nap by the noise, would descend the hillside to *mengesuar* (verb meaning 'slap the faces of') the children. Occasionally these beatings would result in death. When this occurred, the bodies were carried up to Rois and slid down the slope before being taken to wherever they were to be buried. The ending of the story is vague. There were many graves on this terrace which people know about. One of the oldest women in Ngaraard can trace her ancestry there, through her father's side, but she does not know much about the place except those stories which have been shared with her.

An excavation was undertaken on the top terraces of the complex which were to be impacted by the construction of the Compact Road. The terraces of Rois are described as being 'stacked' along the ridgeline between Ngetcherong and Ngebuked traditional villages (Figure 4.8) (Liston 1999a:52), with a small 'crown' mid-way between the Ngemeduu terraces and the lower Rois terraces (Liston et al. 1998:308).

A top terrace in this complex had a low stone mound which was excavated using a back-hoe. At least three burials were recovered, with the remains of five individuals (three adults, one sub-adult, and one infant) represented along with seven other pits that may also have been burials (Liston et al. 1998a:352). Three whole pots were recovered, buried between two of the burial pits, and a mat of un-carbonised material, identified as sponge spicules, capped one possible burial pit (Liston 1999a:52). As the sponge must have come from the coast, its presence in the grave suggests a symbolic connection to the sea. Intersecting pits illustrate at least two burial events (Liston & Tuggle 1998) (Figure 4.9). Liston et al. (1998:355-356) reconstructs a sequence of events related to actual burial, beginning with a levelling of the area, with the small terrace subsequently constructed. Burial pits were then dug into the terraces, though separately over time, perhaps in two burial episodes. The completion of the

burials was said to be marked first by the placement of the pots, and then by a stone mound.

IARII report five dates from charcoal samples taken from the Rois excavations. Two are from the fill of two burial pits AD 220-470 (WK 6463) and AD 120-440 (WK 5889). One is from a pit of unknown function, and has the earliest date, 200 BC – AD 130 (WK 5920). The remaining two date a capping layer, AD 1000-1260 (WK 5921) and a culturally deposited clay layer, AD 120-420 (WK 5922). This is the earliest date for terrace construction in the region. As it overlaps with dates from the ridgeline deposits previously discussed, it lends support to the argument for habitation in the ridgeline during the early stages of landscape modification in the form of earthworks.

A relevant site to be included in this discussion is Ngeterchong Traditional stonework village (B:NA-4:4). It is located next to Rois, extending from the base of the western ridge, east to the foot of the ridge below (Figure 4.8). Excavation of this village for the CRP revealed two deposits that predate village construction. Some dates from the site are from samples taken from terrace fill, however, which suggests caution in their interpretation. One is dated to AD 80-420 (B-100018) and the other 860-1250 (WK 5981). Despite a lack of demonstrable association with particular cultural remains, Liston (1999a) sees value in the fact that they indicate some sort of 'cultural activity' in the area. A more secure age estimate was derived from a large pit with an age range that overlaps with earthwork construction in the ridgeline: AD 420-670 (WK 5893). The close position of this site to the ridgeline suggests possible contemporaneous habitation during earthwork activities, but does not provide evidence to support an argument for village settlement. However, Liston et al. (1998) describe the village as being built on terraces (although considered different to the 'crown and terraces' type of terracing). Thus, there may be further relationships illustrating occupation of the area before the implementation of basalt stone architecture.

Summary

It is clear that the three sites selected for sampling in this thesis are of significance to understanding Palauan prehistory. Not only are they visually dominant and imposing, but their names suggest a complex history in traditional times. The evidence for upland activities in the ridgeline prior to landscape modification with earthworks is unusual compared to most other areas of Babeldaob. Consequently, an analysis that considers these remains allows for diachronic insight into potential cultural processes taking place over time in the Ngaraard landscape, leading to the construction of the earthworks on the ridge. Traditional stonework villages in the area represent the last phase of landscape transformation in Palau[18]. It is rare for these villages to be excavated, because of their social and cultural importance to modern Palauan people. The excavations in Ngetcherong, therefore, represent an uncommon opportunity to interpret change and transformation in habitus through time and space in this distinctive landscape of the Palau archipelago.

[18] Not including the transformations in the Historic period and those occurring today.

CHAPTER FIVE

The Field Programme: Excavations in Ngaraard

This chapter discusses the excavation of Ngemeduu Crown and Terrace Complex (B:NA-4:11), Toi Meduu Crown and Terrace Complex (B:NA-4:12), and Rois Terrace Complex (B:NA-4:6). The excavation programme took place over two field seasons in 2001, as outlined in Chapter Three. The severe tropical storms associated with Typhoon Uta unfortunately prevented the completion of Field Season One[1]. Three of the five test units were not excavated to the C horizon, and two other trenches were not excavated as planned. Fortunately, Jolie Liston from IARII came to my aid. With the help of one of the field crew members, Liston returned to the three trenches after my departure, and placed cores using a hand auger to locate the C horizon. The second field season proved more fortunate in relation to the weather conditions.

5.1 Excavation: methods and field crew

Base camp was located in Ulimang village during both field seasons. My field crew consisted of local villagers from Ngebuked, Ulimang and Ngekeklau: Meked Ngermekur, Mathias Beketaut, Jenny, Rocky, and John. The number of field crew varied from two to four at any time on site. Fortunately, these villagers had been trained by IARII for archaeological work on the Compact Road, and were experienced in working in the often difficult conditions up on the ridgeline. Jolie Liston of IARII also gave assistance with useful advice, and helped with excavation and mapping when time was running short.

Large trenches were the main units of excavation. The size and orientation of each trench was modified on an individual basis depending upon the size and type of feature sampled. As the earthworks are predominantly comprised of

[1] Incidentally, this typhoon caused US $2-3 million dollars damage to Palau.

redeposited soil with few sub-surface features, the majority of information to be obtained concerned construction techniques and stratigraphic interpretations. Therefore, trenching allowed sampling over a large spatial area, and provided an excellent means of gathering data.

Excavation was solely by hand using spades, shovels, picks on occasion, and trowels. Mechanical trenching using a backhoe was neither logistically possible nor desired due to its highly destructive nature to the soil and cultural material within excavated trench-matrices. When the depth of a trench created movement difficulties, buckets and pulley ropes were used to remove the soil. A support made of giant bamboo was also constructed to stabilise one trench when its depth reached over 3 m. In all but four trenches, excavation extended vertically until intact C horizon (saprolite) was reached. Where the stratigraphy extended to extremely deep levels, a hand auger was used.

The provenances of charcoal and pottery located within a trench were measured and samples collected. Those located on sidewalls were removed after section diagrams were drawn. Any artefact concentrations or sub-surface deposits encountered within the trenches were excavated in a controlled manner using trowels, and point-provenance measurements were taken. All charcoal samples were wrapped in aluminium foil and placed in clearly labelled plastic bags, and pottery samples were bagged and labelled.

All sidewalls were cleaned and faced in order to aid stratigraphic interpretation. Layers were numbered from the surface extending vertically and designated with roman numerals, with sub-layers identified by lower-case letters (eg. Ia, IIb). Bulk disaggregated soil samples were collected from each layer, placed in separate bags, and catalogued at base camp in Ulimang Village. Soil samples were also removed at 5 cm intervals from one trench for pollen and phytolith analysis. Soil monoliths cut from *in situ* stratigraphy were collected from Ngemeduu for analysis back in the laboratory. Also, 10 litre bulk

sample soil samples were collected for each layer and screened through a 1/8" sieve as a control sample for each layer.

5.2 Ngemeduu Crown and Terrace Complex (B:NA-4:11)

GPS: North 07°37.857`, East 134°37.964`
Altitude: 179m above sea level

Description

Ngemeduu is a prominent modified hillside on the central ridge system in Ngaraard (Plate 5.1). The dominating feature is the rectangular crown, surrounded by a large terrace, with smaller terraces extending down its north-west (N-W) slope. The north side of the site is very steep, with a N-E facing scarp that extends to the forested lowlands below. The west face extends along a secondary ridge which is intersected by two roads. The first, an old dirt road created by the Governor of Ngaraard, stretches from the base of the ridge up to the crown. The second is the Compact Road, situated approximately 200 m from the base of the crown (Plate 5.2a, Plate 5.2b).

Remnants of a stone path (exposed by construction of the dirt road and heavy rains), extend across the ridge toe. The path is comprised of small angular to sub-angular basalt cobbles, which are different to the medium to large sized basalt rocks incorporated into Traditional stonework villages. It was probably constructed during the earlier upland occupation phase, as suggested by the presence of potsherds amongst the cobbles which are indicative of the earlier thin-black pottery. In addition, small pieces of coral are located amongst the cobbles.

Several basalt boulders are located on the southern side of the ridge, and extend to the base of the crown. Two are quite large – 1 to 1.5 m in height. Others appear to have fallen on their sides, and this may have occurred when the dirt road was constructed. Rim sherds and small basalt cobbles are also present on the ridge surface.

The west base of the crown has a mounded edge or 'berm' on the western extent that tapers as the encircling terrace extends around the crown (Figure 5.1). The encircling terrace spans 16 m at its widest point. The southern side of the terrace exhibits a steep edge that drops into a deep cut across the ridge, separating Ngemeduu from B:NA-4:12. The cut is known traditionally as Toi Meduu, which is also the name of B:NA-4:12. The northern side of the terrace is less steep and has three smaller terraces constructed down the slope. A stone alignment was identified on a terrace to the west. Contrary to Krämer's description, only four terraces in total were identified, rather than six. It is possible that the parts of the hill have slumped in the last 80 years, covering the terraces so that they are no longer visible.

The crown itself is unusual in that it has two rectangular depressions on its surface, again contrary to Krämer's descriptions (Figure 5.1). It is suspected that Krämer unknowingly perceived the two depressions to be one large depression, based on his measurement. The larger and more visible depression is located in the western half of the crown ('west depression'), which is 8.5 m wide (N-S) and 10 m long (E-W). The other, 8 m by 8 m, is located on the eastern extent ('east depression'). Measured at its base, the crown is 48 m long (E-W) and 30 m wide (N-S), and with current slumping it has a 50° slope. The measurements on top of the crown are significantly shorter, 36 m long (E-W) and 16 m wide (N-S).

On the eastern extent of the crown a 'knoll,' or 'peak' has been built. The Japanese measured the altitude of this modified hill during their occupation of Palau, as attested by a concrete survey marker. Ngemeduu is 181 m above sea level when measured to the top of the knoll. In order to comprehend the impressive size of this complex, it can be noted that it rises 9 m above the terrace below.

Vegetation

Vegetation on and around Ngemeduu is predominantly savanna, except to the east where forest is encroaching from the lowlands. Dominant species include false staghorn fern (*Gleichenia linearis),* sword grass (*Miscanthus floridulus),* screw pine *(Pandanus tectorius),* a white flowered shrub *(Melastoma malabathicuim),* and pitcher plant (*Nepenthes mirabilis).* Wild hibiscus (*Hibiscus tiliaceus)* is also present, a common plant found as secondary vegetation, and a young coconut palm (*Cocos nucifera),* which is usually found on coastal plains. The grasses on the encircling terrace were waist high on the eastern boundary, and half this size on the west. The vegetation was quite dense on the crown, especially within the depressions, which hampered the initial surface observations.

Field Season One

Excavation of Ngemeduu took place over both field seasons, with a total of 10 trenches and one test unit excavated.

Trench 1 (TR1)

TR1 was located on a cleared area of the crown within the west depression. Measuring 2 m by 0.4 m and oriented E-W, the trench bisected the prominent 'lip' of the west side of the depression, 3 m north of the southern corner of this feature (Figure 5.2).

Excavation ceased at a depth of 1 m when what appeared to be basal saprolite was observed. However, it was later determined that this was not intact C horizon, as it was loosely compacted. TR1 is one of the trenches I could not complete excavating due to the typhoon, so Jolie Liston of IARII returned to the site after my departure and used a soil auger to locate the base. The core was placed 1.4 m west of the eastern end of the trench next to the north wall. The auger attained a further depth of 1 m and exposed a lense of reddish brown silty clay mixed with saprolite. A hard body sherd was recovered at 194 cm,

along with a charcoal sample. Difficulty in coring and financial constraints meant the excavation had to be halted here, without locating the C horizon.

Stratigraphy

The north, west and eastern walls of the trench were profiled (Figure 5.3). It was immediately obvious that all strata were derived from anthropogenic 'fill'. However, *in situ* layers have developed in the depression since deposition of the matrix, layers Ia, I, III, IIIa, IV, IVa, IVb, and V (for descriptions see Table 5.1). This is attributable in large part to waterlogging in the depression, which has led to soil alteration by hydromorphic processes.

Layer V, a 7.5 YR 6/8 reddish-yellow clay, appears distinct from the other layers. It begins just outside the lip and extends eastwards in line with the curve of the depression (Figure 5.3). Separating LV and LVI is a ferro-manganese thick 'crust' (as it was initially termed) or iron pan[2], which follows the eastward curve of the depression. This is an unusual feature in the crown strata, and in fact it has not been found in any other excavations of crowns and terraces on Babeldaob.

Layer VI, is comprised of a mix of 2.5 YR reddish-brown clay and mottled saprolite (saprolite breccia). It represents the dominant 'fill' matrix of the crown, as it extends beyond the bounds of the depression. The charcoal sample associated with the potsherd was submitted for radiocarbon dating. The sample produced a date of 1993 (1912) 1822 BP (ANU-11641-2; Table 3.1). As this sample derives from fill, however, it does not date the time of construction; rather, the age of probable human activity from which the soil originated.

Layer II overlies this layer, forming the upper surface layer outside the depression, although it did not have A horizon developmental indicators. Layer II did not have any cultural material, or charcoal deposits. The southern wall

[2] See TR1a excavation notes for details on the iron pan's initial term as a 'crust,' and later 'reaction rim'.

had a large basalt boulder 80 cm below the surface of the lip that extends into LII and LVI. It may have been placed intentionally as support for the edge of the depression. A few sub angular basalt cobbles were situated in layers IV, IVa and IVb, but they did not form a pattern. Overall, there was a clear scarcity in cultural materials, with only one rim and one body sherd recovered, and likewise a scarcity of charcoal.

Coring programme

In order to track the spatial extent of LV and the iron pan, eight hand auger cores were completed, extending from the end of TR1 to the knoll on the eastern boundary of the crown. The cores revealed that LV was present within the limits of the two depressions only. The baulk area between the depressions was comprised of fill, with no indication of an iron pan.

The results of the eight cores therefore implied a complex stratigraphic history for the crown. The second field season focused on Ngemeduu in order to unravel this intricate history.

Field Season Two

Nine trenches and one 50 cm x 50 cm test unit were excavated on Ngemeduu during November-December, 2001. Seven trenches were placed on top of the crown, one on its southern slope, and one on the southern section of the encircling terrace.

Trench 1a (TR1a)

The entire surface of the crown was cleared over three days to expose all features and aid decisions on where to place the trenches. TR1a was placed near the western boundary of the depression in order to connect with the southern extent of TR1 (Figure 5.2). TR1a was 9.5 m long, 50 cm wide, and oriented along the N-S axis. A complete connection was made between the two trenches by extending TR1 by a further 20 cm E-W, to avoid cutting into the west lip. A 1 X

1 m extension was excavated to the north and west when movement became difficult in the 'L' intersection between TR1 and TR1a.

The entire length of TR1a was excavated to a depth 1 m deep within the fill layer (LVI) identified in TR1. Three cores were then placed to assess the depth of the C horizon. The first core (4.1 m north of the southern wall) hit a rock at a further 2.07 metres below surface (mbs) deep. The second (3.67 m north of the southern wall) hit a rock a 1.57 mbs, and the third (4.34 m north of the southern wall) hit a rock at 2.32 mbs. As the C horizon appeared to be at great depth, the excavation continued in a restricted section 2.5 m long in the centre on the trench. As the depth increased, the area was reduced again to 1.2 m long.

Excavation continued to 3.5 m deep, and exposed two new layers, LVII and LVIII (Figure 5.4). At this depth, however, safety became a paramount concern in the trench. A brace was constructed out of giant bamboo poles to prevent sidewall collapse, and placed in the trench (Plate 5.3).

Layer VII began at 2.41 mbs, and contained concentrations of pot sherds and charcoal samples. In particular, large portions of two vessels were exposed at 2.85 mbs on either side of the trench. A further 5 cm of excavation (using a trowel) uncovered another concentration of rim and body sherds from different vessel types. Basalt cobbles were also present along with what appeared to be bauxite nodules, and a few large charcoal samples.

Layer VIII began at 3 mbs. Excavation exposed abundant amounts of sherds and 0.5-1 cm sized charcoal pieces. By 4.32 m deep, the frequency of sherds had significantly decreased, though charcoal was recurrent. Also present were small yellow saprolitic rocks, basalt cobbles, and highly degraded bauxite nodules.

Excavation at this depth had become difficult, so a core was placed in the trench to locate the C Horizon. Core A, located in the middle of the excavation unit,

reached basal saprolite at 4.65 m deep. Coring continued a further metre to ensure it was indeed basal saprolite and not a lense.

Stratigraphy

The stratigraphy of TR1a is the same as TR1, with two new layers, LVIII and LVII, and of course the C horizon (Table 5.2). Figure 5.4 illustrates these two trenches, joined by the 'L' intersection. A minor stratigraphical discrepancy is visible between LIVb and LV. Pedogenesis is evident, highlighting soil processes taking place within the crown. Layer V is also significantly thicker in TR1, with a steeper 'lip' and thicker profile in general down to the iron pan. Plate 5.4 illustrates the extensive coverage of LV and the iron pan at the interface between TR1 and TR1a.

Layer VI has a large volume in this part of the crown. Observation during excavation identified concentrations of saprolite and clay throughout the profile, suggestive of different soil sources and depositional episodes. However, a general pattern was clear with a mixing between the two dominant matrices – a 2.5YR 3/3 dark reddish-brown clay and pink, yellow and white saprolite breccia.

Layer VIII, a 5 YR 4/3 reddish-brown clay, had abundant charcoal flecking and an average thickness of 1.5 m. The eroded bauxite pebbles, 2-3cm in size, are characteristic formations of laterite surface soils. Their location within the sherd and charcoal concentrations implied the layer was a former cultural surface and A horizon, possibly the original hill surface of Ngemeduu before modification. With this in mind, three charcoal samples were submitted for dating. All three dates (associated with painted pottery) illustrate an inversion of this layer –1870 (1400) 1390 BP (ANU-11658), 1610 (1530) 1420 BP (ANU-11687), and 2060 (1980) 1900 BP (ANU-11685) (Figure 5.4; Table 3.1). When considered together with the above stated evidence, these determinations support the conclusion that

that LVIII was the original the hill surface, and was placed as the originally layer of the crown.

Layer VII is of a similar matrix to LVIII, a 5 YR 4/4 reddish-brown clay, and has a smaller average thickness of 30 cm. It consists of a mix between A and B horizons, and bauxite pebbles. The origin of this layer appears different to LVIII, an interpretation based on the presence of different pottery types, and the matrix composition. One sample was submitted for AMS dating, and a radiocarbon date was measured as 1350 (1310) 1290 BP (ANU-11686; Figure 5.4; Table 3.1).

The iron pan

The geomorphologist, Professor John Chappell (Research School of Earth Sciences, ANU), visited Ngemeduu and observed the unusual stratigraphy in TR1a (Plate 5.4). His initial reaction was that the iron pan was some sort of 'reaction rim.' His field notes describe it as a dark red, hard haematitic rim, 0.3-1cm thick, with local earthy haematite penetrating 1-3 cm into saprolite breccia. To summarise, he concluded, based on the reaction rim and relict manganese veinlets, that LV had been transformed through hydromorphic processes. Originally, it was purple saprolite breccia. Indeed, Chappell's argument was that LV was originally LVI. However, it was unclear why the 'reaction rim' formed in the location observed in the profile of the depression. Further tests were needed to reach greater understanding, and these are discussed in Chapter Six.

Trench 1b (TR1b)

TR1b was located amongst a collection of basalt cobbles and sherds that were uncovered in the northern end of TR1a (Figure 5.2). The trench extended 1.5 m by 0.5 m and 1.5 m south of the northern wall of TR1a, and was excavated to a depth of 1.10 mbs. No evidence of a sub-surface feature was located.

Trench 1c (TR1c) and Trench 1d (TR1d)

Feature 1

These trenches were placed at the southern end of TR1a, in response to a line of small basalt cobbles, designated Feature 1. TR1c was located 90 cm north of the southern corner and was 50 cm wide (Figure 5.2). It extended 1.5 m east to a depth of 95 cm. This exposed further small to medium sized sub angular basalt cobbles. They veered to the south in a semi-circular fashion, and another small line extended in a N-W direction.

TR1d was excavated to expose the semi-circular southern cobbles of Feature 1 (Figure 5.2). It was placed at a right-angle to TR1c, 1.7 m long N-S, and 0.5 m wide. It uncovered additional cobbles that appeared to end in a mound, though extending approximately 50 cm S-E in a semicircular manner. Two further cobbles were uncovered as part of the semicircular alignment once the baulk between TR1d and the 'L' intersection was removed.

Two final units were excavated for Feature 1. East Extension One, a 1 x 1 m extension adjoined TR1c and TR1a. The alignment ended approx. 20 cm into this extension. East Extension Two connected to the eastern wall of TR1d. At 50 cm wide and 1.7 m long, it was placed to join TR1c to ensure the end point of the stonework feature was located. However, no cobbles were recovered in this extension (Figure 5.5).

It is probable that the basalt cobbles were incorporated as fill material for the crown, contrary to my initial thoughts. In fact, the cobbles are potentially remnants of a platform or other such feature used before terrace construction, located in the area from which the fill material was acquired. This proposition is strengthened by the recovery of potsherds and charcoal samples within the matrix surrounding the cobbles.

Feature Two

Feature 2 was exposed in the 1 x 1 m extension in the 'L' intersection between TR1 and TR1a (Figure 5.6), at ca. 1.43 mbs. It was excavated in four main phases. Discolouration of the soil and an arrangement of cobbles at 1.43 – 1.63 mbs suggested a possible pit-feature. Excavation continued in a reduced section, the northern 0.6 m x 1 m extension. Two further cobble concentrations were observed, at 2.10 mbs and 2.26 mbs. A small number of sherds were collected as the excavation progressed, some painted. The excavation was halted at a depth of 2.45 mbs at the point of which the occurrence of cobbles ceased (Figure 5.4).

It is unclear exactly what Feature 2 may have been, although the circular pattern of cobbles seen in Figure 5.6 might indicate a post support. On the other hand, cobbles may have been incorporated as fill material. Like Feature 1 the cobbles are within LVI, the main fill matrix of the crown. The soil between the cobbles, red clay, suggests that the cobbles likely originated from the surface of an unknown location. Saprolite breccia overlays the cobbles and clay matrix; multiple source areas were obviously utilised during construction of the crown.

Trench 1e (TR1e)

TR1e was oriented E-W in line with the southern extent of TR1a (Figure 5.2), although the trenches were not connected. This section of the depression appears ramp-like as it extends into the baulk area on a gradual slope, without a lip, unlike the western boundary of the depression.

TR1e was 2.9 m long and 50 cm wide, and excavated to a depth of ca. 85 cm (into LVI) with the stratigraphy resembling that of TR1 and TR1a (Figure 5.7). At the base of LV, however, some basalt cobbles were exposed on the southern extent of the trench. The trench was subsequently extended 70 cm to the south and 50 cm to the north in the western corner. Excavation revealed two circular stone piles designated Feature 3 and Feature 3a. The C Horizon was located

during excavation of these features, and I will discuss the strata of TR1e and these features together.

Feature 3 (Plate 5.5; Figure 5.8)

Feature 3 was a circular mound of sub angular basalt cobbles, ranging from 8 x 10 cm to 20 x 18 cm in size. These exposed cobbles were situated at the interface between LV and the iron pan. They were placed in an organised manner, and further investigation revealed that many were loose with hollows between and beneath them. Superficially, this feature resembled the burial mounds located and excavated during IARII investigations on the Ngaraard ridgeline (Jolie Liston, pers. comm.). Excavation continued in anticipation of this result, by placing a 50 cm by 70 cm test unit through the southern half of the feature.

At 95 cmbs two large cobbles were recovered as well as one white sherd. From 1.10-1.65 mbs a number of cobbles were exposed, and a 4 x 4 cm piece of degraded white coral was located at a depth of 1.90 mbs in the NW corner of the unit (Plate 5.6). Saprolite was located at 2 mbs in the east side of the unit, and Figure 5.9 illustrates a drop to ca. 2.4 mbs on the western extent. An additional piece of degraded coral was found just above the saprolite and slightly further west of the previous sample. There was no evidence of a burial, or of whole pots.

Feature 3a (Plate 5.5, Figure 5.8)

Feature 3a was located approximately 35 cm west of F3 at the same depth of ca. 58-60 cmbs. Composed of fewer basalt cobbles, this feature was 'C' shaped with the two dominant cobbles larger than those of F3, at 25 x 30cm and 23 x 20cm. The entire feature was excavated in a 90 cm x 125 cm unit.

Excavation to ca. 1.16 mbs exposed a large mound of cobbles in the NW and SW corners, which appeared randomly placed. Several rim sherds were located

amongst the cobbles and a piece of degraded coral was exposed at 75 cmbs on the southern wall.

Excavation continued to the saprolite– 2.40 mbs (although it is only about 2 mbs due to decreasing angle of the depression, see Figure 5.12). Many of the cobbles extended deeper into the saprolite and outside the boundary of the excavation unit (see Figure 5.10). In particular, a large basalt boulder (Boulder A) that appeared to be on its side, was exposed. The boulder extended from the mid-west section of the unit deep into the western wall, beyond the extent of the excavation. A collection of basalt cobbles were also situated at this depth (Plate 5.7). The surfaces of the cobbles and boulder were extremely friable, indicating initial stages of degradation of the basalt (which eventually results in saprolite). The large boulder resembled those located on the ridge leading up to the crown.[3]

One structural feature, a posthole, was exposed in the north wall of the unit (Figure 5.11). This posthole originally extended beneath the 'C' shaped cobbles, and a small cobble appears to have fallen into the posthole with the loose fill matrix.

Stratigraphy

Within the depression, the stratigraphy of TR1e was very similar to that of TR1a down to the iron pan, with a few minor differences (Table 5.3). Like TR1a, the iron pan extends to the surface of the crown, as the angle of the depression becomes level with the baulk. This supports the argument for a homogenous hydromorphic process occurring within the dimensions of the depression. One difference is that LV does not extend to the surface like the west side of the depression. A possible explanation is that differential pooling of water within

[3] Note that during survey of the ridgeline I noticed that four boulders/stone monoliths were located extending down the west slope of Rois Malk, a terraced hill to the SW of Ngemeduu. It is unclear if the boulders were placed on the hill slopes during upland occupation, and later incorporated into earthworks, or whether they were placed on the hill during earthwork construction.

the depression has led to disparate leaching of iron and the subsequent development of the iron pan.

The east wall profile of TR1e (Figure 5.7) illustrates the baulk strata, and it is similar to the TR1a and TR1 profiles. There are three further derivative layers between LII and LVI. Yet, the 'fill' matrix appears to be generally consistent across the width of the depression.

Of interest in TR1e is the extent of the iron pan, as it runs beneath F3 (Figure 5.9). The soil conditions beneath this feature must have been similar to those in the rest of the depression in order for the pan to have developed. The loose nature of the cobbles implies that water seepage and pooling may have occurred at a faster rate due to the hollows and loose soil between them. This stone feature may have supported a large post. When posts are pulled from the soil they may be rocked from side to side, altering the shape of the hole. Or, if the post is too large it may need to be dug out (see Butzer 1982a:306-308 for further discussion on archaeological postholes). In either case, once removed, the soil here must have been left loosely compacted, aiding rapid water seepage. The iron pan then formed over time whereby the manganese in the saprolite mix leached, and was replaced with haematite, around the cavity left by the post.

Indeed, when considered together with the posthole seen in F3a, it is likely that F3 did support a post. Both stone features were situated 'on' the iron pan, and the depth of the posthole for F3a is similar to the depth of the reaction rim of F3 (Figure 5.12). The F3a post may have been smaller than the F3 post, based upon the smaller size of the rock pile and that water seepage did not produce an iron pan. This could be the result of rapid in-fill of the posthole when the post was removed, compared to F3 where the soil was loosely packed.

The stratum beneath these features was different to that on the west side of the depression (Figure 5.12, Table 5.4, 5.5). A significant factor is that LVI and its

derivatives have a shallower depth – only 1.2-1.3 m of soil, compared to over 2 m in TR1a. The C horizon was also located over 2 m higher in TR1e than in TR1a. This suggests the hilltop was initially steeper on the eastern side.

The high density of basalt cobbles and boulders *beneath* F3a was not suggestive of a burial pit. They were most likely part of the fill material. The high density of cobbles, charcoal and pottery seen in LVIa (Figure 5.12) is consistent with the materials found in TR1a, and may also have been a platform or similar cultural feature prior to its incorporation as 'fill'. A charcoal sample from the upper portion of LVIa was submitted for AMS dating (sample C-1, Figure 5.12). The radiocarbon determination is 2041 (1580) 1265 BP (ANU-12121; Table 3.1).

Trench 1f (TR1f)

TR1f was located in the shallower east depression. This trench, measuring 3.5 m long by 50 cm wide (Figure 5.13), was an unconnected extension of TR1e in that it extended in an E-W direction on the east side of the baulk. Excavation stopped at 1.4 mbs in LVI, as the stratigraphy was the same as the western depression, and with scant cultural material. A core was placed in the centre of the trench and the C Horizon was reached at 2.85 mbs, although the core was extended to a depth of 3.2 mbs to insure it was indeed basal saprolite.

Stratigraphy

Again, the strata were basically the same as that found in the main depression (Table 5.4). Small differences include the iron pan, which is not as well developed in this depression. Figure 5.13 displays the shallower nature of this feature compared to the west depression (represented by TR1e). As it holds less water, hydromorphic processes might have occurred at a slower rate. Hence, weak formation of the iron pan. The 'smudges' of haematite in LV (see Table 5.6) are remnant saprolite clasts from the initial substrate of LV (as mentioned previously), a saprolite breccia mix similar to LVI.

There was a distinctive lack of cultural material in this trench. It consisted of only a few highly weathered sherds and some micro-sized charcoal samples. One basalt cobble was present underneath a large yellow saprolite rock, both without cultural association (Figure 5.13). This paucity in cultural material, combined with the presence of purple-dominated saprolite breccia (Table 5.6), is suggestive of a different source area for the soil on the eastern side of the crown.

The slightly deeper location of the C horizon, compared to TR1e, suggests that the latter area may initially have formed the peak of the hill before modification. However, the depth located in TR1f is still less than in TR1a. The hill surface was most certainly uneven, which is typical of most natural hill formations.

Trench 1g (TR1g)

TR1g was placed on the eastern boundary of the east depression which extends into the knoll (Figure 5.2). The trench was 3.2 m E-W and 50 cm wide. Excavation reached LVI, although time constraints restricted excavation or coring to the C horizon (Figure 5.14). The stratigraphy, as expected, was similar to that in the other trenches. Like TR1f, there was little cultural material, with only a few sherds and micro-sized charcoal pieces. One WWII Japanese bullet was found in the west end of the trench at a depth of 21 cm. This was the only historic material recovered in the excavations.

Excavation further into the side of the knoll was obstructed by basalt cobbles. Though it was thought they might have once been part of a stone facing for the knoll, the excavation of a small test unit to the north (50 cm x 1 m) revealed only one further cobble. The cobbles were most likely part of the fill material used to build the knoll originally, although this does not mean that they were not placed deliberately for structural support.

Stratigraphy

The main stratigraphic differences are that the layers below Ia, I, and IV are not as developed as in the west depression or even those in TR1f (Table 5.7). In Figure 5.14, it is clear that the boundary between LIV and IVb is less distinct, along with LV and VI. In this zone the iron pan is also poorly developed, decreasing in formation in a westerly direction. The slow rate of hydromorphic processes can be explained by a thicker deposition of erosional sediments on the eastern boundary of the depression. These, originating from the knoll, have become LIa, LI and helped form LIV through time. When the knoll was steeper the water would still have pooled in the eastern point of the depression with full development of the iron pan. As the knoll slumped, the deepening sediments would have reduced the conditions for waterlogging. Layer V is evidently formed throughout, but there are many haematite streaks and manganese veins present in this profile, remnants of the mixed saprolite and clay of the original matrix (John Chappell pers. comm.).

Two new layers are also present in the knoll – IVc and IVb. They both appear to be construction fill layers similar to those used on the rest of the crown, though they are dominated by manganese veins which may indicate a separate source area for the knoll 'fill' material.

Trench 1g-a (TR1g-a)

TR1g-a is located on the same axis as TR1 on the opposite side of the knoll – the eastern boundary of the crown (Figure 5.2, Plate 5.8). It was excavated mainly to examine the impact of erosion on this side of the feature. The unit was excavated down to 50 cmbs. Little cultural material was found.

Stratigraphy

The stratigraphy for TR1g-a is different to that in the rest of the crown due to different soil formation processes and likely different area of origin for the soil. Thus, the layers were given separate designations (Figure 5.15; Table 5.8).

Layer I, the root mat, and LII have more organic matter than the rest of the crown. Layer II is also a typical 7.5 YR brown clay, although it has many saprolite clasts indicative of fill material. Layer II was indeed distinguished by its pink, white and yellow saprolite mottling. This layer appears largely erosional in its formation. One sherd was located in this layer. The C horizon was not reached.

The strata confirm that the knoll has undergone significant erosion, most likely slumping after 'abandonment'. The evidence from both TR1g and TR1g-a suggests that the knoll was most likely constructed at the same time as the rest of the crown, and its form would have been more prominent initially. Whether the knoll had a flat or pointed surface can not be ascertained from the excavations, although its size and current flat surface suggests the former.

Trench 1h (TR1h)

TR1h was placed on the southern slope of the crown extending from its base on the encircling terrace (Figure 5.2). Selection of this side of the crown for sampling was based on an observed lower level of erosion and slumping compared to the north side. The trench was placed on this aspect of the crown specifically to investigate the level of erosional soils on the slopes, and to locate the saprolite, and thereby the initial angle of the crown.

The trench was oriented N-S at a width of 40 cm and a height of approximately 2.8 m (Plate 5.9). The north and east walls were profiled, and three soil layers are located above the C horizon (Figure 5.16). Some small basalt cobbles were removed from LII and one piece of pottery was recovered. There was a distinctive absence of charcoal. The deepest section of the trench was from the

surface of the terrace to the saprolite – ca. 2.6 m, with 2.4 m formed predominantly by erosional sediments from the upper surface of the crown.

Stratigraphy

The stratigraphy is quite simple – LI, the A horizon, and LII the erosional sediment of 5YR reddish-brown silty clay, that varies between loose and compact, with some saprolite clasts present. Both LIIIa and LIIIb are mixed layers, indicative of the formation of a B horizon (Table 5.9).

Interpretation of the strata suggests the former walls of the crown were at a sharper angle than the current 50 degrees. The crown would therefore initially have been steeper with a greater surface area. Thus, much of the shape visible today is the outcome of mass erosion from the surface above. Plate 5.10 illustrates visible slumping on the surface of the crown, and its impact has been more extreme on the west and east faces of the crown surface.

There are two possible explanations for the high level of erosional soil. One is that the crown may have had an earth wall around its upper boundary, which has fallen away, down the slopes. However, there is no evidence for earth walls on crowns anywhere in Palau, so this proposition is implausible. An alternative explanation is related to the method of construction itself. As the crown was built predominantly from fill material, the highest points of the crown walls would have become increasingly unstable over time without continual compaction and upkeep. It has been widely documented that constructed features such as earthen terraces do not survive well after abandonment, and can be swept away rapidly (Butzer 1982a:127). The outer boundaries of the crown surface would have been easily dislodged by heavy rains. A perfect example of slumping from consistent rainfall is evident in a side wall excavated for the Compact Road Project (Plate 5.11). The section illustrated here is located some 500 m to the north of Ngemeduu. The lack of structural support in the form of stone facing on the slope of the crown also would have ensured that

continual maintenance was required to stabilise the earthworks. I will return to these processes in Chapter Six.

Trench 1i (TR1i)

Altitude: 170 metres above sea level

This trench was located ca. 12 m SSE of TR1h, 4 m from the edge of the terrace (Figure 5.2). It was 65 cm wide N-S and 150 cm long, E-W. The aim of this trench was threefold: first, to assess how the erosional sediments observed in TR1h had influenced the appearance of the terrace; secondly, to look for subsurface deposits to help understand how the terrace was used; and thirdly to expose the saprolite C horizon and obtain details related to construction of the terrace.

The unit extended to 1.40 mbs with saprolite located at. 120 cmbs (Figure 5.17). A semi-circular rock formation, which contained potsherds and charcoal samples, was designated Feature 1. Additionally, two postholes were uncovered that extended into the saprolite, but not above it into Layer IV. In the north wall profile there is also evidence of a small pit.

Feature 1 (Figure 5.18)

Feature 1 was located on the north side of the trench, and extended further into the sidewall. It comprised mainly small to medium sized sub angular basalt cobbles with some yellow saprolite rocks. There is little evidence to suggest it was a hearth or post support. However, the possibility that it was cultural material incorporated into the fill, intentionally or accidentally, cannot be discounted.

Posthole One

This posthole was located alongside the north wall of the trench (Figure 5.18). It was circular in shape and extended about 25 cm into the saprolite. Its diameter

was 35 cm. It was filled with loose soil; 7.5 YR 4/4 brown with yellow and pink mottles.

Posthole Two

This posthole was located in the N-W corner of the trench, extending into the sidewall (Figure 5.18). The size that was visible was approximately 20 cm and it extended approximately 40 cm into the saprolite. The hole was in-filled with a 5 YR 4/4 reddish-brown soil with abundant charcoal which indicates that some of the post may have burnt in situ. A sample was submitted for radiocarbon dating.

Stratigraphy

Layer II, the erosional layer observed in TR1h, is not as thick at this end of the terrace; only 40 cm. This supports the argument that a large portion of the sediment currently forming the top layers of the terrace is recent and derived from slumping of the crown surface. In TR1h we can see that this erosional soil is thickest at the base of the crown and has thinned out as it has been washed over and settled on the surrounding terrace. The successive layers have been numbered differently to TR1h, and represent separate fill layers (Table 5.10).

Layer III, is a 5 YR 4/4 reddish-brown clay mixed with pink saprolite. It is friable and loose, and is concentrated within the pit feature. The pit appeared slight, and hard to discern. It did not contain any cultural material and its origin and use is unclear. However, the top of the pit may represent the original surface layer of the terrace prior to the deposition of LII. A charcoal sample from Feature 1 (on the border between the cobbles and the pit) was submitted for radiocarbon dating, which returned a date of 3471 (2753) 1951 BP (ANU-11836) (Figure 5.17 and 5.18). It is most likely that this sample is in secondary deposition. The age of the sample, and the large proportion of sherds, charcoal and manganese nodules in LIV therefore supports the explanation that the

cobbles and cultural material of Feature 1 were most likely part of the (older) composite fill material rather than *in situ* cultural remains.

A significant detail concerns the postholes. As they are present in the saprolite only, the original surface layers must have been removed. Thus, a structure must have been present on the hill before it was modified. This supports the proposition that the original hillside was cut back to the saprolite and the soil placed on top of the crown, with the surrounding terrace then levelled, and constructed later by soil transported to the site. The radiocarbon determination from Posthole 2 is 2300 (1640) 1290 BP (ANU-11659) (Figure 5.17). If the youngest crown date from LVII of 1350 (1310) 1290 BP is taken to mark the time at which the crown was constructed (i.e. sometime after this date), then the date from Posthole 2 supports the proposition of earlier settlement on the site (along with the oldest crown date of 2060 (1980) 1900 BP from LVIII).

The uneven surface of the saprolite in both TR1i and TR1h appears similar to stratigraphy identified by Beardsley (1996) and interpreted as 'gouge marks.' Thus, the soil might have been dug back to the saprolite using pointed sticks. These marks are also present at TR4 (see discussion below).

Test Unit 1

Test Unit 1 was the only 50 cm by 50 cm test unit to be excavated in 10 cm spits with the material bagged then wet screened through a 1/8" screen. It was placed amongst a surface deposit of basalt cobbles and potsherds that resembled a paving on the surface of the north side crown, beneath two pandanus trees. It extended from the end of the baulk separating the two depressions (Figure 5.2).

A 50 cm by 4m strip had 5 cm of root-mat removed, revealing further sherds (Figure 5.19; Plate 5.12). The test unit was located in the centre of the main concentration of cobbles. Ten spits were excavated, and the material bagged and taken to Ulong dock and wet screened using a water pump. It was clear by

1 m deep that there were no sub-surface features or deposits, and little cultural material. Excavation therefore stopped here.

Stratigraphy

The strata were consistent with TR1 and TR1a, outside of the depression (Figure 5.20; Table 5.11). Cultural material below the surface was limited to potsherds - two 2 cm sherds in Spit 2 and a few tiny remnants in Spit 10. Small millimetre-sized charcoal pieces were present. The predominant material found consisted of small saprolite clasts and manganese fragments. The assemblage of stones and pot sherds were most likely remnants of an isolated dumping incident.

Screened 10L samples

The screened samples did not produce any cultural material, bar some extremely small pottery fragments (1 cm sized and smaller).

Summary

The results of the excavation of Ngemeduu illustrate that the entire crown was artificially constructed, and that the hill underwent significant modification to form the encircling terrace. Due to the complexity of the construction sequence, I have split the sequence up into the following points: [4]

1. Building commenced with the crown. The original hill surface was cleared or scraped back to the saprolite, removing A and B horizon soils and cultural material. This included cutting into the saprolite at the base of the area where the crown was to be constructed, which is evident in the profile of TR1h, and TR1i.

2. This matrix was then placed on the west side of the hill, as represented by LVIII in TR1a (and possibly LVII as well).

[4] Note that this sequence is my interpretation of 'gross' construction events. I do not suggest in any way that the actual people who built the crown classified or thought about building the earthworks in this manner.

3. Construction of the crown continued using soil 'fill' material (LVI) derived from the surrounding landscape, including the saprolite excavated in Point 1 above. This included areas with habitation deposits and those devoid of cultural material. It is likely that this occurred over a number of years and not in a single construction event.

4. Evidence suggests the depressions were excavated once a crown with a flat surface had been built. The post holes and two stone features (F3 and F3a) suggest construction halted at this point, and some sort of structure was erected in the west depression.

5. The depression was transformed at a later time (this will be discussed in further detail in Chapter Six).

6. The knoll was the last feature on the crown to be constructed.

7. The encircling terrace was levelled with soil brought to the site from another location. The presence of cultural material suggests some matrices were derived from past settlement areas.

A great deal of time and human effort went into constructing Ngemeduu that cannot be explained as a synchronic event. An important result is the indication of movement of materials through the landscape, not only from the upland area, but also from the coastal flats, as suggested by the coral.[5] Ngemeduu's structural form also appears to have undergone significant change through erosion and natural processes. Chapter Six will examine these issues is more detail.

5.3 Toi Meduu (B:NA-4:12)

GPS: North 07°38.183`, East 134°37.935`
Altitude: 156 metres above sea level

[5] This coral may have been part of the previous occupation from which the basalt cobbles, pottery and charcoal were derived. In any case, it still indicates movement of coral from the coast to the uplands.

Description

Toi Meduu is a visually dominant crown and terrace complex situated immediately south of Ngemeduu. It overlooks the ridge to the south as well as spurs which extend off the main trunk. This includes four terrace complexes.

The site itself has three crowns separated by large ditches, one in the northern end of the site, and two to the S-W (Plate 5.13). The northern-most crown possesses a steep scarp and has forest off to the east as in the case of Ngemeduu. To the west, a steep slope extends into the forest below. The remaining two crowns form a slight semi-circle to the northwest (Figure 5.21). To their south, the slope is moderately steep and culminates in a large back-sloping terrace, which stretches into the valley below. There is evidence of large scale erosion on the southern and western slopes, with uneven surfaces characteristic of slumping. To the north of the western-most crown is a large flat terrace with some basalt boulders that may have supported a platform (Figure 5.21; Plate 5.14). The Compact Road currently cuts through the western slope of Toi Meduu (Plate 5.15), and continues through the small valley and on to the western slopes of Ngemeduu.

The west crown is 9 m high from the terrace below (Figure 5.21). There is stonework on this crown that appears to be of the earlier type, although it is heavily eroded and its original form is not clear (Plate 5.16). It most likely represents some sort of past structure, as it has similar characteristics to the path found on the ridgeline leading to Ngemeduu.

The crown surface has eroded into the ditch, making the ditch shallow (Plate 5.17). Pottery fragments were present on the surface of the crown, both on and near the stonework - thin, 2.5 cm thick, straight-sided and incurving, highly eroded potsherds. Another stone platform is located on the central crown on a levelled area, with pottery lodged amongst the stones and eroding from the

surface. Movement between the three crowns was not an easy task, and must have been even more difficult when the ditches were at their original depth.

The western crown is approximately 23 m wide (E-W) x 40.6 m long on the western side. The eastern side is currently 17.8 m long and has suffered heavy erosion into the ditch. The ditch is ca. 5.4 m wide and extends another 16.7 m in the south, broadening out over the edge of the crown (Figure 5.21).

The middle crown is ca. 45 m long N-S and 25 m wide (Figure 5.21). It also has remains of stonework on the S-W side. It is separated from the western crown by the ditch. Its N-E side is attached to a flat area, like a saddle, with similar basalt remains. This adjoins another, slightly higher terrace, which is separated from the third crown by another ditch. This last crown is 30 m long (N-S) by 51 m wide (E-W). A moderate to steep northern slope extends down to the deep cut (Toi Meduu) separating the site from Ngemeduu.

The north-west terrace is 53 m wide (N-S), 28 m long at west, and 52 m long at the eastern extent. On its southern extent the backsloping terrace is 21 m wide N-S on the eastern end, and only 11 m wide on the western end. Its length E-W, is 41 m.

This site has been further disturbed by construction in the Compact Road Project of an access road, which extends from the southern extent around to the N-W (Figure 5.21). The road exposed some cultural deposits in the western slumped slopes. These were excavated by IARII, although the results are not yet published. Features included platforms, pottery and hearths. Also, the road cut exposed gully-like features on this extent of the site, which have been in filled by erosional sediments. Gullies are a common feature in terrace complexes throughout Palau, and are clearly part of Toi Meduu as seen in Plate 5.13. They most likely formed naturally after construction of these sites, in response to high rainfall. I observed that water moved rapidly down these gullies after rainfall.

Vegetation

Savanna grasses dominate this site, except for the eastern extent which is bounded by a steep scarp and forest. Species include sword grass (*Miscanthus floridulus)*, screw pine (*Pandanus tectorius)*, false staghorn fern (*Gleichenia linearis)* which grow mostly on the perimeter of the crowns, and a thorny shrub, which is found specifically in the westernmost ditch. The grasses were knee-high on the northern and backsloping terraces, very short on top of the crowns, and mid-thigh length in the ditches.

Excavation

Three trenches were excavated on Toi Meduu in Field Season One – one on the western terrace (TR2), one in the western ditch (TR5) and one on the backsloping terrace to the south (TR3). I will begin with a detailed discussion of TR2.

Trench 2 (TR2)

GPS: North 07°37.715`, East 134°37.935`
Altitude of this terrace: 147 metres above sea level

The clearance of vegetation on the terrace did not reveal any artefacts or structures. The trench was located a couple of metres away from the rear of the terrace to avoid potentially thick erosional sediments from the crown (Figure 5.21; Plate 5.14). It measured 3 m by 0.5 m, positioned 330° N-W, 12 m east of the western corner of the terrace, and 2 m north of the southern extent. Terraces like this one, which are broad and flat with steep risers, are common in many complexes throughout Babeldaob.

A clear four-layer stratigraphy was revealed in the trench, and the C horizon was located at 50 cmbs. A mottled circular discolouration in the saprolite was observed 2.5 m along the west wall during excavation. The unit was subsequently extended 0.3 m by 0.4 m to the west to expose the possible feature

(the 'western extension'). As this circular discoloration was thought to potentially be a posthole or other structural feature, the clay was removed in a controlled manner using a trowel. A rather shallow depth was revealed, however, and there was a lack of evidence to suggest it was a structural feature.

Only fine flecks of charcoal were present throughout the excavation, mixed throughout Layers I and III. Cultural material was restricted to two pot sherds from Layer II, which were collected. Two small basalt cobbles were also present in LII.

Stratigraphy

Stratigraphic profiles were drawn of the west and north walls (Figure 5.22). The four layer stratigraphy was the most simple of all the earthworks excavated for this project (Table 5.12). The dominant matrix was LIII, which consisted of a 5 YR 5/6 yellowish-red clay with pink, white and yellow saprolite mottling–terrace fill. Layers I and II are derived from LIII, with some pedogenesis apparent between the layers in the field. A similar pedogenic profile was apparent between LII and LIIIa.

The southern end of the profile is slightly thicker due to erosional deposition from the crown above and behind it, although the majority of eroded sediment was avoided due to the placement of the trench. Stratigraphic interpretation suggests that the hillside was originally stripped back to the C horizon and levelled, like Ngemeduu. This is indicated by the regular upper boundary of the saprolite which remains consistent throughout the profile. In addition, there is no evidence of a buried A or B horizon which would be expected if the original hill surface had simply been covered. The scarcity in cultural material such as sherds in the soil also suggests that the soil of LIII must have come from an area devoid of occupation debris.

Trench 3 (TR3)

GPS: North: 07°37.692`, East: 134°37.997`
Altitude of terrace: 124 metres above sea level

The immediate area of the backsloping terrace on the southern extent of Toi Meduu was cleared of waist-high vegetation, and a trench measuring 3.5 m by 0.3 m was situated along the rear of the terrace. It faced E-W, and was 4.3 m in from the west boundary, and 0.5 m in from the rear of the terrace (Figure 5.23). The terrace's front edge drops off into a gully, and is 11 m from the trench. This particular terrace was selected for sampling because of its potential for supplying evidence of agricultural activity (as discussed in Chapter Two).

The excavation reached 2 m without revealing the C horizon. It was apparent that the strata comprised a large amount of eroded sediments from the slopes above and behind the terrace. Financial constraints meant I had to return to Canberra, so Jolie Liston and a crewmember revisited TR3, and used a soil auger to try to locate the C horizon.

Core 1, placed in the middle of the trench, extended 136 cmbs (Figure 5.24). The matrix was continuous LIII. Core 2 was then placed 0.3 m in from the west wall. A rock that obstructed progress was excavated. It proved to be a large basalt cobble, four to five smaller cobbles, along with a concentration of potsherds. The core continued down to 170 cmbs, passing through a highly degraded yellow saprolite rock. One rim sherd was collected at 160 cmbs. Again, the matrix was homogenous LIII. The core was halted here due to difficulties; thus, the C horizon was not reached.

Three small charcoal samples were collected from the concentration of rocks and pottery, and there were some charcoal flecks throughout Layer III. Cultural material was limited to pot sherds though it is clear that they are in secondary deposition.

Stratigraphy

Stratigraphic profiles were drawn of the west and north walls (Figure 5.24). The three layers resulted from erosional sediments (Table 5.13). Layer I, a 7.5 YR 3/3 dark-brown silty loam, and LII, a 7.5 YR 4/4 brown silty clay, are the product of more recent erosion which is still taking place. There is an absence of cultural material in the layers.

Layer III, a 7.5 YR 5/6 strong-brown silty clay, is over 1.5 m deep. The presence of charcoal fragments, many pottery sherds and basalt rocks suggest two possible explanations for deposition. The first is that the soil and cultural material were intentionally displaced during construction of the crowns of Toi Meduu. That people were living on the ridgelines prior to monumental earthwork construction has been previously discussed; the cultural material may be from these occupations, mixed with erosional sediments. This would place construction of this terrace prior to the crowns.

The second and more plausible explanation is that erosion occurred after abandonment of the crowns. An intense or persistent wet season would easily have provided unstable conditions sufficient to produce a high level of erosion. The southern end of the ditch between the west and central crowns (in which TR5 was placed – see below) is located above this site. Ditches are excellent for trapping sheet erosion of sediments. However, both ends of the western ditch open out onto the northern and southern slopes of the site. Therefore, instead of trapping sediments and water, a significant amount was washed down the slopes. Over time, the ditch ends have slumped, indicating erosional processes. Thus, cultural material eroded into the ditch from the crown, and then washed down the slopes (see the following discussion of TR5).

Trench 5 (TR5)

GPS: North 07°38.183`, East 134°37.955`
Altitude: 156 metres above sea level

A 3.4 m by 0.5 m trench was located in an E-W direction through the ditch separating the west and middle crowns (Plate 5.18, Figure 5.21). Oriented roughly N-S, the northern end of the ditch drops vertically into the terrace below (where TR2 was located). It partially empties into a gully, which drains into the valley, ultimately converging on the mangrove wetlands on the west coast. As discussed in the previous section, the southern boundary of the ditch is located above the backsloping terrace, although the dirt road currently cuts into the hillside about 5 m below the crowns.

Past archaeological investigations have shown that many of the ditches found in terrace complexes were over 2 m deep and have undergone immense infilling (Liston et al. 1998; Pantaleo 2000). The main objective of this test unit was to find the original depth of the ditch, and locate dating material to establish a chronology of ditch construction. A remnant stone platform was located immediately above the ditch on the western crown. Therefore, it was anticipated that cultural debris from cultural activity on the platform would have eroded into the ditch with sediment.

Vegetation in the trench was dominated by the thorny shrub. Once this was cleared, the soil was removed at approx. 10-15 cm intervals across the trench to a depth of 1.5 m. Visibility was difficult, but it was clear that the C horizon had not been reached. Liston placed a small test pit in the centre of the trench which extended to 1.95 cmbs. Some scattered sherds, charcoal flecks and small cobbles were found, and also an additional layer (LVIII). A core was placed in the centre of the test pit which reached the basal saprolite at 2.03 mbs (Figure 5.25).

Unfortunately the typhoon affected the complete excavation of this trench, preventing its extension further into the sides of the crowns as initially planned.

Stratigraphy

Trench 5 exhibited a total of nine layers, which were formed through multiple erosional episodes after primary construction (Figure 5.25, Table 5.14). Ditches

are classic structures for high sedimentation if left to fill undisturbed. Rapid, primary fill occurs in the early stages of ditch construction, followed by secondary fill, although this usually transpires at a much slower rate (Butzer 1982a). Therefore, the strata is more complex here than in the other trenches.

Starting from the basal strata, LIX represents the primary fill layer and LVII the secondary fill layer. Layer IX has no cultural material, is a mix of 7.5 YR 4/4 and 5 /6 strong-brown silty clay, and formed not long after initial ditch construction. Layer VII differs, with a 10 YR 3/4 dark yellowish-brown, and heavy saprolite mottling. It consists of cultural materials such as potsherds, cobbles and pottery. This material derived from the crown surface and washed into the ditch at an early stage. A charcoal sample from this layer was submitted for dating, and a determination of 1820 (1360) 990 BP (ANU-11611, Table 3.1) resulted.

LVI is also a secondary fill layer. A 7.5 YR 4/4 silty brown clay, it also contained some charcoal and potsherds, saprolite, and small cobbles. At a later time, LV and IV would have been deposited, potentially when the complex was no longer in use. Layer V is also undergoing change indicative of B horizon formation. A charcoal sample from LIV was submitted for AMS dating (ANU-11610) to establish an upper boundary for use of the complex. A date of 730 (680) 670 BP (ANU-11610) supports later use, though the type of activity that produced the charcoal is not known, i.e. temporary/sporadic use of the crown.

Layers II and III were deposited most recently, and have no cultural material, and Layers I, II and IIa are recent derivatives. Waterlogging occurs in the centre of the ditch, causing these soil transformations.

All potsherds were concentrated on the west side of the trench, and can be tied to cultural activity on the crown. The eastern side was probably quite steep as the central crown is taller at the present day. The erosional layers are also thicker towards the eastern side. The width of the ditch was most likely smaller

originally, and the surface area of the crowns larger. The post-depositional history of the ditch is dealt with in further detail in Chapter Six.

Summary

Toi Meduu has undergone significant post-depositional change in form and structure, on the macro- and micro-scale. This is most apparent in TR3 and TR5 where a significant portion of the observed strata was derived from erosional sediments. As in previous studies, the depth of the ditch extended over 2 m, highlighting the current deceptive appearance of these earthwork features. No direct evidence was obtained from the crowns themselves. What is unclear at this stage is whether the stonework visible on two of the crowns was formed on the original hilltop, or after modification into crowns. If the former is the case, then the Toi Meduu crowns have been formed using cutting and moulding techniques, in contrast to Ngemeduu. The stonework appears to have continued to be used, with a date from the ditch of 1820 (1360) 990 BP (ANU-11611). This implies great longevity of Toi Meduu, indicating its significance as an important place in the landscape.

5.4 Rois Terraces (B:NA-4:6)

The Rois terraces are located on a spur between Ngetcherong and Ngebuked Traditional villages, extending from the central ridgeline to the north east of Ngemeduu. The terraces have been constructed on a slope, and are considered small or 'slight' with broad surfaces and short risers (Figure 5.26). The terraces have been disturbed in places by a dirt road which extends from the west side of the site and emerges on the road to Ulong dock.

The south side of the site is very steep, and devoid of terraces. It culminates in forest which is part of the Ngubuked village area. The west of the site has now been completely disconnected from the ridge by construction of the Compact

Road (Figure 5.26). This has also led to surrounding damage on the top of the site due to falling rocks and soil after blasting operations.

Pottery was found eroding across all surfaces of this site. Observed were both early 'thin' black types, some with a red slip and also later thick-wares. Similarly, the terraces are highly eroded in places. The lowest terraces are currently cultivated with taro and cassava (Plate 5.19). The terrace immediately above these was selected for sampling, as it complemented previous investigations which tested the upper terraces only.

The terrace is 35 m long E-W and 31 m wide N-S, and slightly wider – 36 m at the southern extent. Slumping is evident at the rear of the terrace, similar to most of the terraces in the complex. The western extent is presently artificially mounded due to the dirt road, and the terrace extends a further 4-5 m beyond the road, to the west. Large amounts of potsherds were exposed in the road surface next to the terrace.

Vegetation

The entire ridge-toe is covered in savanna (Plate 5.20). The most prevalent species here are sword grass (*Miscanthus floridulus*), false staghorn fern (*Gleichenia linearis*), sword-pine (*Pandanus tectorius*) and pitcher plant (*Nepenthes mirabilis*). The size of the grasses varied, and the grasses on the sampled terrace were at thigh level, and more closely cropped towards to the edge. The trench was located next to two pandanus trees, and at the rear of the terrace there was a small semi-circular depression with grasses, pandanus and small coconut palms. This feature is probably historic, made by the Japanese prior to or during WWII. Immediately to the north is forest, as the ridge-toe veers to the east.

Trench 4 (TR4)

GPS: North: 07°38.183`, East: 134°38.099`
Altitude: 56 metres above sea level

A section near the edge of the terrace was selected for sampling, and a 3.2 m by 0.5 m trench was placed oriented N-S once the knee-high grasses were cleared (Figure 5.27). The two pandanus trees located next to the trench were left in place to help provide shade with a tarpaulin strung between them.

Excavation commenced at intervals of approximately 10-15 cm across the surface of the trench, and the C horizon was located at 75 cmbs at the southern end, and 1.1 mbs at the northern end. Sherds encountered throughout the excavation were collected, and a few small charcoal samples were recovered. There was no evidence of structural remains.

Stratigraphy

Seven layers were identified in this terrace, attesting to a complex history of construction and use compared to the other terraces excavated (Figure 5.28, Table 5.15).

If we begin with the basal layers, it appears that the original topsoil on the slope was removed and likely used as fill material for the terraces in the top of the complex. Only a small remnant of the B horizon remains, LVII, a 7.4 YR 5/4 brown silty clay with an absence of cultural material. LVI, a 5 YR 5/6 yellowish-red silty clay is discontinuous and may be another remnant horizon. Alternatively, it may be an initial fill layer as it has a high presence of potsherds.

The dominant fill layer is LV, 5YR 4/4 reddish-brown silty clay layer with abundant sherds mixed throughout (see Figure 5.28). These sherds are highly weathered with rounded edges, characteristic of secondary deposition. It is apparent that Layer IV is also a fill layer, as it consists pink and yellow saprolite and a small amount of 5 YR 5/4 reddish-brown clay. The saprolite layer is thicker in the southern section of the trench. This may have formed an original surface of the terrace.

The top 20 cm of the profile is dominated by Layers III, II and I. Layer III has a distinctive wavy boundary, which may be indicative of cultivation. It is possible that these top layers were cultivated during Japanese occupation, as a large outpost was based in Ngaraard. In any case, I will return to this evidence for possible cultivation in Chapter Seven. Layer II and I are the most recently derived soils, and are both undergoing soil transformation processes.

The construction of this terrace differs slightly to the other earthworks excavated. It is clear from Figure 5.28 that the C horizon does not seem to have been cut back and levelled. Instead, the overlying soil was most likely removed for construction of the complex from the top-terraces down, and possible gouge marks are visible in the South Wall profile. As most of the cutting and levelling was implemented to obtain soil for the terraces at the top of the ridge, this lower area of the ridge required the later addition of fill to make a level terrace. The upper boundary of the saprolite also suggests that the slope was quite steep originally, resulting in a high volume of soil during the levelling process. This is clear in the southern extent of the profile where the stratum is 30-40 cm thicker.

Summary

Although only one trench was placed in the Rois terrace complex, it revealed a complicated stratigraphic history, giving insight into construction of the complex as a whole. The soil used to build the terrace excavated must have been transported from a past settlement location, as suggested by the high level of sherds in LV. While no relevant charcoal samples were obtained for dating, the 'top-down' sequence for earthwork construction suggests the top terraces, in which the burials were located, are older. As there is no firm evidence to state that this terrace set was built as a 'complex', one can only suggest at this stage that the bottom terraces were constructed later than the top terraces, and this likely occurred over a considerable time period.

CHAPTER SIX

Environmental Analyses: Clays

Most important is working between the macroscopic field remains and the microscopic in order to deal with identification of processes and materials, as well as integration of standard archaeological methods and interpretive scenarios with microscopic evidence and interpretative procedures (Helen Lewis, Archaeological Micromorphology course handout 2000-2001).

This chapter reports the results of scientific testing on soil components from the excavations at B:NA-4:11 Ngemeduu, B:NA-4:12 Toi Meduu and B:NA-4:6 Rois. It is perhaps appropriate here to re-iterate the aims of the clay analysis as discussed in Chapter Four. This form of environmental analysis was employed to identify *in situ* and anthropogenic soil layers of the earthworks, in order to address questions of construction and movement of materials through the landscape. Its role was also to recognise any natural and anthropogenic processes that had occurred at the sites, and assess their relevance in affecting interpretation.

Analyses took place at two spatial and temporal levels. The first level was on-site identification of anthropogenic and natural soil layers, including recognition of both anthropogenic and natural post-depositional processes. Specialist identifications were also made at Ngemeduu by the geomorphologist, Professor John Chappell (as detailed in Chapter Five).

The second level entailed off-site analysis. Following Canti (1989), a 'mixed method approach' was adopted. This required the incorporation of two main geoarchaeological methodologies. The first is applicable to disaggregated soil samples in which the bulk properties of the soils are investigated (macro-morphological analysis). The second is a micro-scale analysis of undisturbed soil samples, in this case soil monoliths (micro-morphological analysis). Both methodologies were employed to address questions pertaining to post-depositional processes and taphonomic conditions, at two differing scales.

6.1 Clay analyses

Clay background

The clays of Babeldaob are derived from four major geological units – the Babeldoab, Aimeliik, and Ngermlengui Formations, and Irrai Clay. The Formations are characterised generally by basaltic-andesite volcanic breccias, and tuffs. The Irrai clay consists of interbedded clays, silty clays, and lignite, and represents the smallest unit on Babeldaob (Mason 1955; U.S Army 1956).

Latosols are the most widespread soils, covering 60% of the total land area of Babeldaob. These soils are well drained, red to yellowish, friable, strongly acid, deep and ferruginous or bauxitic soils, and are mainly derived from volcanic rock (Vessel & Simonson 1958:258). The most common group of latosols are those from breccias, such as the Palau Association. The most weathered latosol on the island is the Babeldaob Association, and it is characterised by large numbers of surface bauxite concretions. Both Associations are located in hill country (Vessel & Simonson 1958).

In Ngaraard, the dominant soil is the Ngardok Association, which is also found in Melekeok, Ngermlengui, and Ngerechelong. Although this latosol has developed from tuffs, it resembles the previous two that are derived from breccias. These soils are a yellowish-red to red, silty-clay loam, and have friable lower layers (U.S Army 1956).[1] Lucking (1984:134) reports latosols generally to be infertile, with the Ngardok and Babeldaob Associations considered extremely infertile.

Methods applied

pH Testing

[1] See Vessel and Simonson (1958) for a detailed discussion of the geology and clays of the islands in the Palau archipelago, including details on agricultural production.

Soils alkalinity depends on the level of hydrogen ions in soil water colloids. The higher the abundance of hydrogen ions, greater is soil acidity, and that can be measured by hydrogen concentration with reference to a pH scale (Briggs 1977). Chemical solutions range from 1.0, very acidic, to 14.0, very alkaline, with neutrality taken as pH 7.0, but in soils that actual range is generally from 3.0 to 10.0 (Briggs 1977:108-110). Colorimetric testing for pH is accurate to 0.5 pH units, and at times to 0.25 pH units, which is sufficient for most archaeological analyses.

Testing for pH readings in soils is useful for a number of reasons. In general, the readings can give insight into soil processes and taphonomic conditions, particularly when combined with other information on soil conditions. For example, low pH levels in soils can increase the potential for preservation of pollen, while at the same time decrease the survival rate of mollusc and bone remains (Canti 1989). However, Courty et al. (1989:20) point out that pH values can vary within a profile, and can reflect localised conditions. For buried soils in particular, one has to be wary of the effects of water percolation, which can alter pH values, i.e. a measured pH may not be the original value before burial of the soil.

Methodology

The pH levels were measured on the disaggregated soil samples collected from each layer. A standard Australian colorimetric test-kit was used (the Inoculo Laboratories Soil pH Test Kit, CSIRO) on moist soil samples and the resultant colours were matched under natural light conditions in a laboratory setting. The results are detailed in Table 6.1. Four of the samples (indicated in bold in Table 6.1) did not produce measurements using the standard method. There appeared to be a lack of moisture in these samples. Distilled water was substituted, and barium sulphate then applied. This produced the required colour change (although faint), and readings were taken. What appears to be a

'chelate affect' was occurring in these soils, i.e. where the soil deprived of hydrogen ions subsequently 'grabbed' the moisture from the water and the reactor fluid (Geoff Hope, pers. comm.[2]).

Munsell Colour Descriptions

Soil colour identification using Munsell Soil Colour Charts is now an orthodox procedure for the field archaeologist[3]. The use of a standardised system lessens the incidence of arbitrary colour descriptions, thereby decreasing ambiguity.

The identification of soil colour is important for two main reasons in archaeology. The colour of a soil in part reflects drainage patterns of the soil, and colour identification can help identify the main zones of permanent and temporary saturation in a profile. For example, clays at the base of slopes tend to have yellower colours because of iron oxide hydration, where a reduction has occurred from ferric (red) compounds, to ferrous (yellow) compounds under waterlogging conditions (Charman 1978:55)[4]. Thus, processes of oxidation and reduction (e.g. gleyed layers) can be determined by soil colour identification (Briggs 1977).

The second point concerns archaeological profiles in particular. As many soils in archaeological profiles are anthropogenically derived or affected, numerous variations can occur within layers, such as mottling and colour variation. Colour identification can give insight into the origin of the soil, or be indicative of post-depositional processes occurring on the original soil structure e.g. formation of a mixed redeposited soil into a B horizon soil (Limbrey 1975).

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[2] Palynologist; Dept of Archaeology and Natural History, Research School of Pacific and Asian Studies, Australian National University.
[3] Although note that other charts can be used, such as the Japanese Standard Soil Colour Chart (Limbrey 1975:256).
[4] Known as a 'catena' or 'toposequence'.

Methodology

A sub-sample of clay was removed from the disaggregated soil samples taken from each layer during excavation of the trenches. Moist samples were compared to the colour charts in the Quarantine lab in the Dept of Archaeology and Natural History, ANU. This was done next to a window to ensure natural light conditions. The Munsell descriptions are specified in Table 6.2.

X-Ray Diffraction (XRD)

X-ray diffraction is a technique employed to identify crystalline materials (for a detailed discussion see Battey & Pring 1997; Bish & Post 1989). For clays, powder diffraction is used[5], in which X-rays strike the planes of crystals in a powder and produce a diffraction pattern. Diffraction maxima, or peaks, occur at various angles (θ). Intensity measurements are made for each, which are then measured against experimentally measured values, and a correspondence between the calculated and measured values is made to a goodness of fit index, using the 'Rietveld refinement' method (Jercher et al. 1998:387; Rietveld 1969).

In archaeology, X-Ray diffraction is commonly used for analysis of artefacts made of crystalline materials, such as stone and shell adzes, ochre samples from rock art or iron-nodules found within archaeological deposits. For clays, bulk samples are measured to ascertain the mineral constituents. If detailed information on the clay silicates is required, the clay fraction is separated from the other materials. This entails three further stages of processing and analysis. Once a diffractogram has been produced, the relative proportions and types of different clay minerals are estimated according to their position and amplitude on the diffractogram (Courty et al. 1989), allowing quantitative analysis. Mineralogical analysis can impart information on the origin of parent materials in archaeological deposits, and provide insight into post-depositional changes

[5] Clay samples are ground up into a fine-grained powder (a mixture or minerals) in order to expose crystal planes. This differs to standard geological application of XRD where it is usually employed to identify a mineral that cannot be identified by other methods.

and mineral weathering products and processes within a layer and profile (Canti 1989; Courty et al. 1989).

Methodology

X-ray diffraction was carried out in the XRD laboratory, Department of Geology, Australian National University. Samples were processed for clay mineralogy, and a sub-sample underwent further analysis through separation of the clay fraction. All samples were milled, and ground in actetone in an agate mortar. A first set of samples were analysed in 2001: TR1 LV, segment of iron pan, TR3 LIII, TR4 LVII, TR5 LVIII, LIX (not quantified; processed and identified by Dr. Ulrike Troitzsch). Further analysis in 2003 focused on Ngemeduu: TR1a LV, LVI, iron pan segment, LVIII nodules (quantified; processed and identified by the author). The clay fractions of LV, LVI and the iron pan were separated, and processed according to the method as described in Moore and Reynolds (1997).

X-ray diffraction took place in a SIEMENS D501 Bragg-Brentano diffractometer equipped with a graphite monochromator and scintillation detector, using CuKα radiation. The scan range was 2 to 70° 2-theta, at a step width of 0.02°, and a scan speed of 1° per minute. The results were interpreted using the SIEMENS software package Diffrac*plus* Eva (2000), Traces (version 6), and quantitative estimates were performed with the program Siroquant 2.5.

Soil Micromorphology

Soil micromorphology (the microscopic study of soils in thin section) involves examining soil structure and components in their undisturbed state. Although first devised in the 1900s for pedological purposes, it is valuable in archaeology for numerous reasons, one being the identification of cultural or occupation levels which may not be visible stratigraphically in the field (see Table 6.3 for further uses).

In archaeological investigations, the scheme of soil thin-section observation and description has undergone modification to include archaeological and anthropogenic materials (Courty et al. 1989:63). Mathews et al. (1997:304) stress that the major benefit of such studies is that they permit "simultaneous high resolution analysis of diverse mineral, bioarchaeological and artefactual components and their precise depositional and contextual relationships." Thus, soil micromorphology can provide a detailed *in situ* analysis using consolidated soil samples taken from archaeological profiles, which may provide the "key" for further interpretation (Courty et al 1989). As the opening quote illuminates, this technique is most useful when combined with other environmental and archaeological methodologies and information.

Methodology

Soil micromorphology was undertaken on a specific consolidated soil sample from TR1a, Ngemeduu. This technique was applied in order to provide micro-stratigraphic information of a suspected buried surface within the west depression.[6] Although further soil monoliths were taken in the field, analysis of subsequent samples was not required to address this issue. Furthermore, adequate information on the clays at the sites had been obtained through the previous methods outlined; therefore, microstratigraphic analysis was not considered necessary on the remaining soil monoliths.

Sample 12 from TR1a was sent to the Thin Section Laboratory, Department of Geology, Australian National University. Here, the sample was placed in an oven at 25° C for four days. The sample was then impregnated with 10:1 Araldite resin, and a 25-30 μm thin section was cut, and mounted on a 75 x 50 mm glass slide. The sample was sent to McBurney Geoarchaeology Laboratory, University of Cambridge for analysis by Ann-Maria Hart, an iron pan specialist. The thin section is described using standard methods of soil thin section

[6] A New Initiatives Grant, from the Centre of Archaeological Research, ANU, was awarded in 2003 to fund this analysis.

analysis (following Bullock et al. 1985; Stoops 2003). The full report is included as Appendix A.

6.2 Clay Analyses: results and discussion

The results are presented here for each of the three sites investigated, followed by a discussion. In order to understand the types of processes that have occurred at the sites, it is imperative to begin at the feature and sub-feature levels. This creates a greater understanding of how different features within the earthworks have transformed and/or endured through time.

B:NA-4:11 Ngemeduu Crown and Terrace Complex

Ngemeduu displays the most complex history in terms of construction and post-depositional clay transformations, at both the macro- and micro-scales. This can be attributed in part to the differing earthwork features of which the site is comprised.

West depression

Numerous interpretations regarding soil processes were made in the field. It was clear that all the layers, bar the saprolite, were anthropogenic in relation to their deposition – they had been transported to the site from the immediate vicinity of the hill, and other unknown locations. It was also evident that the west depression was formed after the crown had been built, i.e. it was excavated out of the crown surface. The layers within the depression were highly distinctive compared to those outside. Most conspicuous was the iron pan, LV, and LVI. When the geomorphologist investigated the stratigraphy of the depression in the field, his conclusions attested to a hydromorphic process taking place in the depression that had lead to the ferric-iron leaching out of LV, and being deposited as the 'reaction rim' or iron pan. Why and how did this occur?

Firstly, water tends to pool in depressions. In tropical locations, this can occur at an increased frequency due to the high level of rainfall, and I observed such an occurrence in both depressions in the field after being caught in a rainstorm on top of Ngemeduu. Consequently, pooling produces water-logged conditions in the depression. However, there is another factor involved – soil creep and wash. In Figure 5.4 the northern (TR1a) and western (TR1) 'lips' of the depression can be seen (see also Plate 6.1 and 6.2). The angle of the slope in the northern profile is particularly characteristic of soil creep (on a small scale) (see Briggs 1977; Geoff Hunt[7] pers. comm.). What this essentially means is that through processes of weathering, sediment has washed down the depression slopes. The amount of soil present within the depression suggests that the north and west (and probably the southern) 'lips' were originally mounded, and comprised of more soil than we see today. Therefore, some of the layers within the depression are the product of natural soil processes of weathering and creep.

What of the soil colours? The Munsell colour descriptions (see Table 6.2) reflect a diverse colour range for layers within the depression. The layers formed in the central section of the depression can be termed a catena, or toposequence, a common pattern for soils found on slopes (Charman 1978:55). This catena is predominantly apparent through the varying yellow-clay colours of LIV, IVb, and V across the extent of the depression (TR1a, TR1 and TR1e in Table 6.2). Represented in the lower zones of the depression profile, this indicates the hydration of iron oxides, and the reduction from ferric (red) compounds (particular to the parent material – saprolite) to ferrous (yellow) compounds under waterlogged conditions (Charman 1978:55).

This brings us to the mystery of the iron pan. The Munsell colour descriptions have led to the identification of layers where the movement of iron is apparent.

[7] Geologist, Dept of Archaeology and Natural History, Research School of Pacific and Asian Studies, ANU.

As colours are indicative of drainage patterns, those layers not reflecting ferric (red) iron suggest leaching has occurred. Leaching can be defined as "ions released into the soil water by the process of solution, dissociation and cation exchange," and a common form is the washing of ions through the soil by percolating water (Briggs 1977:127). Leaching is most intense under conditions of high rainfall, free drainage, and low pH. Consultation of Table 6.1 indicates an average of pH 5 in the depression, which is quite acidic. This reflects favourable conditions for leaching today, and as leaching has occurred, may indicate similar conditions in the past.

Chappell noted evidence of leaching in the field. However, what was not clear was why the leached iron was redeposited in the exact location in the profile, and why it extends to the surface of the crown (e.g. Plate 6.3). Chappell himself noted that this was not a natural pattern in iron pan formations. Anthropogenic processes were therefore suspected. It was hypothesised that the iron pan had formed on a past (original) surface of the depression, and that LV was deposited at another time, representing a second phase of depression construction. Soil creep, as discussed above, followed this anthropogenic activity. Cultural remains also influenced the creation of this hypothesis: Feature 3 and 3a found on the east side of the depression. Both features, which are interpreted as post supports, are situated at the interface between LV and LVI. These remains imply some sort of structure was present after the deposition of LVI, and the remains of the structure were covered by LV at a later time. This hypothesis therefore challenged Chappell's conclusion that LV was originally LVI. The techniques of XRD and soil micromorphology were employed to test this hypothesis.

<u>XRD analysis</u>

A sample of LV and the iron pan was analysed using XRD after the first field season in 2001. The results were not quantified, and are listed in Table 6.5.

Further analyses were performed in 2003 in order to test the hypothesis. Both mineralogical and clay fraction analysis were performed on LV, LVI and the iron pan. Table 6.7 lists the quantified results and Table 6.6 the un-quantified results, and Figures 6.1-6.7 illustrate the diffractograms.

Kaolinite and goethite dominate both LV and LVI (Figure 6.1 and 6.2; Table 6.6). Kaolinite, goethite, and gibbsite are characteristic of an advanced weathering stage in clays (Table 6.5). They are typical of highly weathered soils on land surfaces in hot, humid conditions. Under these conditions, the cations Na, K, Ca, Mg, Fe, and silica are removed from the soil through leaching. The high level of kaolinite in these samples underwent further investigation through separation of the clay fractions. Figure 6.3 and 6.4 illustrate the three diffractograms produced when testing the clay fractions. The intensity of kaolinite increases after heating at 350° C in both LV and LVI (as goethite collapses when heated at 350° C making the amount of kaolinite increase). This confirmed the dominance of kaolinite and clay silica in these layers.

Processes of leaching have altered the minerals of LV. Kaolinite has altered to gibbsite, and smectite (montmorillonite) has partially transformed to illite. Furthermore, as chlorite is commonly formed by alteration of montmorillonite, its presence in LV (Table 6.6) also supports the conclusion that LV minerals have changed.

As for the iron pan, we see a high level of goethite (hydroxide) and haematite (oxide) (Figure 6.5; Table 6.7 and 6.6), and a low level of silicates. The overall quality of the clay diffractogram, though, is poor, and can be attributed to the low level of silica clays present, and the highly weathered and amorphous nature of the sample. Variable conditions of mineral concentrations in the iron pan are visible on the macro-scale across the depression, as seen in Plate 6.3 where the orange – haematite – is not homogenous in the iron pan, even in this small section of the depression.

The 'nodules' recovered from Layer VIII were also analysed using XRD, in order to verify their interpretation as bauxite (Table 6.7, Figure 6.7). High levels of hematite, gibbsite, and goethite, confirmed this proposition, as these components are characteristic laterite and bauxite minerals (Deer et al. 1992:572). As these occur at the advanced weathering stage, hence on old land surfaces, this evidence strengthens the argument that LVIII was the former surface of the hill.

Summary

It appears that LV and LVI are composed of similar minerals. Layer V is more heavily weathered, with a high level of iron leached and present in the iron pan. Both layers display typical highly weathered characteristics of latosols derived from basalt-andesite volcanic breccia and tuffs. The layers are not distinctive enough in their mineral composition to reflect different source areas, nor resolve the issue of temporal placement. Thus, the mystery of the position of the iron pan was placed in the hands of soil micromorphology.

Soil micromorphology

The full soil micromorphological report by Ann-Maria Hart is presented as Appendix A. What follows is a discussion of the main interpretations of the analysis relevant to the stated problem under investigation – the presence of a former surface of the depression.

The thin section was divided into two layers, LV and LVI, corresponding with the field layer designations (Plate 6.4). Beginning with LV, Hart identified two types of void structures which are indicative of compaction (and possible trampling). The first type of void is most likely compaction as the result of the terrace construction. The second type is probably the result of compaction after terrace construction. Hart (2004:6) explains:

> These voids are evident in figures 2 and 2a. The outline of the larger ped (R) is marked by accommodating planar voids with rough edges. This may be the result of initial compaction but due to weathering by the hydrological environment the edges of the peds are worn. Within and crossing these peds are smaller, smoother accommodating planar voids (S) which suggest more recent compaction most likely occurring post terrace construction.

Layer VI stands in contrast to Layer V. Layer VI has a crumbly structure indicative of high levels of disturbance. Although, we do see evidence of compaction in the peds:

> [I]n some of the peds closer to the iron-manganese "boundary" or pan there is evidence of planar voids crossing through the peds suggesting some level of compaction (figure 4). In addition planar voids are also evident through the iron-manganese pan (figure 8) which is also suggestive of compaction occurring post iron pan formation. This compaction could either be the result of the weight of the terrace itself or by activity carried out on the surface of the terrace (Hart 2004:6).

In relation to the iron pan formation, Hart draws on research from Denmark, where iron pans have been known to form within weeks of anaerobic conditions being present (Hart 2004, citing Breuning-Madsen & Holst 1992; Breuning-Madsen & Holst 1998; Breuning-Madsen et al. 2001). She states that such conditions may be formed by an abrupt change in texture between soil horizons. For example, one horizon may be more impermeable than the other. Hart emphasises that LV and LVI have different microstructures, and the formation of the iron-manganese pan on the boundary of both horizons may be the result of the impermeability of LV (Hart 2004:6). In fact, this is probably why the pan extends to the surface of the crown, as it follows this border. The cause of the impermeability is said to be the compaction of Layer V, during construction.

A crucial point is the confirmation by Hart that the general morphology of the border between Layer V and VI is "not consistent with natural deposition but is more likely to be the result of anthropogenic activity, perhaps preparation of the land surface" (Hart 2004:7). Therefore, it is surmised that the original

depression surface is represented by the location of the iron pan. Later in time, additional soil was placed in the depression. It was compacted by anthropogenic processes, and is represented now by Layer V.

Another key conclusion of Hart's micromorphological analysis relates to the differences between Layer V and VI. Although both layers have high levels of iron and similar mineral constituents (supported by the XRD analysis), LVI appears far more disturbed. A high quantity of charcoal (20-30%) suggests anthropogenic activity, and the presence of dirty unlaminated clay coatings and infillings are indicative of disturbance. As the clay of LVI was redeposited to build the crown, this is not a great surprise. However, LV would also have been brought to the site, and placed in secondary deposition. Two scenarios seem possible here. One, that the clay of LVI originated in an area of anthropogenic disturbance, such as a locale recently burnt-off, and/or previously settled. Alternatively, some sort of burning activity took place on the surface of the depression prior to the deposition of LV. As any evidence of burning would be reflected within Feature 3 and 3a (which it is not), the first scenario seems most plausible. In this case, the matrix of Layer V must stem from a locale that had not undergone major anthropogenic disturbance.

The considerable difference in the compaction of Layer V and Layer VI is also of interest. Two main influences are applicable to compaction levels of soils. The first concerns the amount of force applied, and the duration involved in compaction. The second concerns the nature of the material compacted. In general, sandy materials are easier to compact than silts, because materials from which air and water can be readily excluded, and of which particles can be moved into new positions, are much easier to compact (Charman 1978:32). The most difficult materials to compact are plastic clays. As Layer V and VI are clays, the difference could be explained by human influences on compaction. i.e. that LV was compacted more than LVI. However, there may be another cause: consolidation.

Consolidation occurs most readily under moist conditions. Although some consolidation will take place in dry environments, most will occur after the water content of a soil has been raised to a high level of saturation. To quote Charman (1978:33):

> Air is excluded on wetting, large aggregates are slaked, particles are lubricated, and there is the extra weight resulting from the water. Water is gradually excluded and consolidation takes place.

The amount of consolidation depends on the initial degree of compaction. In light of the water-logging capabilities of the depression, what was observed as differences in compaction may also be related to processes of consolidation. This means that both natural and anthropogenic factors are responsible in the post-depositional history of the depression.

Discussion

As the results of the above analysis have shown, the stratigraphic post-depositional history of the west depression is rather complicated. It is now apparent that at least two phases of construction were involved to form the depression. The first phase created the initial structure, with excavation of the depression from the surface of the crown. This involved mounding the north, west and southern edges, most likely with the soils thus removed. Figure 6.8 is a reconstruction of what the depression may have looked like at this point. A structure was placed in the depression at some time after this (on the south-east side at least), that required post supports in the form of basalt cobbles. After an unknown period, the structure was removed (as there is no evidence that the posts decayed-in-place), and the depression was filled with another soil, represented most definitely by Layer V. It is likely that this deposit initially included all layers up to the current LIV. This is suggested by the presence of the iron pan right to the surface of the east side of the depression, as represented in Figure 5.7. There is no evidence for a mounded edge here, thus

LIV would not have been deposited through creep and wash. It therefore must have been part of the anthropogenically deposited soil.

It is not clear exactly how long it would have taken for the iron pan to develop in the depression, but it was most likely after the erosion of the mounded edges into the depression, as consolidation would have occurred under the waterlogged conditions, eventually causing LV to be impermeable. That the iron pan extends below F3 is probably due to the post that was once located there. The soil around the post would have been significantly compacted as a product of the post's positioning. Thus, once removed, a distinctive border may have been created, similar to that between LV and LVI, which also caused the iron pan to form beneath the stone feature.

The depth of the original depression surface would also have been significantly deeper on the western, northern and southern sides due to the mounded edge. The lack of mounding on the east extent, and its interface with the 'baulk' and the east depression, could mean that the depression was entered from this east side.

East depression

Although the east depression is shallower than the west depression, both possess very similar soil profiles. The shallowness is most apparent on the west extent of this depression, as represented by TR1f (Figure 5.13). In this profile, Layer IV is closer to the surface, and the iron pan is not as dense. The wavy lower boundary of Layer I is indicative of pedogenic formation processes taking place, which is also attested by the colour, which is a dark-yellowish brown clay.

As the depression joins the knoll we see a different picture (Figure 5.14). Here, the iron pan is only partially formed. All of the layers, except Layer V and VI, are not as well developed, and their boundaries are not definitive. Chappell

noted in the field that the remnant manganese veinlets, and haematite streaks, indicate that the hydromorphic process was not fully developed in this part of the depression. In contrast, the east boundary – where the depression meets the knoll – has a developed iron pan and thick deposit of Layer V. It is probable that this part of the depression was relatively deep, as the knoll would have formed a steep eastern wall or boundary to the depression in its original form. However, once the second deposition of soil was in place (Layer V and probably LIV), the most impermeable part of the LV would have been at the base of the knoll.

It seems that a similar process of leaching occurred in both depressions. Consultation of the Table 6.1 indicates a mean of pH 5, illustrating ideal conditions for leaching to take place. The Munsell colour descriptions (Table 6.2) also illustrate a catena pattern although there are fewer derivative layers. An additional difference concerns the matrix of Layer VI. In both TR1f and TR1g, LVI is comprised of different coloured clays compared to the west – reddish brown with high dominance of purple, white and yellow saprolite mottles in TR1f, and a strong brown clay with a similar purple dominated saprolite mix in TR1g. These differences are not related to post-depositional processes; rather, they pertain to different source areas from which the soil is derived.

As there was a lack of cultural materials in this depression, and the general processes seemed to be the same as in the west depression, further tests were not considered necessary.

Knoll

The clays of the knoll are slightly different to those in the depressions, due in part to the post-depositional processes, such as slumping and erosion, which have produced oxidising conditions. TR1g-a was placed through the east extent of the knoll (Figure 5.15), and two main layers identified: Layer II and III. It is

probable that these layers are the same as LIVc and VIb in TR1g. Their minor differences can be attributed to differing processes of water percolation. The strong brown colour of each suggests a high amount of goethite. The top layers are not as acidic, at pH 6, which is linked to the lack of evidence for leaching. Instead, water percolation was most influential in moving the soils down both the east and west sides of the knoll.

The processes evident in the knoll, and those affecting the east depression, are the result of natural processes affecting anthropogenic soils.

Southern Slope of the Crown

A high level of erosional sediment is represented as Layer II (Figure 5.16). It is clear that this soil is derived from the top of the crown, deposited in a pattern typical of slope erosion. It is loosely consolidated, and it consists of the dominant reddish-brown silty clay with saprolite clasts, manganese veinlets and also some sherds characteristic of the fill materials used to construct the crown. Soil formation processes are evident between LIIIa and LIIIb and the basal saprolite, represented by mottling. The layers all display high levels of ferric iron (as indicated by their colour descriptions, Table 6.2), and have a pH of 5. The top humic layer had a reading of 6.5, but this may be due to a high level of organics which absorb the reactor dye and can influence the development of the indicator colour (Briggs 1977).

According to Limbrey (1975:316), when earthworks undergo erosion and soil creep, the lower slopes become protected by a skirt of material, and the soil around the base becomes buried. Further,

> a newly built earthwork suffers erosion at the surface and settling within it, and these two processes combine to reduce the height and slope until a stable cover of vegetation is achieved, after which the slower processes of surface washing and soil creep continue to work upon it, and a soil profile develops (Limbrey 1975:316).

Over time, the erosion on the slopes of Ngemeduu has led to a deep layer of eroded soil. These processes would have accelerated once the site was no longer maintained. So in effect, a natural post-depositional process has occurred on an anthropogenic feature in response to anthropogenic activities.

Encircling Terrace

There is a mix of depositional soils and classic 'fill' in the profile of TR1i (Figure 5.17). Layer II is the same reddish-brown silty clay of TR1h, and illustrates at least 40 cm of this sediment has washed over the terrace. The thickest deposition is at the rear of the terrace, the immediate 'skirt' of the crown, and the thinnest deposition at the terrace's edge. With an average pH of 5, the profile is consistently acidic, although it has not undergone processes of leaching like the depressions. The top of LIII represents the original terrace layer after it had been levelled with material brought to the sites, represented by LIV, a reddish-brown clay containing a high level of cultural materials. Formation processes are represented by LIVa, again by mottling.

As noted in Chapter Five, the irregular boundary of the saprolite is consistent with digging activities where the hill was scraped back to obtain the upper soil horizons for construction of the crown. Thus, the base of the terrace was created through human activities. Layers IV and III represent human intervention once more, as the soil was brought to the site to create a level surface. It may have been brought in to help establish a vegetation layer, as the exposed saprolite may not have had sufficient minerals and nutrients. Also, this soil would have been used to extend the terrace horizontally, to form an even edge and increased surface area. The upper section of the profile has formed through natural processes.

B:NA-4:12 Toi Meduu Crown and Terrace Complex

Three separate features of this site were excavated. I will discuss each one individually, and conclude with a discussion of the site on whole.

North West Terrace

In TR2 a clear four layer stratigraphic profile was evident in the field (Figure 5.22). All three layers were distinct, although it is likely that they were all originally LIII – the fill layer. The hill topsoil was removed, back to the saprolite, and then the fill was placed to even out and extend the terrace surface as at Ngemeduu. The Munsell colours do not suggest major processes of leaching have occurred at the site, although the yellowish-red LIII mottled with saprolite may indicate some movement of ferric iron out of the soil. The acidity levels are the same as Ngemeduu – pH 5. Soil formation processes are taking place, represented by LIII, indicative of B horizon formation.

Like Ngemeduu, there is evidence at the rear of this terrace for erosion and creep from the western crown and ditch (Figure 5.21, Plate 5.10). As such, the top 10 cm may in fact have been deposited through wash over the terrace. The surface area of the terrace would originally have been larger, and the northern slopes of the crowns steeper. Also, in Plate 5.11 it is clear that the northern edge of the terrace has undergone significant slumping.

No further tests were carried out on the clays from this trench.

Backsloping Terrace

This terrace has been severely impacted upon by erosion and wash. In Figure 5.23 and Plate 6.5 the slumping is quite visible, and in Plate 6.6 the curved nature of the trench indicates the current level of curvature on the terrace caused by wash and sedimentation. Stratigraphic interpretation in the field indicated over two meters of erosion-derived sediment has formed the current

terrace surface. Two layers were identified. Layer II a brown silty clay, appears to be a derived B-horizon soil. The silty nature is typical of slope-deposited soils, or sorting on slopes. Briggs (1977:49) states: "[t]he combined effects of solifluction, creep and wash result in the segregation of the soil according to particle size. In general, finer particles are moved further down slope than coarse particles."

Layer III is similarly a strong brown silty clay, over 1.5 m thick at least, and quite compact. It was also formed from eroded sediments. It contained variable amounts of cultural materials, which were also in secondary deposition. This fits the normal pattern for soils of lower slopes. They not only develop deep soil profiles, but the buried horizons (such as the cultural debris and L IV) result "from the occasional inclusion of debris washed from upslope" (Briggs 1977:50).

XRD analysis was performed on a sample of Layer III (Table 6.6). The results are similar to LV of Ngemeduu (quantified sample). Goethite has no doubt influenced the strong brown colour of the soil. The presence of gibbsite (hydrous mica) suggests alteration of kaolinite. The interlayered clay, most likely smectite/kaolinite, may indicate weathering processes, although this is minor. Smectite has great water holding capacity, and represents the finest particles in clays. All three main constituents are advanced weathered clay fractions, and reflect the developmental characteristics of topsoils, with gibbsite a secondary alteration mineral. As with the previous features discussed, the acidity level is the same – pH 5.

The backsloping terrace remains somewhat enigmatic. However, the rear of the terrace appears to have been significantly deeper and wider originally than it is today. Thus, processes of slumping and soil creep have altered its appearance and original form. Its temporal history has not been clarified as it may have been built before or after the top part of the site, or indeed as a separate earthwork altogether.

West Ditch and Crowns

A common feature of most ditches investigated archaeologically is that the edges located through excavation are significantly different to the original shape. This is due to a high level of weathering, which in part causes the upper part of the feature to erode back, while at the same time the lower part becomes protected by the accumulation of materials (Limbrey 1975:291-292; Figure 6.10). This was indeed the case in the west ditch of Toi Meduu, where nine deposited soil-layers were identified in Trench 5 (Figure 5.25). As outlined in Chapter Five, two main fill episodes occur in ditches: primary and secondary fill episodes. During primary fill, chemical weathering and soil formation on the sides of the ditch and on the accumulation is slow in relation to physical processes (Limbrey 1975:292). However, no stable soil develops on the sides of the ditch or at the top, because of the rapid deposition of this material. The primary fill layer in TR5 is LIX, a mix of brown and strong brown silty clay. With a pH of 5.5, this layer is only moderately acidic.

The secondary fill causes most changes within the ditch, despite the slowing down of processes of surface washing, creep, and wind deposition. The slope of the ditch decreases, vegetation starts to take hold, and soil formation begins on the bank, the lip of the ditch, and on the deposit (Limbrey 1975:294). Layer VII represents the first secondary fill deposit. A characteristic feature is the cultural debris, and the high silt content. Other events going on in the ditch at this time include movement of the ditch boundaries into each crown, obfuscating any record of the original ditch walls. Significantly, mineral alteration would have begun when the soil was deposited, particularly on the silt grade minerals. This is where the XRD results are come into play.

Samples from Layer IX and VII were processed using XRD, although results were not quantified (Table 6.5). The results reflect the dominance of kaolinite, goethite and smectite. The fine form of smectite is likely the cause of the silty

nature of these layers. Smectite has excellent cation exchange capacities, and it holds water well, hence the presence of this silicate can have significant impact of soil properties. Beginning with LIX, the dominance of smectite and kaolinite illustrates a high level of silica, and great 'wetting and drying' characteristics. There is less weathering of kaolinite, as attested by the low level of gibbsite. Therefore, leaching does not seem to have altered the soils in this deposit. This situation is certainly applicable to LVII as well. The dominance of intermediate weathered minerals (see Table 6.4) illustrates a higher level of silica and ineffective processes of leaching. Another indicator of non-leaching conditions for LVII is its pH reading – 6, which is not acidic. All told, leaching was not a major transforming factor in the history of these two soil layers.

Another secondary fill episode is represented by LIV, followed by the remaining layers, to the present surface. As the ditch filled with sediment, the erosion rate would have slowed down creating a level of 'quasi-stability' within the ditch (Limbrey 1975:297), particularly in the lower layers. This stability depended not on the cessation of the deposition of mineral material but on the reduction of that already there as fast as new material arrived. Therefore, alteration processes were then restricted to the upper layers, particularly those in the central area where water pools.

To summarise the history of the ditch:

1. The ditch was likely cut between the crowns after they were formed.

2. It was initially ca. 3m deep, when one considers the original height of the crowns prior to erosion.

3. The deposition of primary fill occurred rapidly after the ditch was constructed.

4. The secondary fill began after this initial accumulation, slowing down processes of creep and wash. Vegetation would have taken hold and begun to stabilise the lip and sides of the ditch.

5. Cultural debris were washed into the secondary fill layer (LVII) which were dated to 1820 (1360) 990 BP (ANU-11611). It was at this time that mineral alterations began in the clays.

6. Layer V was deposited above LVII, and the third secondary fill strata, LIV, has been dated to 730 (680) 670 (ANU-11610). This suggests later use of the crown, although the type of activity cannot be discerned.

7. The remaining layers have eroded into the ditch in the last 500 years, blurring the boundaries of the original ditch walls and crowns.

B:NA-4:6 Rois Terrace Complex

The stratigraphic history of the terrace excavated at Rois by no means simple. As discussed in Chapter Five, a remnant portion of a B horizon soil was located, LVII, with brown silty clay soil qualities. A sample of this layer was tested using XRD, and the results are listed in Table 6.5. An interesting result here is that there are high levels of silica clays (smectite, kaolinite) and hydrous oxide (gibbsite). This may signify the weathering of kaolinite, from which the gibbsite has formed. Another indicator is that both the intermediately weathered clays – smectite and interlayered – are in a minority. This is very similar to TR3 LIII, although the smectite is only minor it that case. The smectite indicates good water holding capabilities for this layer. The presence of goethite appears typical for this area. With a pH of 5, this layer is also acidic.

The rest of the layers did not undergo XRD testing. Layer VI may have been culturally placed, although it is a possible remnant B horizon like LVII. Layer V displays comparable properties. This reddish brown silty clay has large quantity of sherds, as illustrated in Figure 5.28. It does not appear to have been

altered through leaching, as it retains a strong amount of ferric (red) iron, although it did have a pH of 5. The high level of pottery suggests it came from an anthropogenically impacted locale, most likely an area of past occupation.

It appears that some sort of pedogenic process is taking place between LIV and LIIIa. Layer IIIa is a reddish brown silty clay with white and pink mottles, and Layer IV is dominated by pink and yellow mottled saprolite. Both layers have a low incidence of cultural material, and the saprolite component of LIV suggests its original state was as parent material. As suggested in Chapter Five, LIV might have been the originally surface of the terrace.

Layer III is a yellowish red silty clay, with a pH of 5.5. This layer has quite a few sherds, and the soil colour is quite different to the previous two. The yellow indicates a loss of ferric iron (red) to a certain extent, although its current pH is only slightly acidic. It may also represent a former surface of the terrace, and its distinctive wavy boundary may indicate past use for cultivation. Certainly, its colour indicates it has been through oxidation processes. That it has not altered into a B-horizon like Layer II, might illustrate that its use for cultivation was in times that are more recent. This issue is explored further in the succeeding chapter that reports and discusses the results of vegetation analyses.

6.3 Integrated Discussion

Mineralogical and structural analyses have produced evidence to aid interpretation of the history of the earthworks. It is clear that all three sites have undergone significant changes since their initial construction. The dominant post-depositional processes that have caused these changes are erosion, slumping and soil creep, which is typical of earthwork structures worldwide. With regard to the crowns, slopes, and the original surface area of the terraces at Ngemeduu and Toi Meduu:

1. The height and width of the crowns was originally larger, and the terraces wider and shallower (Figure 6.9a).

2. Processes of erosion and wash have 'softened' and buried the original edges of each feature (Figure 6.9b), and buried the former surface of the terraces.

3. The eroded nature of all the terraces at Rois also indicates soil creep and erosion, although there is no evidence on this lower terrace for a catena or toposequence. The lower terrace of Rois has not undergone as many post-depositional processes as the other two sites under investigation. However, its construction history is complex, and the terrace was formed through a number of activities, not necessarily all connected.

At present, nearly all the soil layers from the earthworks are acidic. While it is unlikely that the current level of acidity would have existed throughout the history of the earthworks, there is a strong case to suggest that the soils have always been acidic, but in varying degrees. What this means is that it is possible that additional organic remains within the earthworks have dissolved and/or dissipated (e.g. in the burials recovered from the upper terrace of Rois only a few teeth had survived). This issue is taken into account in the interpretation, and not much more can be said about it at this point in time.

What sorts of activities took place in the construction of these earthworks? At the most prosaic level, soil was transported from specific locales in the landscape to create these human constructions. Confirmation of the bauxite nodules and highly weathered nature of the clays through XRD analysis supported the conclusion that some soils were from the immediate vicinity, e.g. LVIII of Ngemeduu. This soil comprised debris from earlier occupational activities in the form of pottery[8], basalt cobbles and charcoal, with radiocarbon determinations placing this earlier occupation from at least 1970 BP to 1400 BP. In comparison, the main fill layer of the NW terrace at Toi Meduu contained

[8] Which is discussed in full detail in Chapter Eight.

minimal cultural material, and its place of origin does not appear to have been inhabited. Therefore, the earthwork builders utilised a number of different locales when 'quarrying' the soil for the earthworks.

Looking at the dominant fill layers of the Ngemeduu crown and terrace (LVI and LIV), a large amount of occupational remains were included as fill. A date in LVI of 1993 (1912) 1822 BP(ANU-11641-2) again indicates cultural activity around 2000 BP, with LIV of the terrace slightly older at 3471 (2753) 1951 BP (ANU-11836), however these dates are not firmly tied to cultural materials, which restricts further interpretation. Yet, the landscape prior to modification must have been 'filled' with settlement remains. This landscape became actively transformed to one appearing both barren and full of life; with the depleted and exposed red-latosolic clays of sourced 'fill' locations on the one hand, and the emergent form and structure of the crown with its associated new vegetation growth on the other. When we inject people back into the equation, a clear activity would have been the recurrent movement up and down the slopes and ridge with basket loads of soils, and the coral found in the west depression hints at some link with the coast. This movement emphasises the importance of the uplands and the significance of these places in everyday activities and practices during periods of earthworks construction. That the hills already played a significant role in social life is attested to by the previous occupation residues in the uplands, even on Ngemeduu itself. Thus, social structures must have been in place that facilitated the materialisation of these activities on both physical and conceptual levels.

By incorporating this cultural material into the crown, the earthwork builders erased *in situ* evidence of previous activity. This in fact began with the act of cutting and shaping the original hilltop into the crown and terrace, obscuring the original topography of the hill. On another level, some of these remains were preserved within the crown strata. It may have been a way of connecting with the ancestors, by establishing a clear connection to the past inhabitants of

the ridgeline, and served as a means of creating memory; linking the past to the future. Thus, processes of manipulation and transformation altered not only the physical appearance of the landscape, but also the social landscape.

It is likely that all three sites were not built in isolation, and their division here (as separate sites) is purely classificatory. Evidence indicates a temporal and spatial connection between Ngemeduu and Toi Meduu. It is quite apparent in Plate 5.20 that before construction of the Compact Road, the savanna grassland formed spatial connection between Ngemeduu and the Rois terraces. Furthermore, cultural activity in Ngeterchong village around 1500 BP is contemporaneous with the cultural remains found on Toi Meduu, and the construction of Ngemeduu. Thus, these processes of transformation were occurring at different places in the ridgeline. Additionally, each of the three sites studied here illustrate evidence of significance of the 'place' prior to modification, which implies longevity and continuity of these places, and the history of the ridgeline as a whole.

Chapter summary

The results have shown that anthropogenic and natural processes cannot be viewed in isolation of each other. The XRD analyses have provided mineralogical results that allowed distinctions in soil source areas to be made, such as the bauxitic hill-topsoils, and those less weathered from more stable profiles. This method has highlighted the complexities of mineral and structural alteration that have occurred in the west depression on Ngemeduu, obscuring the past activity surface. In sum, the 'gross' methods have highlighted processes of oxidation, reduction and leaching, that have altered the clays, leading to greater understanding of the post-depositional changes within the earthworks.

The micromorphological analysis has proved essential in providing the 'key' evidence to confirm and locate the original surface of the west depression, as well as highlighting the different potential source areas of soil in the crown.

When combined with the macro-scale soil results and other archaeological observations and evidence, such micro-scale methods are essential in creating more informed archaeological interpretations, and here specifically, these methods have proven fundamental to understanding the earthworks and their role in the landscape history of this area.

An old cliché is perhaps relevant here: 'don't be fooled by appearances'. Ngemeduu, Toi Meduu and Rois have never been 'static' structures – constant processes, both anthropogenic and natural, have and are transforming the soils and materials within it, on both macro- and micro- spatial and temporal scales. These processes have disguised the former appearance, and masked activities that took place within and on the earthworks. These changes cannot be viewed in isolation from social processes, where similar levels of complexity no doubt occurred as the earthworks altered through time, both physically and conceptually. A clear outcome of the clay analysis is that 'functional' interpretations should not be made on the outward appearance of the earthworks alone, as this runs contrary to the obvious complexities involved in their construction-history. I will return to this issue in Chapter Nine, where a more detailed discussion of Ngemeduu takes place within the realm of habitus and processes shaping and being shaped by the social landscape.

CHAPTER SEVEN

Environmental Analysis: Vegetation

..a ked is a place covered by grass with pandanus trees and some shrubs in patches. Most of the ked are in the high hills, but some are at the slope of the hills or in the lowlands. A particular characteristic of the ked is the dome or trapezoid shape at the top of a hill or a small peak and the step-like platforms on the slope (Hijikata 1995:58).

Throughout the forest regions of the volcanic section there are stretches of wasteland (heath) which the natives call ked.....stretches of woodland alternate with stretches of ked throughout Babeldaob although there are no signs of a physical cause for this... (Krämer 1919:271).

7.1 Introduction

While the popular explanation for terrace construction focuses on subsistence-related activities, there has been no direct evidence recovered in support. Analysis of pollen and phytoliths has been limited to but a few small archaeological investigations in Palau (CRM projects), the results of which seem largely restricted to more recent periods in Palauan prehistory (e.g. Henry et al. 1996). This low number of analyses stands in contrast to application of these techniques in other Pacific archaeological projects for over 10 years. Therefore, this project applied pollen and phytolith analyses in order to locate and assess indirect and direct evidence for subsistence practices, and identify and interpret anthropogenic and natural changes in vegetation on and within the vicinity of the earthworks. The latter concern is particularly relevant in addressing questions related to the formation of savanna (ked) vegetation in the islands of Micronesia, where researchers have questioned the formation of savanna for slash/burn agricultural purposes (Athens & Ward 2004; Zan & Hunter-Anderson 1987). In view of these concerns, this chapter assesses prehistoric evidence for landscape vegetative transformations on the ridgeline of Ngaraard. Although situated immediately within the first and second scales of analysis as discussed in Chapter Four (Methodology), interpretations based upon the results of the vegetation analyses also play a key role in addressing the third scale, namely the social landscape.

7.2 Methods applied

Phytoliths, or plant opaline silica bodies, occur in the stems, leaves and flowers of plants. The silica derives from groundwater as monosilic acid, which is deposited in plant cells (Jones & Handreck 1967; Pearsall 1990:65). Phytoliths can vary in form, type, and size within any plant species, and they decay in place. Their recovery from sediments provides some idea of the plants growing (or that grew) in the immediate vicinity of a sampled area (see Rovner 1983 for further details).

Taphonomic factors can influence the survival rate of phytoliths. Although an absence of carbon means phytoliths do not suffer from organic decay factors (as does pollen), phytoliths are subject to chemical corrosion and mechanical abrasion in soils (Rovner 1983:235). It appears that only high alkaline soils adversely affect phytoliths, such as those above pH 9, although Pearsall (1990) argues that there is no simple relationship between pH and phytolith preservation. She explains:

> I have recovered good phytolith assemblages from soils with pH values well over 9. The relationship of pH, water percolation rate, temperature, and soil texture to phytolith assemblage integrity needs to be investigated systematically (Pearsall 1990:72).

On the whole, however, opal phytoliths are extremely durable in a range of soil conditions. In archaeology, factors of deposition are more important to phytolith identification than preservation. Soils that are transported (by wind, water, or humans) affect phytolith content in soils, as does soil erosion and alluviation. As such, phytolith analysis is most valuable when used in conjunction with pollen analysis (Horrocks et al. 2000).

Within archaeology, phytolith analysis plays a vital role in two main areas of research – identification of past subsistence crops, and changes in vegetation patterns, particularly between forest and grasslands. These are especially relevant in the Pacific, where the technique has been applied to investigations

in search of the identification of tropical crops such as taro and yam, and also rice (Pearsall 1990). However, as most root crops are not high silica accumulators, indirect evidence of agricultural activity is relied upon, such as the identification of invasive plants (e.g. grasses, sedges) which may be indicative of past field surfaces (Pearsall & Trimble 1984). In addition, changes in vegetation from forest to grasslands, and variation within grassland populations are of importance for those studies addressing issues of land clearance and use (Pearsall 1990). In most cases, these issues are linked to studies directed to answer questions of agricultural production.

Pollen preserves well in sediments. The outer wall of pollen grains (and spores of ferns and other non-polleniferous plants) is composed of sporopollenin, which is an organic substance with a high resistance to decay (Horrocks et al. 2000:863). As pollen is generally specific to particular plant families, it can be readily identified with a good reference collection. Mechanisms for pollen dispersal are either by wind- or insect-pollination. In spatial terms, the former can be dispersed up to hundreds of metres, while the latter is generally deposited within a few metres of the parent plant.

In terms of preservation, pollen is quite resistant although, as mentioned above, organic decay can occur. Soils with low pH conditions seem to favour pollen preservation (Canti 1989). Pollen preserves best, however, in waterlogged sites, not soils. Perturbation in soils by natural and human causes, and the oxidising conditions of soils affect pollen preservation, as can processes of cyclic wetting and drying (Horrocks & D'Costa 2003:27). As with phytoliths, processes of soil transportation and disturbance also impact on pollen survival.

By providing analysis of non-polliniferous plants – particularly through fern spore identification – this type of analysis has been used to gauge levels of vegetation disturbance, specifically those argued to be the product of anthropogenic activity, such as fire regimes for land clearance. As some crops

have an absence of pollen, the identification of pollen from weeds and other garden-associated plants are used as secondary indicators of subsistence related activities in many Pacific studies. With these factors in mind, the benefits of using a combination of phytolith and pollen analyses are apparent.

Methodology

The samples from Ngemeduu that were processed for pollen and phytoliths derived from the west depression and immediately outside the depression, and the encircling terrace samples were examined for pollen only. Six samples were processed for phytoliths, and nine samples were processed in the pollen analysis in total. Five samples in total for pollen and four for phytolith analysis[1] were processed from Toi Meduu, and seven samples were tested for pollen from Rois, although only two were submitted for phytolith analysis.[2] Reports are included as Appendix B (pollen) and Appendix C (phytolith).

Twelve soil samples for phytolith analysis were sent to Dr. Jeff Parr (formerly of the Centre for Geoarchaeology and Palaeoenvironmental Research, School of Environmental Science and Management, Southern Cross University, Australia). Parr used the Perkin-Elmer Multiwave Sample Preparation system for phytolith and starch grain extraction from each sample. Phytoliths extracted from each were weighed, mounted on to microscope slides and scanned at 400x magnification on an Olympus BH2 microscope. All phytoliths encountered during three transects of a microscope slide were counted, although only one transect was counted for charcoal.

Fossil phytolith types were compared to those stored in a modern phytolith digital-image database of around ~200 species from regionally applicable flora of Papua New Guinea and Australia. Other databases included the (Runge

[1]My project did not have the funds to test all three sites in detail. Therefore, samples tested from the Toi Meduu trenches were restricted.
[2] As with Toi Meduu, funds did not cover the complete phytolith analysis of the terrace.

1996) CD-ROM and Kealhofer and Piperno (1998). Phytolith sizes were gauged using an ocular micrometer and the individual scale bars on each digital image.

Pollen analysis took place in the palynology division of the Department of Archaeology and Natural History, Research School of Pacific and Asian Studies, ANU. Gillian Atkin processed all samples following standard ANU processing procedures, and *Lycopodium* pollen was added as a 'foreign' control measure. Once processed, the samples were mounted onto microscope slides and analysed by Dominique O'Dea.

Measurement of pollen took place by moving down along a transect, and then repeated in reverse, until all transects were completed. A total slide pollen count was completed due to the relatively unknown flora of the area, although a database from Papua New Guinea was consulted. Charcoal counts were made following the methodology of Clark (1982). The results were entered into a Tilia database (version 2.04b) and pollen diagrams were produced using Tiliagraph (version 2.04b) (Appendix B).

7.3 Combined Results of pollen and phytolith analyses

As the following discussion addresses temporal changes in the vegetation pattern, it is necessary here summarise the temporal sequence. It is as follows: construction of Toi Meduu appears to have been earlier than Ngemeduu, based on dates obtained from the west ditch (TR5) (Table 3.1). The radiocarbon determination of 1500 ± 190 (1820 (1390, 1360, 1350) 990 cal. BP) (ANU-11611) documents cultural activity on the west crown which has eroded into the ditch. Therefore, construction of the site most likely took place earlier than this date, as the ditch was excavated (i.e. initially 'built') after the crowns were completed. As discussed in Chapter Three, cultural remains recovered from the immediate landscape prior to Toi Meduu's construction illustrate earlier cultural activities from 1860 - 2150 BP (Welch 2001), which overlaps with the ridgeline's transformation into monumental earthworks.

The earliest date for construction of Ngemeduu is after 1420 ± 30 (1350 (1310) 1290 cal. BP) (ANU-11686), although there is evidence for cultural activities on the hilltop prior to construction at 2140 ± 220 (2740 (2140, 2140, 2120) 1570 cal. BP) (ANU-11659). This places construction not long after Toi Meduu was completed, and a range of radiocarbon determinations from the initial hill surface (LVIII) from ca. 1400 – 2000 BP (Table 3.1) suggest Ngemeduu might have been occupied while Toi Meduu was under construction.

The terrace at Rois that was excavated in this project had insufficient samples for radiocarbon dating. Thus, its date of construction can only be projected from the age of the burials excavated by IARII on the top terrace of the set. Dates from the burial cluster around 2000 BP. With the 'top-down' construction sequence in mind, the lowest terraces were consequently constructed after the upper terraces, and as such after 2000 BP (assuming the burials were placed in the top terrace not long after it was built). In any case, this tenuous evidence suggests the Rois terraces are potentially older than both Toi Meduu and Ngemeduu.

Results for each independent feature sampled at each site follow, with both phytolith and pollen results presented in Table 7.1a-c. The analyses focused on Ngemeduu and Rois, although the specific layers from three earthwork components excavated at Toi Meduu that underwent analyses do provide results that aid landscape interpretation for the ridgeline.

B:NA-4:11 Ngemeduu crown and terrace complex

Crown surface

Layer II (which is situated outside of the west depression (Figure 5.4)) was tested for both pollen and phytoliths (Table 7.1a). The pollen identified represents 'classic'[3] savanna grassland vegetation e.g. *Pandanus* sp., fern spores,

[3] 'Classic' in the sense of Pacific grassland environments.

Polypodiaceae, and Poaceae, (see Table 7.2 for a list of taxa for each vegetation zone on Babeldaob). The charcoal concentration is low for this layer, although the phytolith charcoal level of abundance is moderate. While the phytolith data illustrate a range of plants, their low number does not allow quantification beyond presence/absence (but see Appendix B for raw data). Grasses (Poaceae) are recorded, and also banana (Musaceae), a tree (Marantaceae), and a starch grain.

West Depression

The layers in the central part of the depression were focused on here, except for LVI[4]. From LVIII up to LI, there is a general fluctuation between classic savanna grasslands dominated by *Pandanus* sp. and grasses (Poaceae), and savanna dominated by the ferns and fern allies, which are disturbance indicators (Table 7.1a). The pollen counts tend to increase vertically in the profile, with LI and LIV illustrating the highest sums. A few secondary vegetation taxa are recorded in LV-LIV, however, they are poorly represented in general. There is a clear variation in charcoal concentrations, with the basal layer (LVIII) and the top layer in the depression (LI) displaying the highest intensities.

The phytolith analysis provides comparable results. No phytoliths were recorded for the lowest two layers, however the grasses and *Pandanus* sp. observed in LV-LIV support the pollen results. Layer IV displays the most varied range of taxa, with classic savanna, secondary vegetation and disturbance plants present. The fig (Moraceae) and Liliaceae phytoliths are of note, though only one of each was observed. The presence of Arecaceae in LV and LIV may indicate betel palm growth on site. Little charcoal was recorded, although the presence of charred phytoliths suggests local fire activity (discussed in further detail in section 7.4). The high concentration of charcoal

[4] Layer VI was not sampled due to its great volume, and its highly disturbed structure.

recorded in the pollen record for LVIII is replicated in the phytolith charcoal results.

Encircling terrace

Pollen analysis of samples from LIV and LIII in Trench 1i (Figure 5.17) produced results reflecting savanna grassland (Table 7.1a), although LIV is dominated more by ferns/fern allies and LIII by Poaceae and *Pandanus* sp., the more classic grassland taxa. The pollen count is significantly higher for LIV, and so too the charcoal concentration.

B:NA-4:12 Toi Meduu crown and terrace complex

North West terrace

Soil samples from LIII and LII (TR2) were analysed (Figure 5.22; Table 7.1b). A similar pattern to the terrace at Ngemeduu is observed, with LIII (fill layer forming the initial terrace) exhibiting a higher percentage of ferns and fern allies, and LII higher in *Pandanus* sp. and Poaceae percentages, the classic savanna taxa. However, the reverse picture is seen in the pollen sum and charcoal concentrations, with LII exhibiting higher levels of both charcoal and pollen compared to LIII. No phytoliths were recorded from LIII. The charcoal count for the phytolith analysis is exceptionally low, although a *Synedra ulna* fresh water diatom was identified. Diatoms are microscopic forms of aquatic and sub-aquatic algae, inhabiting wetlands, lakes, estuaries and oceans (Stroermer & Smol 1999). When they are present in archaeological contexts, they indicate water sources in the vicinity (Horrocks, et al 2000, citing Bryant & Dering 1996). *Synedra ulna,* an epilithic and pennate diatom, grows best in the presence of nitrates, and prefers to live in habitats with a pH above 7 (an alkalibionte form) (Werner 1977). They are most commonly found in puddles or pooled water in variable locations. The implications of diatoms in these samples is examined in section 7.4.

Backsloping terrace

The pollen record for Layer III of TR3 (Table 7.1b) reflects the dominance of the ferns/fern allies, with virtually no grasses represented and only a small percentage of *Pandanus* sp. pollen. The total pollen count is low, and the pollen charcoal levels moderate. In contrast, no charred material was observed in the phytolith sample, or identifiable phytoliths. Three *Synedra ulna* fresh water diatoms were also recorded in this terrace.

West ditch

The two main secondary fill layers (LVI and LVII) were tested for pollen in Trench 5 (Table 7.1b). Both layers have low overall pollen counts. The ferns/fern allies dominate each layer, and there is a clear absence of grasses and an extremely low percentage of *Pandanus* sp. pollen. Charcoal counts are also minimal, with a slightly higher count recorded for LVII compared to LVI. This charcoal pattern is replicated in the phytolith charcoal abundance levels.

B:NA-4:6 Rois terrace complex

Lower Terrace

The savanna vegetation pattern is also apparent in the Rois pollen record (Table 7.1c). Of note is the classic savanna growth seen in LVI (the 'B' horizon remnant; see Chapter's Five and Six) which changes to a more disturbed savanna with ferns dominating the anthropogenic 'fill', LV. Layer's IV and IIIa border on grassy-to-fern, and the classic indicators return in LIII to LI with the higher percentage of Poaceae and *Pandanus* sp. pollen. The phytolith record accounts for grasses for LIII and one tree phytolith, although LV was phytolith deficient. In general, charcoal counts on the pollen slides oscillate, with the highest concentrations present in the upper three layers, in parallel with the total pollen sums (of which the taphonomic implications are addresses below).

Phytolith charcoal was minimal, although a charred phytolith observed in LIII may indicate fire activity on site.

7.4 Discussion

Vegetation Pattern

The results are generally indicative of an anthropogenically disturbed landscape during the initial stages of earthwork construction, characterised by a ferns/fern allies dominated savanna. Once the earthworks were completed/near completion, stable classic grassland was established in both the local environment and on the sites themselves, as all of the plants (from which the pollen and phytoliths derived) do not contribute significantly to regional pollen rain. Thus, they are likely to have been growing in the immediate vicinity (within 50 m) or on each site (Simon Haberle pers. comm.).[5] Only Rois displayed a differing pattern, whereby classic savanna was evident in the locale prior to construction of the lower terrace tested in this project. The absence of forest taxa suggests that the landscape was not (immediately) forested prior to these earthwork constructions.

If we begin with Ngemeduu, the lowest crown layers were formed through the initial hilltop earth-moving and earth-building activities. As such, the disturbed savanna vegetation pattern, dominated by ferns/fern allies, fits with these activities. The upper layers of the depression stand in contrast. By the time LV was deposited, the landscape appears to have been a classic savanna, and the upper layers (LIVb - LI) have high fractions of both Poaceae and *Pandanus*, indicating a more stable grassland environment on and around the crown. The same pattern is observed in the encircling terrace. Layer IV, the anthropogenic 'fill' layer has a clear dominance of ferns, with LIII (the original terrace surface) illustrating more stable 'classic' grassland growth.

[5] Palynologist, Resource Management in Asian Pacific Program, Research School of Pacific and Asian Studies, Australian National University.

The phytolith results also attest to a more stable environment for plant growth in the upper layers, with a variety of taxa recorded in LIV. As well as the classic savanna indicators (grasses, vines, and shrubs), others resembled Moraceae - fig, and Liliaceae -*Cordyline* sp. which are usually grown in the coastal plains, and around gardens. The Compostiteae may also be related to plant growth, as this type of taxa can be incorporated with mulching materials. The banana phytolith recorded for LII is also of note here. However, it is obvious that no root crop phytoliths (nor pollen) were present in the samples. Furthermore, as only one phytolith per 'possible' food-plant[6] was noted, any conclusion focused on subsistence activities would be rather nebulous at this stage.

In temporal comparison, the older site of Toi Meduu exhibits a similar vegetation pattern. Both terraces reflect a dominance of ferns and fern allies in their most disturbed layers - LIII of the backsloping terrace which was formed through erosional processes, and the 'fill' layer of the north-west terrace (LIII). Clear classic savanna growth is present by the time LII formed on the latter terrace. A unique component of the Toi Meduu record is the diatoms. The immediate explanation is that both terraces must have had pooled water at some point in time in order for *Synedra ulna* to have grown. Although if this was the case, diatoms should have been found in the depression profiles of Ngemeduu, and they were not. Alternatively then, there is a possibility that the diatoms were deposited in the original soil matrix of the relevant layers, or through direct animal defecation. Further investigation of diatoms in archaeological contexts is certainly required in order to clarify such depositional issues as this.

In relation to the ditch, the primary fill layer in the ditch represents a phase in its depositional history where vegetation growth would not have taken hold (as discussed in the previous chapter). It is not until the secondary phase that some

[6] I emphasise 'possible' here, because most food plants have other uses in Palau, e.g. *Cordyline* has religious and medicinal uses, as does *Pandanus,* the leaves of which are used for weaving (Merlin and Keene 1990).

sort of vegetative stability would have formed, more so on the sides and edge of the ditch than within it, and with this in mind LVI and LVII were tested. The lack of phytoliths (which especially reflect immediate plant growth) for both layers certainly fits with this depositional history. The pollen record is indicative of a disturbed environment, dominated by ferns. One can propose with some certainty that these ferns were growing on the sides of the ditch. I observed such an occurrence in Ngatpang State, where *Gleichenia linearis* (false Staghorn fern) formed a dense vegetation layer on the side of a deep ditch that is part of an earthwork complex (Plate 7.1). In sum, the general consistency in the growth of the fern/fern allies is indicative of a disturbed environment throughout the initial construction of each feature of Toi Meduu. Stability is reflected only later in its construction history, when the soils had regained some of their nutrients through organic activities and sedimentation, and human clearance activities decreased and/or stopped. Toi Meduu and Ngemeduu have very similar vegetative histories in this respect, in that both hilltops did not have stable classic savanna vegetation prior to the earth-building activities that transformed each into monumental earthworks.

The pollen and phytolith record of Rois differs slightly to the ridge-top sites. Two different depositional episodes are apparent. To begin, there is potential indirect evidence for cultivation activities (as no direct evidence for subsistence crops was found at any of the sites) in LIII to LI. Firstly, the wavy layer boundaries are similar to a pattern associated with cultivation surfaces, and this has already been highlighted in the previous two chapters. The evidence from these analyses concerns LIIIa. As previously stated, LIIIa appears to have been undergoing pedogenic alteration with LIV. However, LIIIa also exhibits vegetative components of LIV: the dominance of ferns, and LIII: the higher charcoal concentrations, pollen sums, and *Polygonum*, and as such may represent 'mixing' between the two layers. A tentative conclusion based on these factors is that this potential pollen mixing and pedogenic activity may be

the result of anthropogenic mixing of LIII and LIV through gardening activities, which eventually created LIIIa. The 'classic' savanna vegetation pattern that dominates LIII to LI may be a later development, once the terrace was no longer used, as these layers were most likely formed by the wash of sediments through erosional activities. If cultivation did occur, it is still not clear whether it was immediately after terrace construction, or later in time.

As the upper layers all possess higher pollen sums and higher charcoal counts, it is possible that this is time-related. The implication here is that the age of the soil surfaces (in this context) correlate with pollen preservation, i.e. the younger the surface, the higher the amount of pollen (and charcoal) preserved. This certainly appears to be the case when one reviews the pollen sums (Tables 7.1a-c) in the upper-most layers at the three sites tested in this project. Therefore, it is proposed that the upper layers of the TR4 were deposited in the late Traditional or Historic periods. Whether the possible 'cultivation' activity is from the later period or earlier in time is still uncertain.

The lower layers of the Rois terrace are certainly the result of older terrace-forming and cultural activities. The results imply that the landscape prior to deposition of the fill layer (LV) was quite stable with 'classic' savanna vegetation reflected in LVI. A transformation occurred once LV was placed to form the terrace, as ferns and allies overshadow the record (in fact, all the 'fill' layers have indicated fern dominance in all three sites). This disturbed vegetation pattern continues into LIV, although *Pandanus* sp. and Poaceae percentages do increase.

All told, the vegetation pattern at all three sites not only reflects a transformed 'physical' landscape through earth-building activities, but also through the record of both disturbed and classic savanna grasslands in which primary forest and/or forest re-growth was not part of the ridgeline landscape immediately before earthwork activities, and not at all after the earthworks had been formed.

Fire/burning activities

Phytolith charcoal records are considered to reflect localised fire events, with abundant records attesting to a fire event on site. Pollen charcoal counts generally reflect the regional fire record, although some charcoal will be local depending on dispersal mechanisms and plant taxa e.g. *Pandanus* sp. (Simon Haberle pers. comm.). Comparatively high levels of charcoal are seen to represent increased clearance activities through fire. Layer VIII of Ngemeduu has such a high incidence, which suggests land clearance activities consistent with the initial earth-building activities that this layer represents. The phytolith abundance record correlates here with the pollen charcoal concentration, implying local fire events on the ridgeline.

The next significant increase is not apparent until LIVb. The record of charred phytoliths[7] here also implies fire activities on site, and the higher level of phytolith charcoal for LII compared to the pollen charcoal count supports on-site burning activities. Layer I has the most concentrated pollen charcoal, but as suggested in the last section, this may be a function of its earlier age and proximity to the surface rather than representing any 'real' increase in regional fire activities.

Although the charcoal concentrations are low in the encircling terrace, the concentration in LIV is significantly higher than LIII. Again, this coincides with the pollen record which is dominated by ferns/fern allies, indicative of a disturbed environment, and one in which vegetation clearance through burning played a role. The 'classic', more stable savanna growth seen in LIII is consistent with the low concentration of charcoal, and lends support to the argument of a stable grassland landscape.

[7] Note here however that the integrity of 'charred phytoliths' is being questioned among phytolith circles, as to whether these phytoliths are indeed 'charred' or just 'stained' through some other as yet undefined process (Simon Haberle pers. comm.).

In the pollen record for Toi Meduu, charcoal concentrations are remarkably low, except for the upper layer (LII) of the north-west terrace, and LIII of the backsloping terrace and both point towards regional fire activity. There may be a relationship here between the lack of phytolith charcoal in the latter site and the presence of diatoms. As diatoms grow in wet environments (including puddles) the terraces may not have provided dry enough conditions for fires to take hold. This could be the case for the backlsoping terrace in particular. However as the west-terrace has a low amount of phytolith charcoal, the single diatom could represent a drier environment. In its entirety, Toi Meduu did not display the same levels of charcoal concentrations (hence fire activities) as Ngemeduu.

The Rois pollen charcoal record is interesting because it demonstrates an oscillating pattern between layers. The low concentration of charcoal in LVI is likely linked to the stable grassland vegetation pattern, indicating little clearance activities. But once LV was deposited, the charcoal record increases. It drops off again in LIV, the proposed initial terrace surface layer, but increases once more in LIIIa. Significant increases then occur from these layers upwards; however, this may also be a time-related function of preservation (as discussed previously).

Taphonomy and Preservation factors

Although the identification of fossil pollen, spores, and phytoliths provides evidence of past floras, it must be remembered that all vegetation reconstructions

> ..are *interpretations*, limited not only by the usual complexities of spore and pollen production, but also by local phenomena including the geometry of the depositional environment (Macphail et al. 1994:192, emphasis added).

Archaeological sites in particular tend to have been more affected by localised post-depositional events. Thus, a primary concern of the pollen and phytolith results in the earthworks was assessing the integrity of the records as

representing plants growing on site/in the vicinity/region of the site, or if the plant evidence was 'in' the soil when it was used to build the earthworks. It was discerned (through discussion with palynologists) that if the pollen and phytoliths were in secondary deposition, they would be damaged due to the bioturbation and transportation processes affecting the soils during their translocation. As only low levels of damaged pollen were recorded in each sample, and none at all for some samples (see Appendix B), the conclusion reached was that both records reliably indicate vegetation growth on-site, or within 50 m of the site.

The affects of bioturbation do require further attention here. Horrocks et al. (2000:868) point out that in some archaeological sites, the high presence of fern spores over forest/tree taxa may a function of differential preservation in biologically active soils (citing Dimbleby 1967). In addressing the Ngemeduu pollen record, the major layers that might have undergone bioturbation and pedogenic processes are LIVb and LIV. Layer IVb has remarkably fewer phytoliths compared to LIV, although the pollen record for each layer is comparable. Therefore, if bioturbation had occurred between these two layers we would expect to find more phytoliths in LIVb. The only layer in which such processes may have occurred is LII. Ferns dominate the record, with only low amounts of *Pandanus* sp. and Poaceae pollen. The main point is that there is an absence of secondary vegetation indicators (trees/shrubs), which stands in contrast to LI, the other soil layer close to the surface of the depression. Therefore, bioturbation processes (such as worm activity) might have favoured fern preservation over trees/shrubs in LII.

In general, all the samples were phytolith deficient, despite the ideal pH context for phytolith preservation. Parr (n.d.) suggests this deficiency is a product of the strongly weathered condition of the palaeosols. In Ngemeduu, the lowest layers (LVIII and LVII) have a distinct absence of phytoliths, although they do have charcoal records, and so too for Rois (LV) and the ditch layers of Toi Meduu.

This brings to the fore the question of preservation versus deposition and/or post-depositional processes. We know from the XRD analyses on Ngemeduu that both layers, LVIII in particular, are highly weathered and leached latosolic clays with bauxitic elements. The two erosionally derived ditch layers have also undergone mineral transformations, and the fill layer (LV) of the Rois terrace was highly disturbed and in secondary deposition. Therefore, the dominance of the ferns/fern allies appear in agreement with poor quality, disturbed soils, as it is highly probable that plants (that would produce phytoliths) could not become established in such an environment. Furthermore, in a study on savanna grasslands and forest regrowth in the Ngeremeduu Bay area of Babeldaob, Endress and Chinea (2001:563) found that grasslands with a thick herbaceous mat of *Ischaemum* spp., *Miscanthus floridulus* (swordgrass), and *Gleichenia linearis* (false Staghorn fern):

> may inhibit seeds from reaching the soils and prevent seedling establishment by causing low light availability and root competition. Once established, small seedlings and saplings must still compete for soil nutrients and growing space with the established herbaceous layer and also survive annual or semiannual burning.

There are two possible implications here: firstly, that the low level of phytoliths may be a direct relation to the soil taphonomy[8] i.e. soil weathering, and secondly, the low level of phytoliths is a direct result of the fern/fern allies dominated vegetation which is not conducive to the growth of phytolith-producing plants e.g. trees/shrubs.

On the other hand, there is a cultural factor to consider. In the phytolith report Parr (n.d.) states: "[r]esults from previous studies indicate that the greater abundance of phytoliths in buried soil horizons may be indicative of cultural activity (citing Rovner 1983)." Thus, an explanation for lower phytolith counts is that there was not enough time in between layer deposition at the site for plant growth to re-establish, and "the samples that are comparatively more

[8] Note that Hart (2004) remarked that the high levels of iron oxide in the soils made it difficult to identify more delicate features such as pollen and phytoliths in the soil thin section.

abundant in phytoliths than other samples may actually indicate fallow periods or soil stability allowing the re-emergence of vegetation" (Parr, n.d.). Only two layers in Ngemeduu had 'abundant' phytoliths – LII and LIV. The latter explanation seems most applicable to Layer II, as it would originally have formed the surface layer of the crown, and as such possessed a stable context for vegetation growth, both before and after the second phase of depression construction. However, when compared to the pollen record, the total pollen sum for LII is extremely low compared to other layers deficient in phytoliths, which does not imply stable vegetation growth. It has been remarked that for pollen to accumulate in each layer at these sites, construction must have been slow enough for plants to re-grow in the immediate environment. Accordingly, there is a strong case for taphonomic factors effecting the survival of phytoliths here, rather than a cultural explanation.

This also seems to be the case for LIV. The high level of both pollen and phytoliths in LIV seems consistent with the soil conditions which are waterlogged and conducive to plant growth. The clay analyses (Chapter Six) demonstrated that LIV has developed through soil developmental processes after the second depression construction event in which LV and LIV were deposited (although they were originally of the same matrix). As there was a deficiency in charcoal for dating LIV (and LV), it is difficult to discern exactly when these plants grew in the depression. It is highly probable that these taxa grew in more recent times, in the Traditional Village period or the Historic period. While human activities contributed to the creation of this depositional environment, it appears that post-depositional taphonomic factors related to soil transformations may be the key component in explaining the low level of phytoliths in the depression.

The pre-earthwork ridgeline vegetation: a 'humanised landscape'?

In arguments concerning the impact of humans on island ecosystems, we are seeing a focus now on recognition of the "humanisation of forests" (Kennedy & Clarke 2004:1) and indeed a consideration of the intense humanisation of many Pacific Island landscapes on the whole (e.g. Clarke & Thaman 1993). The results of the vegetation analyses in this project, in combination with the palaeoenvironmental investigation by Athens and Ward (1999), subsequently allow investigation of just how 'humanised' the ridgeline vegetative landscape was prior to earthwork construction.

In their analysis of the Ngerchau core (which was located at the rear of Ulimang Village at the base of the ridgeline, as discussed in Chapter Three), Athens and Ward (2001:169-170) identified three 'pollen zones'. It is in the earliest - Zone A – that they point to the first evidence of landscape disturbance (and in their interpretation human settlement) based on 'significant numerical changes' in disturbance pollen indicators (grass pollen, *Pandanus* pollen, fern spores) and charcoal concentrations in the core record. This activity is dated to 4291 cal. BP (Athens and Ward 2001:171). However, it is not until later at 2750-2650 cal. BP that we see the most consistent (and convincing) evidence for land clearance activities. In Zone C, *Pandanus*, sedge and grass pollen peak, consistent with a very high concentration in charcoal particles. Their argument suggests methods of agroforestry, with "landscape [forest] clearance, transformation to savanna formation and fire maintenance for vegetation control" (Athens and Ward 2001:170).

Wickler (2002:69-70) discusses the agricultural argument (Athens in Ward 1999), in which the first sign of disturbance indicators is proposed to mark swidden agriculture activities (i.e. burning). The decline in indicators, from 3000 – 2700 cal BP is seen to represent a shift from extensive to intensive agriculture, the intensification seen through terrace construction. The later 'surge' in indicators (2750-2650 cal. BP) is speculated to represent general

expansion of agriculture spurred by population growth. So how does this compare to the archaeological remains?

Firstly, the earliest dates for earthwork construction in the ridgeline are from Rois, at ca. 2000 BP. Thus, there is no evidence at this point to suggest earthwork construction around 3000 BP as proposed by IARII above. However, as examined in Chapter Three, there is evidence in the Uplands for occupation from 2500 BP, and structural remains were identified during excavation of Ngemeduu dated to ca. 2200 BP. Therefore, the savanna transformation argued by Athens and Ward from 2750-2650 cal. BP has some consistency with cultural activities in the Uplands, and may mark initial movement of people into this topographic zone. The claim that population pressure drove an 'expansion' of agriculture must remain conjectural at this stage, as there is an absence of supporting archaeological evidence. That people were using fire to burn vegetation at this time certainly seems to be the case, and that they were doing this to clear the land seems a reasonable proposition. But why were they clearing the land?

Vegetation clearance in Pacific Island landscapes is generally argued to represent swidden agriculture, or what Zan and Hunter-Anderson (1987:19) call the "hortigenetic hypothesis." However, the creation of savanna grasslands is also related to other purposes, such as the creation of paths for movement through the landscape (Zan & Hunter-Anderson 1987), and the clearance of forest to create settlement locales, which are not related to agricultural pursuits. Furthermore, non-economic motivations are apparent for upland settlement by interpretations of the cultural remains recovered (discussed in more detail in the following chapter). Thus, I argue here that there is no clear correlation between land clearance and cultivation activities in the ridgeline.

While the vegetation pattern from Rois intimates stable 'classic' savanna prior to terrace construction, the hilltop sites of Ngemeduu and Toi Meduu reflect a

more disturbed grassland environment. My interpretation is that the vegetation in the ridge-top sites was less stable compared to the Rois terraces, because the latter vegetation pattern is of an older age. Whether the savanna was created by much earlier clearance activities, or was a natural component of the landscape, is still a matter of debate. Although Zan and Hunter-Anderson (1987) have argued for the presence of 'natural' savannas in Micronesia, recent palaeoenvironmental investigations in Guam provide evidence to the contrary. Athens and Ward (2004:27) declare "[t]he finding that humans are responsible for the creation of the savannas that presently extend over broad areas of the interior uplands of southern Guam appears indisputable," therefore dismissing any claims for 'natural' savanna growth. However, further work in the Palauan palaeoenvironment is required before the possibility of naturally occurring savannas is dismissed. For Toi Meduu and Ngemeduu at least, it appears that the landscape was cleared during- or just prior- to upland occupation, and thus the savanna here is anthropogenically created.

As the argument for the presence/absence of evidence for agriculture could take up an exhaustive (and somewhat fruitless) portion of this chapter, I believe it is essential to look beyond such economic explanations. What is most significant is that the evidence for clearance indicates that in clearing the land people were transforming their environment; they were creating a specific 'humanised' landscape in the ridgeline. This signals a change in human practices whereby people were engaged in processes of moulding and creating specific spaces and/or locales for habitation, i.e. they were forming places. That this behaviour represents the materialisation of an altered perception of time is another key point. The clearance of the land signals a commitment of people to place, one that would have required 'up-keep' through time, and this appears to be the case with the maintenance of savanna grassland on the earthworks. It indicates a conceptual shift in both time-space relations, one which reflects a concern for the 'long-term' situating of activities in specific places. Such practices are the

first visible signifiers of habitus in the history of the ridgeline landscape. Recognition of these changes and that social structures both mediated and created their acceptance and perpetuation, is imperative to understanding the transformation of the landscape with monumental earthworks. I return to this issue in greater detail in Chapter Nine. But for now, it is apparent that any interpretations of the earthworks cannot be made in isolation of consideration of the first signifiers of human activities and habitus in the ridgeline, as partially attested to by the results of the vegetation analyses.

CHAPTER EIGHT

Pottery Analysis

In stating the role of ceramic technology [studies], I am inclined, therefore, to stress, not its accuracy or reliability, not the data it recovers, not even the special advantages if offers for determining the sources and relationships of pottery, for these contributions are recognised, in some measure at least. Rather, I would bring out the fact that ceramic technology places the human factor in proper perspective. Awareness of the potter's role means interest in pottery as a product of human skill and intelligence and as a facet of culture (Shepard 1971:4-5).

8.1 Introduction

Pottery is a ubiquitous feature of Palau's archaeological record[1]. Due primarily to the low survival rate of organic material in the acidic soils, pottery survives as the most dominant portable artefact representing past activities and occupation on the volcanic islands. As such, pottery has received analytical attention by most archaeological researchers of the islands. Before outlining the prevailing methods and conclusions of such analytical investigations, a brief précis of ethnographic accounts of pottery making in Palau is presented.

8.2 Background: Palauan potters, pots, and propositions

Women's work: the art of pottery making in Palau

Unlike many other Micronesian and Pacific islanders, Palauans were still engaged in pottery making at European contact. An active interest in the skill and method of making clay pots in the archipelago began with Augustine and Elisabeth Krämer the early 1900s (Krämer 1926)[2]. Elisabeth observed the work of a female potter in Oikull, a village of Airai in southern Babeldaob. Although her full description is too lengthy to include here (see Krämer 1926:197-200), her major observations were:

[1] I prefer the term 'pottery' to 'ceramics' in this analysis. The latter term has a more general definition which covers "all objects made from a dominantly silicate material which have been transformed in physical state by heat (firing)" (Velde and Druc 1999:5), whereas the former (in potter's terminology) is a term for all vessels made of clay resources.

[2] Although Kubary did record some elements of pottery making in 1873.

a. Pottery was made by women, and fired by men.

b. Clay was collected from a *ked* in Oikull – white with red streaks in this case.

c. Large piles (reaching the size of 'ostrich eggs') of clay were made after repeated drying and kneading.[3]

d. The base of the pot was then formed; the clay was rolled into 'sausages' and the pot was created using the 'coiling' method; then shaped, and left in the sun to dry.

e. A 'pounder' and basalt 'pressing-tool' (paddle and anvil) were then used to beat the sides of the pot smooth, followed by further days of air-drying.

f. Firing took place on an open fire, which took around 20 minutes. The pots were removed from the ashes and placed aside to cool.

Kubary (1873), and later Hijikata (1993) and Osborne (1966) also documented similar methods, although they record some variation in the clay-preparing stage. In his descriptions, Hijikata (1993) describes the same clay source as Krämer, but notes that sandy soil and once-baked earthenware pieces and stones were crushed and added to the white clay as temper because it was too fine-grained (Hijikata 1995:257). In Osborne's observations of pottery making in Ngatpang, a fine-grained grey clay was collected from stream beds or taro patches. Temper was also added: sherds that had been ground up in a *Tridacna* shell mortar. He stated that the tempering material "always consists of ground sherds; no one knew of any other material" (Osborne 1966:33).

The above researchers also queried their informants about pottery manufacturing locations. In their answers, the Palauans revealed some consistencies in the villages named, despite some 60 years between Kubary and Hijikata's visits to the islands. Villages named include Oikull (Airai), Ngatpang,

[3] Pots that had been formed and dried but not fired were also re-used. They were broken into pieces, placed in water and after re-hydration would be used again.

Chol and Chelab (Ngaraard) and Ngardmau (Hijikata 1993, 1995, Krämer 1926), and Kubary also named Ngeong, Ngarengasang and Ngarakesou, which were reputed to have produced particularly "sturdy pottery" (Kubary 1873 cited in Krämer 1926:197). While Ngatpang was said to have red-clay and Oikull white, Hijikata (1993:21) recorded "[a]t Chelab there is a blackish-colour soil that is not so good, but they still make earthenware there today."

What kinds of pots were made? Krämer specifies two cooking pots ([g]*olakang* and *teroter*), and one in particular for storage (*bakai*) of molasses and water (Figure 8.1a). Some *bakai* were quite large, up to 1 metre in height, as identified by Kubary. Special circular pads were made from coconut leaves to provide stability to the pots when they were placed on the ground (because they did not have flat bottoms), and when they were placed on the head for transportation. Krämer describes several pots with suspension holes for hanging from walls or rafters. Clay lamps were also manufactured, although dominant opinion suggests they were a Spanish introduction (Krämer 1926). By the 1920s, only three pottery types were recorded by Hijikata – the *olakang, bakai* and lamps (Figure 8.1b).

Palauan pottery goes 'under the knife'

Archaeological investigations indicate a long history of pottery making in Palau. There were several changes in vessel form, although the technique of coiling and the use of a 'paddle and anvil' appear temporally consistent. This section highlights these pottery variations as explicated through analytical investigations.

Osborne's investigation (1966) marks the first thorough attempt at pottery analysis in Palau. His analysis of pottery from a terrace site, Koror 7 (K7), utilised a classificatory system based upon sherd thickness, paste, surface treatment and rim forms. Osborne's (1966) conclusion was that a thin, sand-tempered ware characterised early sites, and a thick, grog tempered ware

typified later assemblages. The integrity of this sequence is argued by Osborne to be just, as he believed the terrace was formed through accretionary processes rather than a synchronic event (Osborne 1966:96). Using techniques of seriation (based on Ford 1951), Osborne could not establish a fine-grained typology, although the results did provide partial support to his sherd thickness- and paste-associated chronology.

Lucking (1984:151) was critical of Osborne's sequence from K7, as she had misgivings about his 'accretionary' site-formation explanation. She proposed her own typology based on a small collection of sherds from her terrace excavations. Although not detailing her methodology, she proposes three types of pottery (Lucking 1984:155):

> Type 1 is a very distinctive red exterior/black interior ware....Type 2 is a thin black ware, usually rims and body sherds are both less than 6mm thick. The third is flat, about 20-40mm from inner to outer surface and less than 9mm thick.

Sherds from the first two types underwent neutron activation analysis, but only proved to illustrate that they were made with Palauan clays (Lucking 1984; Pavlish et al. 1988). Ultimately, Lucking could not establish a sequence with chronological consistency, beyond asserting that the sherds found in the terrace fill and test pits on terraces "must directly relate to terrace construction" (Lucking 1984:157).

The application of an adaptationist model to Palauan pottery by Snyder (1989) proved inconclusive. Snyder measured physical properties of sherds such as thickness, porosity, and weight, to test an hypothesis based on the assumption that due to the nature of adaptation there should be a change in the physical properties of pottery through time. Desilets et al. (1999) provide a summary of the problems in the dataset on which this study took place, and I will not detail them here, suffice to say that when the data set was assessed in relation to processes of 'natural selection', conclusive results were limited.

As expected, IARII have also undertaken pottery analysis. While Wickler's (1996, 1997) analysis suffered from poor chronological control, Liston et al. (1998) were able to associate 'thin' bodied sherds (less than 7 mm) to cal. 385-45 BC and cal. 792-416 BC (Wickler et al. 1998). The most conclusive IARII pottery investigation is the formal analysis undertaken on pottery recovered from the Compact Road Data Recovery (CRDR) project (on Babeldaob), where over 15,000 sherds and seven whole vessels were excavated (Desilets et al. 1999:186). The IARII methodology details a set of rim 'types' based on analysis of attribute data, as well as radiocarbon determinations for a portion of their dataset which is incorporated into seriation, correspondence, and bivariate analyses. As the pottery analysis in this thesis incorporates elements of this methodology, I will expand upon these analytical methods in section 8.3. To summarize their results here (Desilets et al. 1999:222):

> seriation revealed by correspondence analysis indicates that thicker walled vessels (greater than 5mm) are strongly associated with archaeological sites dating after AD 1, while those with thinner walls (less than 5mm) are found in sites dating prior to AD 1.

Bivariate analysis highlighted a correlation between body thickness and rim thickness through time, although correspondence analysis indicated a great deal of diversity with the pottery assemblages. Both analyses, however, do concur that approximately 1,000 years BP, a distinct change in rim type occurred: "[v]ery distinctive flanged sherds are found to derive from later sites, particularly to those dated after AD 1100" (Desilets et al. 1999:231). Tempering materials in the CRDR analysis were predominantly grog.

The most recent pottery analysis by Clark (2002) provides the longest sequence and most definitive evidence of changes in vessel form and tempering materials in the Palau archipelago. In part, this is a feature of taphonomic conditions. Located on one of the 'Rock Islands', the Ulong Island[4] pottery assemblage was recovered from a site in coralline sand on the west beach; hence a near absence

[4] This island is most famous because it was 'home' to the shipwrecked crew of the *Antelope* in 1783, although they were based on the eastern side of the island.

of acidic soils and consequently improved artefactual preservation. Osborne (1979) excavated at this location in 1968 (the 'Wall test') but stopped short of the C horizon. In Layer IV (the deepest excavated layer), he identified 'backcurving' (everted/outcurving) thin walled globular jars with grog temper (Osborne 1979:76-78, 238). Clark placed his test-pits in order to reach the basal strata and investigate this everted ware. The pottery in the upper strata were consistent with Osborne's LI-III, dominated by thicker vessel walls, inverted flanged rims and grog tempering (see Clark & Wright 2002; Osborne 1979). However, Clark did reach the base of the site, and found an additional cultural layer (LV) that contained a stylistically distinct pottery vessel, "a jar assemblage with an outcurving rim, pointed lip and a mixed calcareous and volcanic sand temper" (Clark 2004:28). A study looking at temper in Palauan pottery included a sample of these distinct sherds from LV. Analysis revealed four main temper types: A) exclusively grog, B) dominantly grog with rare terrigenous volcanic sand, C) grog particles more abundant than terrigenous grains, and D) terrigenous grains more abundant than grog. An additional group (including the sherds from Ulong) had mixed calcareous and terrigenous sand (*hybrid* tempers) (Fitzpatrick, et al. 2003:1178-1181), with this latter group seemingly the oldest temper type in Palau. The results indicate a definite origin of all materials, temper and clays, in the Palau islands (Fitzpatrick et al. 2003).

The lowest stratum – LIV and LV, and the associated pottery assemblages, have now been reliably dated. The everted jars of LIV are extremely similar to the thin-black pottery found on Babeldaob. Radiocarbon dating of charcoal in association with this pottery places them at ca. 2800-2400 BP (Athens Ward 2001:165). After a series of radiocarbon dates on material from LIV and LV, Clark's results appear to corroborate the IARII dates for the thin-everted pottery e.g. 3060 (2910) 2790 BP (OZG342). The age of pottery from LV appears to be only slightly earlier, with initial occupation of Ulong Island suggested by 3000-2800 BP (Clark 2004:30). Associated with volcanic and *hybrid* tempered

vessels, these results (and those of Fitzpatrick et al. 2003) present a reliable pottery sequence, illustrating an alteration from volcanic to grog temper through time, which is correlated with a change in vessel form.

Decorated pottery

In general, decorated pottery is not considered to play a major role in prehistoric pottery assemblages, with a low level of decoration recorded for assemblages excavated in the archipelago. Accordingly, most pottery analyses have focused on establishing a chronology through rim/vessels forms and tempering materials. However, decoration plays a dominant role in the pottery assemblage excavated in the project. Therefore, an outline of the prevailing forms of decoration is presented below.

In his 1966 publication, Osborne describes different pottery colours. He discussed smudging and variation in surface finishes – from black (smudged), grey, reds (buff) to dark reds – and names polished surfaces on some sherds (Osborne 1966:76). He also recorded slipped surfaces, although noted they were rare. The colours named are white, both interior and exterior surfaces; red exterior/white interior; red exterior, buff interior, and grey or white exterior and red interior, although none of these combinations were found on whole vessels.

Another interesting but "rare" form of decoration identified by Osborne (1966:78) are "red-on-buff" painted sherds, and a slightly larger quantity of painted sherds was recovered in his later excavations. Examples include straight-sided sherds with solid red paint on the interior and carved triangles on the exterior, solid red painted sherds, one with a painted 'v' on the interior. From Ulong he recovered some sherds with either solid red pigment on all surfaces, or a mixture of solid red pigment and diagonal or diamond shapes (Osborne 1979:75). In total, Stratum II of the 'wall test' had "12% painted, incised and painted, stamped or modelled sherds" which, he noted, was a large quantity of decorated wares by Palauan standards.

The final form of decoration includes "incising" such as punched or punctate incisions, lines, and mat impressions. Desilets et al. (1999) have also recorded finger impressions, crenulations, and zigzag impressions. Piercing and punctate are also noted, although the former is seen as functional and the latter as decorative. Wiping is also identified, although its designation as 'decorative' is questioned, as it is most likely just part of the manufacturing process. Clark and Wright (2002) also recorded fingernail impressions on flanged rims. In general, these decorative types are located on rims or lips of vessels, and many on flanged rims, while painting occurs of the bodies of sherds/vessels as well as lips and rims.

Summary

Establishing a pottery sequence in Palau has been problematic. Confounding factors include the acidic soils of the volcanic islands, which have directly affected preservation of pottery. This has resulted in highly degraded surfaces on many excavated sherds, as opposed to those retrieved from calcareous depositional environments. Another factor concerns the number of terrace sites excavated in early investigations. As the pottery was predominantly recovered from redeposited clay layers, a sequence with firmly associated radiocarbon determinations was not achieved. The picture has now changed. In recent years, several sites with improved stratigraphic and chronological integrity have been examined, and a sequence has been produced stretching back some 3000 BP. Based on current evidence, the earliest vessels in Palau were large outcurving jars, tempered with volcanic and calcareous grains. A change to grog-tempered, thin walled everted jars took place, followed most characteristically by inverted, flange-rimmed, grog tempered bowls and jars, with flanging dominant by 800 - 1000 BP. The transitionary period between the latter two vessel types remains fuzzy in many respects, as does the role of decoration. However, the analysis in this project provides information that helps remedy this 'black-box' in the pottery sequence of Palau.

8.3 Methodology: form and surface treatment

Formal analysis

Analytically, the formal analysis of pottery allows comparison within and between pottery assemblages in relation to vessel form/shape, decoration, and fabric (Summerhayes 2000). In the case of Palau - where the recovery of whole pots during excavation is uncommon - the analysis of potsherds is a central component of archaeological investigations.

The methodology adopted here includes features of Summerhayes' (2000) study of Lapita pottery (which incorporates methods expounded by Irwin 1985b; Joukowsky 1980; Poulsen 1987; and Specht 1969), and IARII's analysis of the CRDR pottery from Babeldaob (Desilets et al. 1999). This involves recording low-level pottery attributes (variables) which are entered into a computer database for analysis. In general, methods based upon 'low-level' attributes are necessary when studying prehistoric sherd assemblages when knowledge of past vessel shapes is limited. In most cases, these analytical processes lead to a proposed set of vessel forms (Summerhayes 2000:33).

In this project, derivation of rim and vessel forms through attribute analysis was not feasible due to the small size of the sample (n=437, of which only 91 are rims[5]), and therefore advanced statistical analyses were not appropriate. However, as IARII has defined a set of 'rim types' through analysis of the CRDR pottery assemblage, my analysis predominantly follows their rim typology, although low-level attributes were also recorded in light of the potential identification of 'new' rim types. Additionally, I have added four groups of vessel forms (Vessel Form I-IV). Each rim type is consequently related to a vessel form, although variability within each form generally equates to more than one rim type per vessel form. I will emphasise here that the rim

[5] Summerhayes (2000:33) unequivocally states "the most important category of sherd in determining vessel form is the rim and its orientation (see Poulsen 1987:870)."

types and vessel form groups are utilised in this analysis as heuristic devices in order to identify differences between and within sites based upon vessel shape, as well as decoration and fabric (after Summerhayes 2000:33).

All told, the aim of analysis is to "build a pottery spectrum made up of particular attributes and frequency (Poulsen 1987)" (Summerhayes 2000:34), as well as the identification of attribute patterns. The identification of similarity and variation within the assemblage is a major goal, which subsequently allows comparison between sites. This includes temporal comparison through associated radiocarbon determinations.

Database

A database was formed into which classificatory attribute data were entered for the pottery recovered from Ngemeduu (B:NA-4:11), Toi Meduu (B:NA-4:12) and Rois (B:NA-4:6). Following Summerhayes (after Irwin 1985) the attributes describe the form (size and shape), surface treatment/decoration (location, technique), and technology (paste) of the potsherds (Summerhayes 2000:34). To begin, all sherds required classification as either diagnostic or non-diagnostic sherds. Diagnostic sherds include identifiable segments of vessels such as are rims, bases, and necks, as well as sherds with surface treatment (e.g. decorated sherds). Non-diagnostic sherds are predominantly plain body-sherds. The database only contains provenance details for the latter group of sherds.

Formal data: attributes

This section outlines the variables/attributes selected for formal analysis. The attributes consist of variables applicable to pottery analyses in general (e.g. sherd type, weight, thickness etc), and those specific to Palauan pottery assemblages (e.g. surface condition, vessel forms, rim types, etc). The attributes were allocated numeric codes, and all variables were recorded on a record sheet prior to entry into the database.

a. Type of sherd

This attribute denotes the location of the sherd on a vessel. Sherds are identified as either 1) rim, 2) body, 3) neck, 4) spout[6], 5) knob, 6) base, 7) carination (Figure 8.2a).

b. Sherd weight

Each diagnostic sherd was weighed, and measurements recorded in grams. Although considered an unnecessary practice by some, it can provide a "further useful quantification of ceramic collections" (Bedford 2000:89).

c. Sherd thickness

Two different methods were incorporated here: thickness of rim sherds, and thickness of body sherds. Rim sherd measurements follow Summerhayes' (2000) method of measuring two points, A and B (after Specht 1969:78, and Irwin 1985:107). Depending on the type of rim, measurement A is of the lip of those sherds with parallel/constant thickness, or at the point of "maximum or minimum thickness on expanded and reduced rims" (Specht 1969:79, cited in Summerhayes 2000:36). Measurement B is taken on the body, just below the rim.

All diagnostic body sherds were measured. In general, all Palauan body sherds are of near constant thickness. Thus one measurement was taken for each body sherd, and rim sherds with a large body portion had a third measurement taken in this manner, entitled measurement 'C'.[7] Moreover, additional information was required for the database due to the highly degraded nature of sherds from the volcanic soils of Babeldaob. From experience working with the assemblage, any remaining original surface of a sherd (which forms the outer 2-3 mm of the both sides of a sherd), is cracked and flaky (Plate 8.1a). When the entire surface has degraded, the remaining sherd does not flake or crumble, and it remains

[6] Spouts are components of lamps. Although lamps are usually found in late assemblages, this attribute was still included in light of potential surface finds.
[7] Note that all thickness measurements were rounded to the nearest whole number.

firm (Plate 8.1b). Thus, measurements were recorded as either 1) the original sherd surface, or 2) the remaining sherd surface. In addition, the measurements were grouped to facilitate chronological differentiation in vessel thickness (Wahome 1998). However, instead of the Wahome's 1-4 mm intervals, I have used 1-5 mm intervals based on thickness groups employed in the CRDR analysis (Desilets et al. 1999:219). The sherds were subsequently placed in one of four groups: 1) 1-5 mm, 2) 6-10 mm, 3) 11-15 mm, or 4) 16-20 mm.

d. Rim orientation

The orientation (direction) of each rim sherd was recorded, based on five directions (Summerhayes 2000:35). Not all sherds could be classified due to insufficient size or incomplete rim profiles. Those sherds exhibiting the required characteristics were classed as (Figure 8.2b) –

1. Everted (with an interior corner point)
2. Outcurving (with an inflection point)
3. Direct (no change in contour or shape)
4. Inverted (with a corner point on the exterior edge)
5. Incurving (which may or may not have a point of vertical tangency)

There is a distinction here between the everted and outcurving, inverted and incurving categories due to the presence of corner-points in the everted and inverted categories, as specified by Summerhayes (2000:35). This is in contrast to the CRDR analysis where only inverted, everted and direct rim categories were used, although it is not specified as to whether this includes corner-points (Desilets et al. 1999:191). The additional categories here are included to record aspects of variability in the ridgeline assemblage that may not have been present in the CRDR assemblage.

e. Rim stance and orifice diameter

Recognition of the rim stance is essential to defining the rim direction and the vessel orifice diameter. The method of Joukowsky (1980:422) was followed here. The rim stance is established when a rim sherd is placed upside down on a flat surface and moved forwards and backwards until there is no discernable light between the rim edge and surface (Summerhayes 2000:35, also see Glover 1986).

Having determined the rim stance, the lip of the rim is placed in this stance on a piece of paper displaying concentric circles. The orifice diameter is the diameter of the circle that matches the curvature of the rim (Summerhayes 2000:36). This is a common method used by pottery analysts in the Pacific (e.g. Specht 1969; Irwin 1985; Joukowsky 1980:422, and Glover 1986:39).

IARII have highlighted a compounding factor that affects orifice diameter measurements: the presence of oval bowls in Palauan pottery assemblages: "oval vessels can not be measured for diameter unless at least half the orifice is present" (Desilets et al. 1999:190). To address this problem, IARII introduced a degree of error to their rim diameter measurements. They recovered seven reconstructable vessels, one of which was oval. As this vessel represented 14% of the assemblage, up to 14% of the un-flanged, unthickened rim sherds were considered part of oval vessels. As this error factor was based on and calculated specifically for the CRDR assemblage, it is not appropriate for application to the ridgeline assemblage, or any other assemblage. It must be remembered that all rim orientation and orifice diameters based on rim sherd analysis can not be considered 'precise' due to irregularities in vessel shapes made by the potter, as well as formation of oval bowls and pointed rims (Clark & Wright 2002:20). However, these attributes are essential to establishing the range of variation in vessel forms in the pottery assemblage through time and space, and thus are analytically useful. The potential presence of oval pots in the assemblage is readily acknowledged, and is further addressed later in this chapter when discussing vessel form groups.

f. Lip profile

Lip profiles are inherently variable in Palauan vessels. In order to establish how variable this attribute is, lips (the end point of the rim) were classified as either, 1) flat with a sharp edge, 2) flat with a rounded edge, 3) rounded, or 4) pointed (Figure 8.2c).

g. Rim shapes

IARII defined interior and exterior rim shapes primarily to facilitate correspondence analysis. The aim was to "identify broad regularities in rim form with the aim of reflecting variability in the assemblage" (Desilets et al. 1999:214). Interior rim shape was divided into seven categories (A-G) (Table 8.1 and Figure 8.3). In general, A-C are straight sided rims, with C rims inverted, and B rims with a distinctive rounded coil. Category D rims are curved, and G rims have angled thickening and are generally inverted. Categories E and F are inverted flanged rims, and the flange length can be twice as thick as the body. The defining factor of the flanged rims concerns their articulation to the body: E rims have a curved join, and F rims have a sharp, obtuse join.

Two further interior rim shapes have been added based on the ridgeline assemblage. Category H is also flanged, but articulated to the vessel wall with distinct outcurvature. Category I is also outcurving, but without the flange. There is some interior thickening of the lip, although it is generally flat and rounded.

The exterior rim shapes are generally the opposite of the interior categories, with an additional category – rim shape H, which is extremely incurving. The most different rim shapes are D-F, which overhang the outer wall in varying degrees, and are inverted. Two further categories have been included to complement the interior shapes. The rim in Category I overhangs the outcurving body by 5mm or less, whereas Category J is distinctively outcurving with an absence of lip thickening.

h. Rim Types

The rim shapes were subsequently grouped by IARII based on the "overall degree of curvature, as well as the presence of thickening, flanges, or other diagnostic features" (Desilets et al. 1999:217). Seven rim types were defined consisting of four to seven different combinations of the interior and exterior rim shapes (Table 8.2). An additional rim type was added (Type 8) based on the added rim shape categories identified in this project.

Type 1 rims are generally straight-sided, vertically oriented with some lip thickening, with flat–rounded or rounded lips dominating, and Type 2 rims are also straight-sided but with angled orientation and flat lips with rounded edges. Type 3 rims have rounded lips and obvious curvature and Type 4 and 5 are flanged rims, the former defined by an obtuse body-join and the latter by a curved join, and flat or pointed lips. Type 6 rims have angled thickening with some flat rounded lips, while Type 7 rims are similar to Type 3 but with thickening in the lip by a coil or acute angle thickening and variable lip profiles. Type 8 is a distinctive outcurving vessel with lip thickening or small flanging with flat-rounded or just rounded lips.

i. Vessel forms

The four vessel forms recognized in this study include more than one rim type, except for Vessel Form IV (Table 8.2). The vessels are considered within two overarching vessel categories:

A. Unrestricted and simple restricted vessels (Figure 8.4) -

I. Open bowl, cup, or plate/shallow dish with either straight-sided, angled orientation, or curvature in rim orientation. Bowls and shallow dishes may also have incurvature and a point of vertical tangency.

II. Open pot/jar, with general straight-sided vertical rim orientation, with rounded/coiled lips.

B. Restricted vessels (Figure 8.4) -

III. Jar/pots with flanged rims and slight restricted neck or orifice.

IV. Pots/bowls with everted and outcurving rims with restricted necks.

All vessel contours are simple (see Shepard 1971:230-236 for contour groups). The most variation is seen in Vessel Form I which consists of bowls, plates and cups of varying rim types, and it is into this group that oval vessels are found. As oval bowls have the same profiles as round bowls, an oval shape cannot be discerned by profiles. If Vessel Form I is abundant in an assemblage, it can be assumed that some of the vessels were likely oval.

The bases/bottom sections of pots are not known for all vessel forms, and as such have been projected with dashed lines (Figure 8.4). The vessel forms have been compiled predominantly from the reconstructed vessel diagrams by Osborne (1966, 1979), Hijikata (1995), and Kramer (1926), as well an extension of the rim types found in this project, and consultation of Shepard's (1971) section on vessel shapes.

j. Surface treatment

Surface treatment refers to modification made to a vessel surface after it has been formed (Desilets et al. 1999:196). This includes aspects of manufacturing, such as wipe marks, more 'functional' attributes like pierced holes, as well as decorative features like painted surfaces and designs. Two types of attributes were recorded for surface treatment: A. the techniques used, B. location on the vessel (after Irwin 1985 and Summerhayes 2000). The technique was recorded as one of the following:

Impression

1. finger
2. crenulation
3. mat impressed
4. stamped impressed

Incision

5. linear
6. miscellaneous

These first six categories were not observed in the ridgeline assemblage, although the following types were well generally well represented (except Type 8):

Other

7. wiping
8. punctation
9. piercing
10. exterior ribbing
11. painted – block
12. painted – pattern/design
13. slip

Those sherds that did not have sufficient original surfaces were classified 14), and those that had original surfaces but no surface treatment were classified as 15).

The most problematic technique here is the category 'slip'. Although a common component of most pottery analysis, slips are difficult to identify in Palauan assemblages due to the highly weathered/degraded surfaces of most sherds. A slip is a "fluid suspension of clay in water" that is applied to the pot, forming a fired coating on a vessel (Rye 1981:41). A further category is a 'float' also known as a 'self-slip', which

> is made out of the clay mineral fraction of the paste base used by the potter to make his pot. This clay fraction is brought to the surface by smoothing the clay paste under pressure (Velde & Druc 1999:7).

Another technique that produces a slip-like coating is called a 'wash'. The major distinction between slips and washes is that the former is applied before firing and the latter post-firing (Rice 1987:151). Thus, identifying whether a feature is a slip, float or wash can be challenging.

Nevertheless, slips considered to be decorative can be identified by their colour which is *different to that of the body* of the vessel (Rye 1981; Shepard 1971). This colour 'layer' is generally thin, sometimes only measurable in microns, and as such the colour does not extend into the clay body. Therefore, a difference in surface colour compared to the body formed the initial stage of slip recognition in this project. Following from this, sherds with suspected slips were viewed under a binocular microscope and the edges examined under x16 – x40 magnification. If the colour had a thickness of 1 mm or less it was considered to be a slip. Thus, this analysis identified decorative slips only, and not washes or floats that are the same colour as the body fabric.

A secondary indicator of slips can be wipe marks (attribute '7' above). Rye (1981:41) discusses the three techniques of applying slips: dipping, pouring and wiping. These techniques are somewhat self-explanatory. However, the most relevant point to note about slips applied by wiping is that fine grooves can be left on the surface of the pot, indicating the direction of application. The relationship between sherds with wipe marks and sherds with slips is explored further in section 8.5 (Results).

Another note on decorative techniques applies to painted sherds. Rye's (1981:40) definition of 'paint' has been adopted in this analysis:

> [a] material added before or after firing to decorate the surface of a vessel.....This term describes the potter's action rather than a particular kind of material.

Painted patterns/designs have a high occurrence in this sherd assemblage, most commonly defined by stripes, triangular geometric designs, and leaf-like patterns. Block colour refers to the entire surface –interior or exterior- as being

coated in paint. This type of decoration is distinguished from 'red-slip' by its thickness/relief (see segment k. below).

The common exposition of the usefulness of painted pottery is that it has "proved to be of little analytical use in Palauan archaeology" (Desilets et al. 1999:197)[8]. The ridgeline assemblage, however, provides a uncommon collection of painted pottery, with the recovery of 55 painted sherds, the majority from one layer in Ngemeduu which has associated radiocarbon determinations (Phear 2003). This provides a long awaited context allowing attributes of this painted ware to be studied analytically.

k. Surface treatment location

The surface treatment was recorded against ten locations on the vessel -

1. lip
2. outside rim
3. inside rim
4. knob
5. spout
6. neck
7. carination
8. inside body
9. outside body
10. body (side indistinguishable)

l. Colour code

This attribute concerns the colour of slipped and painted sherds.

1. red

[8] In the CRDR analysis only 5 sherds and one whole vessel were painted, which is an extremely small amount considering the entire assemblage size numbered 15,032, and therefore not considered analytically useful.

2. dark red
3. yellow/white
4. orange/red
5. orange
6. brown
7. pink
8. yellow-orange
9. yellow-grey
10. grey
11. black
12. white

If a surface displayed smudging (part of the manufacturing process) is was given the code 13).

m. Application time

Those sherds with painted surfaces had an additional attribute recording the time in the manufacturing process that the paint was applied: 1) pre-firing, 2) post-firing, or 3) pre- and post-firing. All painted sherds were examined under a binocular microscope. Red pigment was distinguished as being applied post-firing if it a. exhibited significant relief (0.5 mm or more) on the surface of the sherd, and b. could be scraped from the clay body using a scalpel (after methods described by Shepard 1971:168, 176-77). Microscopic examination also confirmed slips in some cases where both decorative techniques were employed, and as such were recorded as 3).

n. Body fabric

This attribute groups the sherds based on their fabric. Decorated rim sherds were examined macroscopically (using a binocular microscope), in order to separate the sherds into groups (after Rye 1981:50). Two main groups were

distinguished: 1) grog, and 2) grog with some volcanics. Those fabrics, which exhibited no visible inclusions (plastic or non-plastic), were classed as 3).

o. Paste colour

The colour of the interior sherd was recorded to give a basic indication of potential variability in firing conditions (after Shepard 1971:128). The colours recorded were:

1. black
2. grey
3. black/grey
4. orange to grey
5. brown to black
6. yellow to black

The last three (4-6) denote the colour closest to the sherd surface (the first colour), with the latter the colour of the centre of the sherd.

8.4 Methodology: petrography and paint analysis

As noted above, the ridgeline assemblage is distinguished by the collection of painted pottery in a dated (albeit inverted) context. This presented a unique opportunity to learn more about the painted technology in Palauan prehistory, and as such specific analytical techniques were employed address tempering and paint materials.

Petrographic analysis

Petrographic examination was employed to identify inclusions – mineral, organic, grog – added to the clay as temper by the potter. Petrographic analysis is helpful in identifying exotic wares and tracing the movement of materials between islands with different geological contexts (Descantes et al. 2001). An

important aim, then, was to establish whether the painted ware was made on Palau or was 'exotic'.

Secondly, petrography was employed for relative dating purposes, due to the recent evidence (Clark 2004; Clark & Wright 2002; 2003) indicating a chronological relationship between the differential use of inclusions in Palauan pottery production (as discussed in section 8.2). The oldest grog tempered pottery has been found in ridgeline sites and dated to 2400-1600 BP (Welch 2001). The basal ceramics, with volcanic and calcareous temper found at Ulong are older, with Clark obtaining dates of 3000-2650 BP (Clark 2004). While macroscopic analysis did not indicate sherds with sole volcanic/calcareous temper, some did appear to have a mixture of volcanic grains with grog, as highlighted in section 8.3.m above. Therefore, fine-grained petrographic analysis by an expert in this field was required in order to provide information on the temper/s used in painted wares for chronological assessment.

Sixteen sherds were sent to William R. Dickinson at the University of Arizona for petrographic analysis[9]. Eleven of these sherds are painted rim sherds, and five are plain rim sherds from the same stratigraphic context. These plain sherds ('plain' used here to mean 'not painted') were included in order to ascertain whether the plain vessels were manufactured and used concurrently with the painted vessels. All sherds underwent epoxy-impregnation, were thin sectioned, and mounted on a slide with a cover slip at the University of Arizona Geology Department. Analysis was made using a polarising microscope. The full petrography report is included as Appendix D.

Paint analysis

The identification of the pigment/s used to paint these vessels is important for understanding the stages of production and degree of specialization involved in

[9] Funding for the petrographic analysis was through a New Initiatives Grant, awarded in 2002 by the Centre for Archaeological Research, ANU.

pottery manufacture. Of interest was whether the paint was made from organic or mineralogical materials, although the latter was suspected. Additionally, the study aimed to test for the presence of organic or clay paint binders, as both can be used in iron oxide paints (see Shepard 1971:36-39)[10].

Two methods were employed. Eleven painted rim sherds were sent to Alan Chappell at X-Ray Unit in the Advanced Analytical Centre (AAC), James Cook University, for analysis using micro-X-ray diffraction (μXRD) using the General Area Detector Diffraction System (GADDS) (Appendix E). Initially, two sherds were sent to the AAC in 2002 to assess the suitability of this form of analysis for the sherds[11]. The results were promising, and consequently nine extra samples were sent for analysis.

The samples were analysed on a GADDS made by Bruker AXS. Frames of diffraction rings are collected and integrated to produce conventional XRD patterns (2theta v intensity). The Bruker AXS uses Copper $K\alpha_1$ copper radiation (λ = 1.5405Å) generated at the X, Y and Z directions: collimation of the X-ray beam is by selection of a suitably sized pin-hole collimator. All samples were analysed with a 200 μm collimator and X-ray diffraction patterns were collected at steps of 0.2mm. Data were collected at 300 seconds per step.

The second method was 'experimental' and only three samples were analysed[12]. Following recent research in identifying and dating organic binders in rock paintings (see Watchman 1993 for an overview), the samples were tested using Raman Spectroscopy at the University of Canberra, and direct combustion for the presence of organic binders, and as such for the potential for radiocarbon dating. Raman spectroscopy provides information on the vibrational

[10] Some Palauan researchers have compared the painted pottery technique to that used in Historic times to paint wooden bowls and structures in a *bai*. This method uses organic binders (e.g. Desilets et al. 1999:198; Hijikata 1995:269). Thus, this same method has been suggested for the painted technique on potsherds.
[11] Courtesy of Dr. Alan Watchman, Department of Archaeology and Natural History, Research School of Pacific and Asian Studies, Australian National University.
[12] Again, courtesy of Dr. Alan Watchman.

frequencies of molecules. Here, it was specifically employed to detect inorganic carbon and organic matter in the paint samples. Additionally, the samples underwent direct combustion (en route for preparation for AMS dating) to establish the presence of organic carbon in the form of a paint binder.

8.5 Results

A total of 437 sherds were recovered from B:NA-4:11 Ngemeduu, B:NA-4:12 Toi Meduu, and B:NA-4:6 Rois. The largest portion of this assemblage (283 sherds) came from the Ngemeduu excavations, with 73% of all sherds from the site in LVI – LVIII (Table 8.3). Both Rois and Toi Meduu exhibit similar, though significantly fewer sherds: 87 for Rois and only 67 for Toi Meduu. Like most Pacific pottery assemblages, non-diagnostic (plain) body sherds comprise the bulk of the assemblage (60.4%). For Ngemeduu, 208 sherds in total are body, and 134 are plain. Rois and Toi reflect a different picture with near correlations between plain body and total body sherds, illustrating the low levels of diagnostic body sherds at these sites. Further analysis is restricted to diagnostic sherds only.

Within the diagnostic sherds, there is a near even split between rims (52.6%) and bodies (47.4%), with a total diagnostic assemblage of 173 sherds. An exceptional feature of the assemblage is that 72% (n=125) of diagnostic sherds have surface treatment (predominantly decoration), and again this is most visible in LVI-LVIII of TR1a, with 78.4% falling in this category. As the total assemblage is not large, the percentage of sherds with (predominantly) decorative elements is unusual for Palauan pottery collections. As such, sherds with surface treatment/decoration have received additional analytical attention, with analysis restricted to TR1a of Ngemeduu, and further to the dated context of LVIII. On the whole, it is clear that Ngemeduu stands apart from the other two sites in relation to pottery remains, both in counts and the level of

diagnostic, decorated sherds. The interpretative implications of this distinction are explicated in section 8.6.

Diagnostic body sherds

Weight and thickness measurements

In the ridgeline assemblage the rim sherds are significantly heavier than the body sherds, which is likely a result of taphonomic processes, i.e. rim sherds are less affected by taphonomic processes of breakage, with the Ngemeduu assemblage displaying the largest disparity (Table 8.4). Weight measurements in this case do seem to indicate the relative size of sherds when compared per layer and site. For example the difference between Test Unit 1, where three surface rim sherds have a weight of 257 gm, compared to LII where two rim sherds weigh 14.31 gm. This reflects a high level of variability.

Body thickness measurements were made on all diagnostic body sherds with original surfaces (Table 8.5a). This reduced the number of sherds from 83 to 55. In the Ngemeduu assemblage, size group 11-15 mm stands as the dominant body thickness (47.3%), although 6-10 mm is similar (41.8%), with only three sherds each in the 1-5 mm and 16-20 mm groups. Again, TR1a reflects the highest number of sherds. With only seven body sherds in the Toi Meduu analysis, 1-5 mm and 6-10 mm are the dominant size groups, but this is an extremely small sample. The solitary Rois sherd is also in the 1-5 mm range.

Twenty-seven out of the 44 body sherds were associated with LVIII. With three dated sections of this layer, these 27 sherds fell within age range of 1530-1970 cal. BP (Table 8.5b). The LVIII results match the overall thickness pattern, with 59.3 % of sherds 11-15 mm, followed by 37% at 6-10 mm, with 78 % of the sherds associated with 1970 cal. BP. There is an absence of 1-5 mm sherds, and only two in the 16-20 mm range. Sherds in this time frame therefore seem to fall within a 10 mm size range: 6-15 mm. These results therefore support Desilets et

al.'s (1999) analysis that sherds with a thickness of 5 mm or less fall into the pre-AD 1 period of pottery manufacture, and suggest a thickness of 6-15 mm from ca. AD 1 to 600.

Surface Treatment

Analysis of surface treatment on diagnostic sherds is focused on rim sherds. However, out of the 55 diagnostic body sherds, 18 (32.7%) are painted and 37 (67.3%) are slipped. Dominant paint colours are red and dark red, and slip colours are yellow-grey (20%), grey (15%) and yellow-white (11%).

Lip profiles, rim orientations and rim types

Out of the 91 diagnostic rim sherds, 87 have discernable orientations, lip profiles and rim types (Table 8.6), and 80% of the attributes come from Ngemeduu. Flat, rounded rims clearly dominate all three sites followed by rounded lips. In the Ngemeduu assemblage it is clear that there is no fixed lip profile for Types 1-3, and 7, although Types 6 and 8 are clearly flat-rounded, , and Type 5 pointed.

Out of the eight rim types, only one is not reflected – Type 4. This is not unanticipated, as Type 4 is flanged and principally associated with later assemblages, 1000 BP to the present. The rim orientation results are firmly associated to the rim types, with one inverted vessel comprising Type 3 rims. The most prolific rims are Type 3 (24%), Type 1 (22%), and Type 2 close behind (17.2%) (Figure 8.5). Types 2, 3 and 7 which are only present in the Ngemeduu sample illustrate variability in the assemblage. Type 8, the outcurving vessel, is found at all three sites, though in low abundance. This latter type and Type 1 are the only types present at all three sites. Table 8.7 illustrates the rim shape combinations recorded for each rim type. Combination D-H of Type 3 is the most prevalent (incurving rims), and B-C of Type 2 (angled direct orientation with coil/rounded lip) marginally behind.

When compared to IARII results, both assemblages record high levels of flat lips, although the ridgeline assemblage lips are rounded. The CRDR assemblage had a high amount of Type 4 flanged rims (20%) as many of their excavations were at younger sites. Types 3 (17.5%), and 1 (14.4%) are reasonably well represented like the ridgeline assemblage, although Type 2 falls second from the lowest at 11%. A similar pattern reflected in both projects is a low level of Type 7 rims.

Vessel Forms

All four Vessel Forms (VF) are found in the ridgeline assemblage, although there is a clear dominance of VF I (51.7%) (Figure 8.4, Table 8.8), and as indicated in the rim type results, the lack of Types 2,3, and 7 for Rois and Toi Meduu equates to an absence of VF I. Whilst acknowledging the extremely small sample sizes for these latter two sites, it is nonetheless notable that VF I, the most variable vessel group, is not represented. Instead, we see VF II and IV, and also VF III in the Toi Meduu sample. For Ngemeduu, Rim Type 3 dominates VF I, and Rim Type 1 in VF II which is the next largest vessel group. Vessel Form III and IV are poorly represented. The results therefore clearly illustrate a predominance of unrestricted and simple restricted bowls and pots, with VF I the principal form. While restricted vessels are present, their numbers are low, and they are configured mainly in the Toi Meduu assemblage.

Orifice diameters

The sherd sample used for orifice diameter analysis is restricted to Ngemeduu, and contains those sherds with original surfaces only. As such, the sample group is reduced to 25 rim sherds (Table 8.9). A large proportion (68%) of the vessels are VF I, with the major diameters (65%) falling between 38-48 cm (Figure 8.6a). Three small vessels have 26 cm and 28 cm diameters (Figure 8.6b). One definite oval vessel was recovered (Figure 8.6c), which appears to be a lid or shallow plate, although the diameter could not be ascertained. There is

variability within VF II, with a group of small vessels at 24-30cm, and a larger group at 40-46 cm (Figure 8.6d). One sample each of VF III and IV measure 30 cm (Figure 8.6e). Although the total counts for each size are variable, an orifice diameter of 40 cm is recorded for VF I, II and IV, and has the highest frequency.

Thickness of Vessel Forms

Due to the frangible nature of the surfaces of most sherds, the sample size was reduced once again to 20 sherds for rim measurements, with the sample restricted to those rim sherds with both A, B and C measurements (Table 8.10). The measurements indicate great variableness between both A (lip) and B (below rim) measurements on all sherds. The largest lips occur in VF I (28 mm and 20 mm) with the smallest lips VF IV and III (the restricted vessels). Vessel form II displays the least variance in lip (A) measurements with only 4 mm between the smallest and largest measurement. In contrast, B measurements for both VF II and I display great variance, with a 10 mm variance for the latter, and 7 mm for the former. Therefore, there does not appear to be an obvious relationship between vessel form and lip and rim thickness in this assemblage, beyond the conclusion that variance is larger in unrestricted vessels compared to restricted vessels.

When placed within the four thickness groups, the lip thickness results show 45% within 16-20 mm, and 40% within 11-15 mm (Table 8.5c). Thickness below the rim ranks highest in the 11-15 mm group (65%), while the body measurements are smaller again at 6-10 mm (55%). These results suggest a general pattern whereby lips are thicker than bodies, and the point just below the rim is thicker than the body, but smaller than or equal to the lip thickness. When compared to the body sherds (Table 8.5a), the rim C measurements support the observations that body thicknesses in this assemblage range from 6-15 mm at 1530 – 1970 cal. BP.

Comparison with the CRDR results is hindered here, by the fact that their study used bivariate analysis to investigate relationships between rim thickness, body thickness. As the sample size is quite small in this project, similar statistical analyses were not suitable. Nevertheless, some comparisons can be made. IARII results indicated a greater degree of uniformity in early pottery (e.g. pre AD 1) compared to later pottery, as attested to by levels of variability between rim and body thickness measurements. Although 'early' pottery is not well represented in the ridgeline assemblage, the level of variability between the lip, below, and body measurements seems to correlate with the CRDR results.

Fabric colour

The majority of rims have black interiors (84.9%), with the remaining sherds with black/grey (5.5%), brown to black (5.5%), orange to grey and yellow to black figure lowest. In general, black interiors are usually associated with the presence of carbon, where the core is of 'unburned' organic material (Rye 1981:108). The survival of organics indicates the pottery was fired in a reducing atmosphere rather than an oxidising atmosphere[13]. Additionally, iron not incorporated into the crystalline structures of other minerals (e.g. Fe_3O_2) become grey and black oxides (FeO, Fe_3O_4) on reduction around 900°C.

That the majority of sherds in this assemblage were fired in a reducing atmosphere is also supported by the presence of charred fibres that were observed in nine sherds with black paste (Plate 8.2), two with a grey paste and one with black/grey paste. Additionally, radiocarbon dates from potsherds illustrate that the pottery does contain carbon, although the dates are not reliable due to old-carbon contamination (see Anderson, et al. in press), as this carbon was present in the clays used to manufacture the pots. If the pots were fired under oxidising conditions, this old carbon (as opposed to young carbon

[13] An oxidising atmosphere exists when the level of oxygen is greater than required for combustion of the fuel, and as such an oxidising atmosphere removes organic material; a reducing atmosphere exists when there is not enough oxygen to combust the available fuel and carbon monoxide forms in the surrounding atmosphere of the vessels (Rye 1981:108).

contamination, which is usually removed through ABA pre-treatment procedures) would not be present in the pottery after firing.

Surface Treatment

Surface treatment was assessed in 117 sherds from Ngemeduu, seven from Toi Meduu and only one from Rois. In the assemblage total, 38% of sherds had insufficient surface remaining for observation, and 29% had no observed surface treatment. The dominant surface treatment in all three sites is slips, with 29% of the Ngemeduu sherds slipped, and 20.5% with slip and wiping (Table 8.11). Wiping on its own has a low frequency, and 90% of this treatment occurs in association with slips. Table 8.11 records both singular surface treatment techniques and combinations as observed in the assemblage. By itself, painted block accounts for 11.1% and sherds with painted patterns only 6%. But when considered in their combinations, with painted pattern/block and painted pattern/block/slip the percentage increases to 28%. There is also a clear correlation with piercing and painted/slip combinations, and one pierced sample with a slip only (4 incidents of piercing were recorded in total). Exterior ribbing is found on one undecorated sherd, and on two sherds with slips.

Turning in more detail to the assemblage from TR1a (Table 8.12), a breakdown of occurrences of the dominant techniques is included. While slips are dominant with a total of 68, painted pattern occurs 34 times and painted block 25 (see Plate 8.3 for a selection of painted body sherds). Wiping has a low count due to the high level of slips occurring with painted sherds where no wiping was observed. If we look at the dispersal of sherds in the layers, LVIII ranks highest with 68.4% then LVI with 23.5%. Layer VII has very few sherds with surface treatment (8.2%). The combination frequencies are similar to those accounted the whole assemblage, but with an absence of exterior ribbing.

Locations of surface treatment

Table 8.13 presents a cross tabulation of surface treatment techniques and surface treatment location on the sherds from TR1a. The inside body of sherds accounts for the highest surface treatment (32.7%). The chief occurrence of slips fall into this location (54.1%) and slips with wiping (33.3%), as does painted pattern (42.8%) and painted pattern with slip (33.3%). Painted pattern also occurs on the inside/outside body (30.7%), and pattern and slip are recorded on the outside body, inside and outside body, lip/outside rim and lip/outside rim/inside rim. Painted block is located most prominently on both inside and outside body (30.7%), and lip/outside rim and inside rim (23%).

As for piercing, Osborne (1966:86) identified two types of pierced holes – those 'punched' into soft clay, usually in pairs, and single holes drilled post-firing. These types were echoed in the CRDR assemblage (Desilets et al. 1999:205), where nine cases of pierced holes were recorded. Three of these vessels were from the Rois burials. As pierced holes are commonly thought to have been made to suspend pots over a fire, and/or from walls or rafters, it is interesting here that three pierced sherds in the ridgeline assemblage are painted, which may mean that the vessels were intended for display. One sherd has patterns on both interior and exterior surfaces, while the other is painted on the interior. The third sherd has block colour on both sides, while the fourth appears to be slipped on both surfaces. All four sherds here have single holes, and one (catalogue #18) exhibits a raised surface on the interior of the hole which suggests it was pierced during the leather-hard stage of manufacture. The same process is reflected in the sherd with block colour (#40), but in the opposite fashion: raised edge at the hole's exit on the exterior sherd surface. Interpretation of these pierced vessels is presented in section 8.6.

Paint and slip colours

Of the range of colours recorded, paints used for block and patterns were red and/or dark red, with one case of orange-red pigment (Table 8.14). The

dominant colour of slips is yellow-white, followed by red, yellow-orange, yellow-grey and orange-red. Thus a variety of colours were exploited for slips compared to painting. Additionally, five cases with smudging with slipped sherds were recorded, which occurs during the firing process.

It was important to gather details on when the paints were applied to the surfaces in order to address manufacturing issues. The pre-firing category reflects the dominance of slipped sherds in the assemblage. However, the 36 counts recorded in the red and dark red columns correlate with a large portion of counts from the painting. Pre- and post-fired sherds generally have a combination of slip and painting, although some painted surfaces do appear to have been fired[14].

Trench 1a LVIII: vessel form, decoration, and fabrics

The high frequency of painted sherds recovered from LVIII indicated that sherds from this layer required further analysis. As the layer was also the original surface of the hill prior to modification, it was felt that significant information could be gained regarding pre-earthwork pottery manufacture. Of the 67 sherds from LVIII, 32 are rims with discernable vessel forms, and 27 have surface treatment, with 18 exclusively painted (Table 8.15). Three vessel forms are represented in this group.

Vessel Form I: dominates this group of sherds (66.7%), with an age range of 1400-1970 cal. BP. The rim types for this form are split between straight sided or angled rims with rounded and/or coiled lips, pronounced incurving rims and vessels, and curved vessels with rounded lips. With seven slipped sherds, six exhibit wiping striations which suggests the slip was applied using this technique. Of the remaining 11 sherds, three are painted in block colour (Figure 8.7a.i-iii), two have block and pattern, another with definite pattern and

[14] Note that the combination of post-fired paint and slip was also discovered in Osborne's analysis where a red painted sherd was analysed by W. R. Dickinson and D. L Weide (Appendix I, in Osborne 1979).

possible block (Figure 8.7a.iv-vi), and another four in combination with slips (Figure 8.7a.vii-x). One sherd has both forms of painting and a pierced hole (Figure 8.7a.xi). The patterns displayed are simple linear lines and geometric designs dominated by triangular patterns. As for the macroscopic fabric groups, both are represented in VF I, although grog dominates.

Vessel Form II: Significantly fewer sherds comprise this vessel group (n=8), which displays the same age range as VF I. All rim types are straight sided or angled, with a coiled lip. While only two slipped sherds with wiping are present, the category 'painted pattern' is more frequent with one singular, one with block paint and slip, and one pattern just with a slip (Figure 8.7b.i-iii). Painted block has less representation compared to VF I, with one singular, one in combination with pattern and slip (previously mentioned), and one in combination with piercing (Figure 8.7b.iv-v). Patterns range from simple stripes to circular 'leaf-like' patterns. Both fabric groups are evenly represented.

Vessel Form III: Only one sherd was found to be of this vessel form, and it has an associated date of 1400 cal. BP. It is a flanged sherd which is quite unusual, although early versions of later flanged vessels have been recorded in most archaeological pottery investigations. This example is quite small and has block red paint (Figure 8.7c.i), and the fabric contains both grog and volcanic grains.

Petrographic Analysis by William Dickinson

All sixteen rim sherds submitted for petrographic analysis were from LVIII. Dickinson (2003, n.p. Appendix D) confirmed that all the sherds contained variants of grog temper, "similar to tempers present in 90% of the sherds examined to date in thin section from Babeldaob and neighbouring islets of Palau (Fitzpatrick, et al. 2003)." Having previously established four types of grog-tempering in Palau, the samples from this project were placed within three of these groups (Table 8.16):

A. exclusive grog temper with essentially no terrigenous grains

B. dominantly grog temper with sparse terrigenous grains

C. composite tempers of mixed grog particles and terrigenous grains but with grog particles more abundant than terrigenous grains

None of the sherds contained type D tempers (which are dominated by terrigenous grains with low amounts of grog). The terrigenous grains in these temper types are most likely natural, imbedded in clay when it was collected.

Dickinson makes clear that,

> [n]either from the sherd numeration, nor from the typology (painted vs unpainted), is there any discernible system to the distribution of A-B-C tempers in the collection. Proportions of A-B-C tempers (56-31-13) are not significantly different from the proportions (63-23-14) in 156 other grog-tempered Palauan sherds containing A-B-C tempers (Fitzpatrick, et al. 2003)

Additionally, the distribution of these variants is most likely random.

Percentages of terrigenous grain types were compared to data from previous analyses (Table 8.17). The outcome confirms that both the painted and unpainted sherds were made on Babeldaob or other nearby volcanic islands, and therefore do not represent an 'exotic' ware. With an absence of dominant terrigenous grains and/or volcanic/calcareous temper, the petrographic analysis confirms the later date for the manufacture of these sherds.

A final note of significance concerns grog temper. In six of the sherds (four painted, two unpainted), grog particles themselves were found to

> internally contain pre-existing grog particles, or at least one margin of pre-existing grog particle, and these occurrences favour breakage of grog tempered pottery to obtain more grog (Dickinson 2003, n.p.).

There is still uncertainty surrounding grog as a tempering agent. One issue concerns whether the grog came from fired pottery, plain baked clay, or unfired clay. This issue requires further investigation, and is beyond the scope of this thesis. However, the above results do provide clear evidence that some

prehistoric sherds display grog from previously fired pots, illustrating great longevity in this technology (as it was recorded in the 1800s).

Paint analysis (GADDS)

The GADDS analysis provided successful results, with mineralogical identification of the paints (Table 8.18, unquantified data). Consistency is apparent between the minerals, with haematite and quartz in all but one of the samples. Three sherds have extra minerals – sherd 11 has goethite, sherd 28 ilmenite, and sherd 41 calcite. Sherd 48 is the most outstanding painted sample, and its vessel form is either an oval plate or lid (Figure 8.7a.v). Both red and orange paints exhibited on the outer surface of this sherd were tested. The red paint has a clear absence of quartz and is pure haematite. In general, it appears that the main difference between the orange and red pigments is the levels of quartz, i.e. more quartz equals a lighter colour (Dr. Alan Watchman pers. comm.).

Iron oxides such as haematite and ochres (an amorphous and minutely crystalline form of haematite) can be pure, although they frequently carry impurities or are intermixed with other minerals such as quartz, clays, mica and gypsum, as well as calcium and magnesium carbonates (Jercher et al. 1998:385; Shepard 1971:37). The presence of goethite, ilmenite and calcite therefore suggest separate sources of haematite for these three samples. The GADDS method here has adequately provided information suggesting the ochre samples came from differing geological environments. However, any future analysis could use trace element analysis (X-ray Fluorescence) to provide detailed geochemical identification for a fine-grained provenancing study of haematite sources. For now, however, the near homogenous presence of quartz suggests a red ochre resource rather than derivation from iron stone which is hard, reddish to brownish black, and at most times has a submetallic luster (Shepard 1971:37). Ochre does not require preparation in the form of grinding,

which is the case if ironstone is used. It is also likely that the potters added quartz (as clay) to lighten the colour, making the distinction between red and orange.

Organic binders?

Raman spectroscopy was employed to detect the presence of organic binders in the ochres. The results proved inconclusive. No inorganic carbon was detected, and the spectrum for organic matter was uncertain. If carbon was present in low concentrations it was not detected by the spectrum (Dr. Alan Watchman pers. comm.). Additionally, preparation of the sample for AMS dating, using direct combustion, did not provide adequate levels of carbon dioxide for dating. These results indicate that there is no evidence of organic binders in the pigment of the painted potsherds, and that water may have been the sole vehicle for application (Watchman 1993:59, citing Judson 1959; Watson 1967). Nevertheless, we cannot discount the possibility of an organic binder *originally*. Shepard (1971:177) raised the point that organic binders used in the application of post-fired paints can be subject to leaching and decay in exposed locations, while others may be well preserved. At this stage the medium of paint application on the Palauan sherds is still unclear, and requires additional investigation.

8.6 Discussion

Like other Palauan pottery assemblages, the ridgeline collection illustrates differing levels of variability within and between different attributes. When considered in total, however, certain features do stand out. To summarise the major outcomes:

1. The assemblage from Ngemeduu in particular falls within the 'black box' of the pottery sequence, between the first recorded upland pottery– thin, black

paste, small bowls and outcurving pots (ca. 2400 BP) and the later thicker flanged pots from ca. 1000 BP onwards.

2. Features of this pottery include vessels between 6-15 mm thick. Lips are generally flat and rounded, and vessels are straight/direct angled, or interior curved bowls and shallow dishes/plates, most with distinctive interior coiling of the lip[15].

3. Both plain and painted vessels have the above characteristics, and both have similar grog tempered fabrics with no or some imbedded terrigenous grains. The terrigenous grains have been identified as local to volcanic islands in Palau and are therefore the pottery is not 'exotic', although pastes with terrigenous grains indicate a different clay source/s from those without the terrigenous grains.

4. The identification of grog tempering also supports the radiocarbon date range, as sherds with temper indicative of early pottery manufacture (volcanic and/or calcareous grains) were not present.

5. In terms of manufacturing, pottery from this time frame (1400-1970 cal. BP) is made from a clay source high in organics, and fired in a reducing atmosphere. This correlates with the general firing pattern of the earlier pottery collections, and indicates diachronic consistency in firing strategies.

6. In general, decoration is high in the assemblage, and slipped surfaces of yellow-white, red and grey dominate.

7. The technique of painting pots with red pigment is well represented. The technology is quite sophisticated, illustrating the collection of ochre from

[15] This distinctive rim with interior coiling had only a few occurrences in Osborne's analyses (1966,1979) and not at all in Clark's investigation (Clark and Wright 2002, Clark and Wright 2003).The CRDR study recorded only 13 out of 510 samples, and Lucking (1984) had a few rims of this type. One obscure study with rims from Akarabasan [Ngerkebesang], Anguar and Melekeok indicates the presence of this rim, but its exact occurrence is not specified (Riesenfield 1951).

various sources, and a knowledge of manipulating the ochre (by adding clays) to mix the desired colour - red, or orange.

8. The application of this technique on already fired pots suggests these vessels were not suitable for cooking over a fire, and therefore had a social rather than 'economic' role within Palauan social groups. The presence of various geometric and linear designs represents a means of expressing and encoding meanings, the major instrument in these processes being the colour red.

9. The fact that both plain and painted vessels are of the same general vessel forms does not point to a specific pot 'type' for painted vessels only. However, the assemblage may represent a collection of sherds from a context not related to everyday occupation, and in this respect both plain and painted vessel forms may not be representative of the 'norm' for pottery manufacture during this time frame.

Continuing from the above summary, it is clear that a change in pottery manufacturing technology must have occurred prior to the first millennium AD. By continuing to use the same pottery temper, however, the potters did not need to instigate radical changes in firing technology (see Braun 1982; Rye 1976; Shepard 1971; Summerhayes 1997 for further discussion on temper and firing characteristics). The biggest alteration appears to have been vessel size and form: a change from outcurving globular pots and bowls, and small cups and, to thicker bowls, pots and plates that *were not* outcurving. In utilitarian terms, possible explanations include a change in cooking strategies, with the increased sizes of pots suggestive of cooking in larger quantities or cooking for bigger groups of people. Compared to initial occupation of the uplands, the pots were smaller and finer, and vessels with restricted orifices may have been better suited to movement in the landscape or storage of small quantities of food. But this is not the only difference: that potters began to paint these vessels suggests a role of pottery within the social realm. So what is significant about this

painted ware? And why is it important for understanding monumental earthworks? The following section highlights the key features of painted pottery found in Palau, in relation to designs, vessel forms, and provenance locations.

Painted pottery

Painted pottery has been recovered in three main locations in the volcanic and limestone islands: earthworks, caves, and rock island sites. The quantity of sherds and vessels from these sites, however, has been so low as to lie beyond the realm of chronological 'pin-pointing'. However, after reviewing their occurrence, a number of painting combinations are noticeable:

1. painted pattern with block colour
2. painted pattern
3. painted block
4. painted block with carved/incised triangles/incised lines
5. carved/incised lines filled with red ochre
6. painted with pierced hole/s
7. painted block with punched holes in the lip

All pigments (but one, see below) are variations of red. While Osborne (1966:230) declares all designs from painted sherds to have been "limited to a poorly painted and crude striping," others feel it was quite a sophisticated technology, and the variety of painted combinations just listed appears to support the latter opinion rather than the former.

Caves and burials

Most whole painted pots have been recovered from caves. Hijikata (1995:261) was the first to make note of such vessels. He discusses a group of shallow plates or baking pans (*olikang)* that had designs in red clay. They are thought to

have come from a cave site. Figure 8.8a illustrates one such dish with a geometric pattern on its interior.

Osborne (1979) describes three bowls from the Palau Museum. Bowl B is painted 'red on buff' on the interior, and "covered with a wide, straight line in geometric design (Figure 8.8b).The exterior surface is the same apart from the central area which contains more gridwork. Bowl 13 is large and slightly oval, measuring 55.25-52.7 cm, and has handles. One handle is perforated (pierced) twice. Handles are extremely rare in Palauan pottery, and this vessel is more closely associated with pottery from the Philippines (see below). The exterior surface has a red on buff painted design, of curvilinear loops (Figure 8.8c). Bowl 18 is smaller, with a diameter of 42.2 cm, and is 8.3 cm deep. It has painting on both the interior and exterior surfaces, and is considered a serving plate. In his earlier investigation, Osborne (1966) collected a painted bowl from Palauans who had removed it from a cave in Ngeream Island in south-west Babeldaob. This cave had been used for burials, although Osborne was of the opinion that they were not 'ancient' (Osborne 1966:230). The bowl is incurving, and painted on the exterior in a red-star like design, has two pierced holes, and has a diameter of 12.5 inches (Figure 8.8d). Two additional bowls are discussed briefly by Osborne (1966). Apparently, Professor Kanaseki of Kyushu University found the bowls in a limestone cave. They are painted red and contained several stone adzes and shell artefacts (Osborne 1966:65). Figure 8.8e reflects how the bowls were found (one acting as a lid), and the contents of the pots. The upper bowl has a diameter of 33 cm and the lower 23.5 cm. Unfortunately, no further details are provided about these bowls.

When a cave in Sengall Ridge, Koror, was investigated, it was found to contain four skeletons, as well as a *Tridacna* adze, four painted pottery vessels, painted sherds, plain ware sherds and some *strombus* sp. shells (Beardsley & Basilius 2002:148). The vessels are shallow bowls with narrow parallel rims and volcanic sand temper. The paint is red on buff, with geometric designs with both parallel

and linear elements. Two bowls also have solid red pigment on the interior (Figure 8.8f). A radiocarbon determination was made on C3 plant material located in the temper of one sherd – 2630 ± 60 BP[16]. However, this date is not reliable due to old carbon contamination by organics contained in the clays used to manufacture most Palauan pottery (Anderson et al. in press (2005); Phear et al. 2003).

IARII has also recovered two painted rim sherds from a cave system in Ngermereus Ridge, Koror. The sherds were also found in association with burials. One rim is painted dark brown which is unusual, and one is 'possibly' painted an orange-brown. All the sherds were of Rim Type 2. The authors state that Type 2 rims are the least common in the CRDR assemblage, and are not usually that common in Palau ceramics. They suggest this may be because, the, "vast majority of Palauan vessels are not painted where as two of the five sherds analysed from the burial cave are painted" (Reith & Liston 2001:52). This point is important because Type 2 rims were the third highest rim type in the ridgeline painted assemblage, and therefore it supports the proposition that specific rim and vessel types are associated with painted vessels.

Earthworks

IARII excavated a partial bowl during the CRDR investigation. It was recovered deep within a partially in filled trench on Engoll Hill (B:ME-6:T1) in Melekeok (Figure 8.8g). The exterior surface of the bowl is degraded, but visible is a "star design pattern extending outward from the bottom of the vessel in a series of radiating stripes" and this vessel is said to resemble Osborne's striped vessel (Figure 8.8d) (Desilets et. al. 1999:199). This vessel is associated with a charcoal sample that produced an age range of AD 212-637 (Desilets et al. 1999:199), which coincides with the time range of the painted pottery found on Ngemeduu.

[16] The lab number is unknown.

Sherds with both painting and incision are out of the ordinary, as no whole vessels have been found with this combination. Four sherds displaying both decorative techniques were excavated by Osborne from a trench in a crown, and a test-pit on the terrace below a site in Ngchesar (B40). These sherds have carved isosceles triangles below the exterior rim, and solid red paint on both surfaces (Osborne 1979:121). Like the ridgeline painted assemblage, the average sherd thickness was 9.7 mm. Unfortunately, no dates were securely associated with this painted pottery.

In a trench placed in a crown and 'brim' site in Aimeliik (B10) Osborne found one red painted sherd and two clay discs (which are an anomaly). At the base of an earthwork site in Melekiok (Coconut Grove test), Osborne recovered a rim with both interior and exterior pigment and a pierced hole, sherd with a red painted 'v' on the interior which is replicated on the exterior surface (Osborne 1979:47). Two additional sherds have carved isosceles triangles, one which appeared to have been filled with red ochre. A final site is in Bardrulchau, the megalithic site in Ngerechelong State in northern Babeldoab. On the hillside test (which is next to terraced slopes and may have 'vague' terracing) he recovered six painted sherds, but describes only one which was incurving, of fine paste (sand and grog), painted on the interior, with a diameter of 19.4 cm (Osborne 1979:200).

Rock Island sites

Incised and painted sherds were recovered from Ulong, in the Wall test excavation (re-excavated by Clark 2002). Six sherds have painted surfaces with grooved incisions, slashed 'chevrons', 'X' slashes, and punched dots on the lip. All are from Strata II which places them after the thin, incurving pots i.e. post ca. 2400 BP. Furthermore, Osborne identified four sherds with solid red pigment, simple stripes, and one with piercing just below the rim.

On Anguar Island Osborne recovered a distinctive painted sherd. It had coarse grog temper, and 10 mm wide red bands, five on the exterior and four on the interior surface (Osborne 1979:20).

The andesitic island of Ngerkeklau, situated immediately north of Babeldaob, is an unusual site. A tiny island, it is reported to have belonged to the Ngekeklau people who came from Yap. What is most interesting about this site is that the island is the site; it is composed of a mixture of ancient and modern walls, platforms and monoliths built from coral limestone and coral. The southern and central section is purported to have been a 'king's seat' which was used by great men to sit and ponder over war and conquest (Osborne 1966:299). Painted sherds, which are defined as 'luxury wares' were described by Osborne to have been unusually numerous, and seven were collected. Like Melekeok, one sherd had carved triangles or zigzag lines that had been filled with red ochre. Ultimately, Osborne (1966:299) argues that this site was a ceremonial or social centre, or a retreat for the socially important.

General Interpretation

The general consensus is that these painted vessels were not used for utilitarian purposes, as the painted surfaces make it less likely that these vessels were exposed to open flames (Desilets et al. 1999; Phear 2003). Rather, they are said to have been "luxury or feast dishes" (Osborne 1966:78), or produced as burial 'furniture', or both. That the vessels may have been hung from walls or rafters to display the painted designs has been suggested by IARII (Desilets et al. 1999), and it is possible that the pierced holes may have been used to secure lids. Of particular interest are the three bowls with dual piercing that were recovered from the Rois burials. Two circular pots were recovered, one upside down over the other like a lid, and each had pierced holes. The other bowl was oval, but it too had piercings. The average thickness of these bowls was 7 mm. Thus,

although not painted, it is the context and thickness of the bowls that is most significant here.

When this review of painted wares is considered with the painted sherds recovered from Ngemeduu, the painting technology displays some uniformity. Painted vessels with piercings are well represented and may have been used to hang vessels from walls or rafters, or to attach lids. Vessels that have solid red pigment are closely associated with those with incised and carved lines. Additionally, it might be suggested that the painted geometric designs actually emulate the incised patterns, or vice versa, as no sherds have been recovered that have both incisions and painted patterns. There are also the outliers, such as the dish with handles (Bowl 13). Are there parallels with pottery traditions elsewhere in the Pacific or Island South East Asia?

For once there appears to be a likeness between Palauan pottery and pottery of the Philippines. On Palawan Island, for example, painted wares have been found in Manungal Burial Cave (one of the Tabon Caves). To quote Fox (1970:85-86):

> At least nine vessels – jars, covers, and the pottery coffin - in this cave were completely painted with haematite after firing...[p]ainting with haematite after firing was usually combined with incised or incised and impressed designs.

The assemblage contained jars and bowls – both unrestricted and simple restricted. One vessel in particular is a shallow bowl with incised and painted designs. It has four pierced (perforations) holes on its rim and it is suggested to have been used for suspension during rituals. Another point is that jars commonly had covers that were tied together *using perforations on the handles* (like Bowl 13 discussed above) and corner points of jars and covers. Another site, Asin Cave in Southeastern Mindanao, displayed a collection of sherds and vessels associated with, and part of, burials. The techniques included painted and incised (and just painted) with red designs in the form of curvilinear scrolls, straight bands on the rim and/or lip, and broad fields that contrast with

adjacent large areas (Solheim II et al. 1979:51-58). Solheim states that this pottery is "without doubt" related to the Kalanay Pottery Tradition of the Visayan Islands, although in some ways it is quite distinct (Solheim II et al. 1979:46).

While it is still premature at this stage to establish a firm relationship between the painted pottery of Palau and the Philippines, the similarities should not yet be discounted. That a similar type of pottery was used in cave burials is perhaps the most important point here, as it illustrates use of red haematite and pottery vessels in a social and spiritual realm.

A final point here concerns the connection of the colour red. This colour has geographically and culturally widespread connections with ancestors and the spirit world. To the Mafa and Bulahay people of Africa, for example, red was a colour of power and protection. Some Mafa pots were given a red wash on the base, because this section of the pot "penetrates the realm of the ancestors" when placed on the ground (David et al. 1988:371). A particular point of relevance here is the situation in which whole pots are coated in red:

> In the course of a funeral, the personal spirit pot (*gid pats*) of the deceased is reddened, and the pot, not renamed *sagam*, represents him or her in the period between burial and the manufacture of the pot to the spirit within... (David, et al. 1988:371-372).

In New Guinea, there is a 6000 year history of ochre use for decorative and ritual purposes, and particular sources were traded long distances (Hughes 1977). In Australia red ochre has special symbolic significance, whereby "the transformative power of red ochre is centred upon its representational status as sacred blood, particularly in ceremonies where the Ancestors themselves are being invoked" (Jercher et al. 1998:384). And, of course, red ochre is very common in painting of structures, rock art, artefacts, and in body decoration, across the Pacific, where it generally indicates a *tapu* status. Thus, it is likely that red ochre had a special meaning in prehistoric Palau, due to the contextual relationship between burials and red painted pottery.

Painted pottery and Ngemeduu: a place of 'spirit leaping'?

With the connection between painted pottery and social/spiritual meaning established, the question posed here is: why were the remains of painted vessels found on a hilltop, and how do they relate to the transformation of the hilltop into a monumental earthwork?

Hills and high points have special meaning across the Pacific. In Palau specifically, oral histories recorded for Sengall Ridge (the location of a burial cave with painted pottery) describe the ridge as a ghost walk and spirit leaping place (Beardsley & Basilius 2002). Beardsley and Basiluis (2002:149) emphasise that "on many islands across the Pacific, tales of spirit leaping places are often recounted, along with associations between spirits and places of burial" (citing Clerk 1995). Though the oral histories do not extend back as far as earthwork construction, "the sheer persistence and longevity of stories about spirit leaping places suggest a considerably older age than the general corpus of oral history, in Palau and elsewhere" (Beardsley & Basilius 2002:150). Additionally, such places are inevitably linked to tall points of land, and those that are highly visible from numerous locations in the landscape.

Situated in the northern realm of the volcanic island of Babeldaob, there are no caves or overhangs in the ridgeline of Ngaraard. Thus, it is perhaps no surprise that burials have been found in ridgeline locations, such as the upper Rois terrace, and the top of Rosingang (a crown and terrace site just to the south of Toi Meduu, see Chapter Three). It is therefore not unreasonable to suggest that these highpoints in the ridge may have been ancient 'spirit leaping places' in the volcanic uplands. These burials fall just outside the age-range of painted pottery from Ngemeduu, and do not have painted pottery. So how does Ngemeduu fit into this scenario?

The results from the excavation indicated a structure was present on Ngemeduu prior to modification, with a date of ca. 1700 cal. BP, and the date

range from LVIII the original hill surface is ca. 1400 - 1970 BP. Based on current evidence, I suggest that originally, Ngemeduu had a special religious or spiritual importance. Whether this involved burials or the housing of high status individuals with painted pottery, cannot be confirmed. As a prominent highpoint location, the hilltop may have been of place of ritual and/or sacred significance, a place where painted pottery played an elemental role in 'reading' and interpreting the meaning of 'place'. Bringing the human element to the fore (as Shepard suggested in the opening quotation), the practices of potters involved transforming pottery into vessels of encoded meaning. Through techniques of 'decoration', the potters are expressing not the social structure behind its production, but the *principles* on which the structure is based (David et al. 1988:370).

Furthermore, various activities and daily practices would have taken place within a landscape comprised of significant places such as this, between places of living (occupation), and places of ritual or spiritual achievement. This, then, puts a new interpretation on understanding the structuring principles of the social landscape in which the hilltop was actively transformed into a monumental earthwork. It places new impetus on social and spiritual connections rather than economics and competition or warfare. The full integration and discussion of the transformation of the ridgeline is discussed in the following chapter. A final point here, then, is that excavation of the earthworks has proved integral to recovering these distinctive cultural remains. The earthworks are highly complicated, both physically and conceptually, and it is only in consideration of multiple cultural and structural elements that the enigma begins to unfold.

CHAPTER NINE

Discussion

Landscapes are experienced in practice, in life activities (Tilley 1994:23).

*[P]ractices **are** the processes, not just consequences of processes. Thus they generate change (Pauketat 2001:74).*

9.1 Introduction

This chapter aims to bring together all the threads of a landscape history for the ridgeline, in order to 'weave' together a coherent discussion of the social and physical processes of landscape transformation in which the earthworks were constructed. In relation to the research methodology, the set of questions outlined in Chapter Three were integral to addressing the overarching research question, and questions from the first two scales of analysis have already been answered, or partially answered, in the preceding three analytical chapters. However, the nature of these questions makes them ill suited for simple 'question-answer' treatment in this chapter. The questions can only be answered in full by looking at the earthworks within the social context in which they were created. This entails consideration of the history of the ridgeline landscape in which they were built and, as such, includes activities and practices that took place both prior to and after construction of the earthworks (see Cooney 2000). This has been achieved by using a landscape perspective, where the earthworks are not divorced from the social and physical elements of landscape of which they are a part, as both elements were to an extent created by past human practices.

This chapter, then, is split into four parts. The first section presents a summary of the principal interpretive outcomes based on the evidence generated by the methodological strategies which have been detailed in the previous four chapters. The second part addresses the final three research questions,

1. Can we identify past cosmologies of the prehistoric inhabitants through time and space?

2. Is there evidence of changing habitus and landscapes, and what does this mean?

3. How do perceptions of space and place change through time, and what does this tell us about changes – social, socio-political – in the activities and practices of past inhabitants?

These questions are addressed in the presentation of my interpretation of the history of landscape transformation in the ridgeline, beginning with the first evidence of actions and representations (practices), and thus habitus. This provides the context in which to address the materialisation of earthworks in the physical and social landscape of the ridge, and the subsequent processes of re-creation through practices and negotiation. Focus then shifts to the physical and social landscape transformation evidenced in the stonework villages in the ridgeline.

At this point, the chapter then addresses earthworks in Melekeok, in order to identify similarities and differences in the social landscape. The aim is to gain understanding of the processes involved in the transmission of ideas and practices, habitus, and culture, particularly in relation to the earthworks. To conclude, the chapter tackles the overarching research question.

9.2 Key points in site interpretation

A significant amount of evidence has been generated in this project from each of the analytical techniques specified in Chapter Three. The principal outcomes can be grouped into four major points:

1. When compared with other earthwork/terrace chronologies, a collection of evidence has been obtained in this project which illustrates that Rois, Toi Meduu and Ngemeduu earthworks were constructed in locations which were *already* places of human activity and practices. This can be seen in the results of the excavation programme (Chapter Five). The remains of a structure (two

postholes) that was present on Ngemeduu hill top prior to modification were uncovered, and dated to ca. 1770 BP (ANU-11659, Table 3.1) was on charcoal from one of the postholes. Additional evidence suggesting that Ngemeduu was a place of repetitive activities was recovered in LVIII. Confirmation that LVIII was matrix from the original hill surface was provided by XRD analysis (Chapter Six, section 6.2). The recovery of a deposit of painted pottery in this layer implies the hill top had special sacred or ritual significance prior to modification (see Chapter Eight, section 8.6). Furthermore, three radiocarbon dates collected from this layer, and one from the layer above, indicate that the layer was inverted (Chapter Five). The range of dates suggest activities took place on the hill top from 1970 BP to 1310 BP (Table 3.1), and it was at or after the youngest date that the construction of the crown began.

Evidence of activities on Toi Meduu prior to earthwork construction is intimated by the remains of stone platforms on the western crowns which were placed on the hill prior to earthwork construction (Chapter Five). So, unlike at Ngemeduu, the crowns were not completely constructed at this site. Rather they were cut and moulded, although the northwest terrace was constructed in a similar manner to the Ngemeduu encircling terrace (see Chapter Five, section 5.3). This argument is supported by the pottery recovered from the ditch on Toi Meduu. It shares close affiliation with the thin, black vessels present in the ridgeline archaeological record ca. 2500 - 2100 BP (Chapter Eight, section 8.5). A radiocarbon determination of 1380 BP (ANU-11611) recovered from the primary fill layer of the ditch (Table 3.1) suggests that the modification of Toi Meduu was 'completed' prior to the commencement of construction activities at Ngemeduu.

Further evidence to support the argument that activities were taking place in these locales prior to earthwork construction is demonstrated in the results of the vegetation analysis (Chapter Seven). The results of the pollen and phytolith analyses indicate that the area where Toi Meduu and Ngemeduu are located

had been cleared of vegetation prior to their construction, and that clearance activities began around 2700 BP (see section 7.4). Evidence of the more stable 'classic' savanna displayed in the Rois terrace profile is interpreted as being older than the savanna on top of the ridge, with the most probable explanation pointing to early land clearance by people in this section of the ridgeline, although its existence as 'natural' savanna cannot be ruled out at this stage. However, if the landscape was cleared by humans, it is interesting to note that Rois was also the first place to be modified with terraces in which burials were interred. In this respect, it appears that the importance of this place has a long history.

2. Palaeoenvironmental evidence shows that post-depositional and anthropogenic processes have had a major impact on the appearance and physical structure of the earthworks, and in light of this result (Chapter Six, section 6.3) I have already voiced my concern over interpretations centred on the outward form of the earthworks. One of the main reasons for this concern is that it is clear that these processes have altered and obscured evidence of past activities on the sites. For example, on Ngemeduu, a significant volume of clay was deposited in the depressions through both anthropogenic and natural processes. Investigation using soil micromorphology of the iron-pan (which subsequently developed in the depression) indicates that the depression has undergone at least two phases of construction related to its use (Chapter Six, section 6.2), with the second phase resulting in the burial of evidence of this past activity, including of basalt post supports. The soil micromorphological analysis also revealed a difference in charcoal counts and voids between the original depression layer (LVI) and the soil added in the second phase of depression construction (currently LV). This indicates that the latter clay layer was collected from a locale that did not appear to have had repeated or noticeable episodes of vegetation burning. When this result is considered along

with the lack of cultural remains recovered in LV, a 'natural' soil source seems to have been used.

When the results from the 'gross' palaeoenvironmental methods (e.g. pH testing, XRD), the stratigraphic interpretations from the excavations, and the pottery analysis are considered together, they also indicate that the soil used to build the earthworks was transported from various environmental locations. High levels of iron oxides and bauxite nodules indicate exposed surface-soils (e.g. Chapter Six, section 6.2 and 6.3), and those soils with high levels of cultural remains – pottery, basalt cobbles – are indicative of 'fill' collected from past settlement locations (Chapter Five, Six, and Eight). Other layers that had high silica content, and/or a high level of saprolite with an absence of cultural material indicate clays 'quarried' from C and B horizons, and this likely includes locales in the valley area. When considered in light of stratigraphic interpretations from other projects looking at the earthworks, there is consistency in the use of both cultural remains from previous settlement locations (implied by the pottery, charcoal, and cobble remains), as well as the soils that the previous inhabitants lived on.

3. The analysis of pottery recovered from all three sites provides several key results for interpretation. As detailed in Chapter Eight (section 8.6), the formal pottery analysis has identified the assemblage as falling within a 'black box' area of the Palauan pottery sequence. My analysis, and comparison with other pottery sequences for the archipelago, indicates a change in pottery technology some time after 2500 BP but before the first millennium AD. Of particular significance was the recovery of red painted pottery from LVIII of Ngemeduu. As this pottery is associated with cave burials in other parts of Palau, its presence in Ngemeduu has been interpreted to indicate that the hill top had ritual and/or sacred significance to past inhabitants, and as such the modification of the hill into a visually dominant monument cannot be divorced from such evidence (see sections 9.2 and 9.3, this chapter).

Pottery recovered from Rois and Toi Meduu differed to that found on Ngemeduu, and this is likely due in large part to the varied contexts (i.e. ditch, terraces, crown) excavated between the three sites. In particular, the pottery recovered from Toi Meduu and Rois is derived from 'fill' layers, and the vessel forms indicated by the formal analysis (though in low amounts) indicates they are more closely affiliated with the early ridgeline pottery than with that recovered from Ngemeduu (section 8.5). As such, clear links with previous ridgeline settlements are evident.

4. When all methods are considered together – excavation, clay analyses, vegetation analysis, and pottery analysis – the evidence shows that the earthworks were not built in synchronic events; they were built over long periods, with indicators of repetitive but short term use. Evidence for long term construction is found in the results of the pollen analysis in particular (Chapter Seven, section 7.4). It has been made clear that in order for significant quantities of pollen (and charcoal) to be present in the earthwork layers, construction must have been slow, enabling plants to grow both around the ridgeline and on the sites themselves. This is particularly evident in the stratigraphic profile of Ngemeduu. Additionally, the cultural remains recovered within the depression indicate a structure was placed on the crown, but it does not appear to have been in the ground for an extended period (Chapter Six, section 6.2). While it is possible that organic cultural remains within the crown strata related to the activity/s that took place in the depression have simply 'dissolved' through the acidity of the soils (as discussed in Chapter Six), there is no further evidence to suggest habitation or long term use, e.g. stone artefacts. Furthermore, the fact that the structure was removed and the depression 'covered up' suggest a short-term activity on the crown.

The evidence generated from the above methods has helped answer questions related to terrace use and function. While the difficulties in addressing such questions are expounded in the following discussion (section 9.3),

interpretation based on the excavation and analytical analyses have shown that, firstly, no evidence was recovered to suggest the earthworks were constructed *for* agricultural production (Chapter Seven). While there is some evidence of cultivation on the Rois terrace, it was explained in section 7.4 that this may have taken place long after the terrace was completed. There are problems concerning the survival of certain types of pollen and phytoliths (that would clearly indicate cultivation) in the archaeological record, and these problems have already been discussed. While such issues in preservation are acknowledged, when the evidence and results (environmental and archaeological) for this project are considered together, an argument for terrace construction within an intensified agricultural system is not supported.

Secondly, no evidence was recovered to indicate that Toi Meduu or Ngemeduu (or Rois) were built as fortifications (Chapter Five). Excavation did not uncover evidence for palisades on the crown surface, the terrace or in the ditch of Toi Meduu, and no occupation debris was recovered that would be generated even from short-term refuge.

Thirdly, no evidence was recovered to support an argument for earthwork construction for domestic settlement. While remnant platforms are located on Toi Meduu (Chapter Five), it is difficult at this stage to know if these represent the foundations of houses or structures related to non-domestic activities. However, as no occupational debris (like midden, stone tools, hearths, etc) was recovered in any of the excavations, an argument for construction of the earthworks for domestic settlement is not plausible.

It is apparent that a wealth of evidence was generated as a result of the field programme, and that this evidence has been integral to interpreting not only the earthworks themselves, but also the landscape history in which the earthworks were an active part. It is when these results are combined with previous investigations in the ridgeline – archaeological, palaeoenvironmental,

ethnographic, and oral historical - that we can gain a more informed understanding of the social and physical elements of landscape transformation in the ridgeline through time. Therefore, the following section details the interpretation of the landscape history in the ridgeline of Ngaraard.

9.3 The creation of a humanised ridgeline landscape: practices of permanence

Creating open, humanised spaces

The first visible signifier of the intention of habitation - of permanency - is seen through the clearance of the land, ca. 2800-2500 BP. People became actively engaged in using fire to clear forest, and created spaces to locate and concentrate specific practices and places related to their daily existence, such as settlement locales and paths linking such places as these. With this act of landscape transformation, these people were actively shaping and humanising the landscape. Yet, it is likely that the landscape was already redolent with meaning. Acts of settlement are not isolated social events; settling involves reference to the previous use of that place (Brück & Goodman 1999:14). As Bradley (2000:35) pointed out, "natural places ..... acquired significance in the *minds* of people in the past". Whether these prehistoric people viewed the environment in this dualistic manner, i.e. 'natural' elements, as opposed to cultural or artificial, is not open to demonstration. The main point here is that the ridgeline, or certain places in the ridgeline, most likely had meanings in the minds of these people that influenced their decision to settle, and that these meanings incorporated reasons beyond subsistence and economics; in the end, all people are social beings, and it is through processes of enculturation that we make decisions.

By clearing the forest, people created open spaces. This signifies a change in time-space relations, on both horizontal and vertical axes; not only was a sense of distance created in the visible, physical landscape, but also within the social

landscape through a concern for long-term practices on the land. This new spatial configuration, therefore, provided a situational context in which places would have been created.

While landscape (physical and conceptual) is not static, and is always in a state of 'becoming,' the creation of places can in a sense 'make' landscapes. Places come to accomplish this through their role in daily actions and representations, but also through their settings and the repetitive movements inscribed in the land where these practices took place (Cooney 2000). Places are important because they are active components in forming and containing memories and history and/or tradition. Knowledge of places, though, stems from human experiences, feeling and thought, and this occurs through actions and representations or practices. Practices are the embodiment of people's habitus (Pauketat 2001).

Places in the ridgeline landscape

Humanised places (such as settlement remains, see below) are visible in the ridgeline not long after the initial activities of land clearance. We can only speculate at this stage that people had previously been settled on the coast, and recent research in Papua New Guinea certainly points out that coastal settlement may, in fact, only have been short lived (see Torrence & Stevenson 2000). Given settlement by at least ca. 3000 BP, there must have been some prior knowledge of the area. On the ridge between Toi Meduu and Roisingang there is evidence of structural remains: stone platforms, alignments, and low earth platforms. Whole pots were recovered from 'caches' with smaller pots inside larger ones, with associated dates of 2150 – 1860 BP (Welch 2001). Although human remains were not recovered, burials and ritual activities have been considered as the most probable explanation (Welch 2001). On Toi Meduu itself, there are the remains of stone platforms on the crowns (built pre-modification) with thin pottery that resembles ridgeline pottery dated to ca. 2500 BP. That

these places were significant is also attested to by the presence of carved stone monoliths with human or skull-like faces, which were situated on the ridge between Toi Meduu and Ngemeduu, and on the ridge at the rear of Toi Meduu (see Chapter Four, section 4.5). These stone monoliths are argued to have communicated encoded meaning at particular points in the landscape during movement in this upland locale.

The above archaeological evidence attests to a structured landscape, imbued with meaning. These are the remains of habitus, of the practices of people as they formed a landscape defined by places, creating patterns of material residue through construction of platforms and structures, and the repeated burial of pots, as well as through the continued clearance of the land with fire activities. These places were continually redefined through repetitive movement, actions, and representations, and the placement of stone monoliths demarcates a pattern in these movements. In these practices, landscape can be seen as cultural process, with ritual and everyday actions recursively moving between foreground and background (Hirsch 1995) in the daily negotiation of practices and living. In this way, the 'sacred' and the 'secular' were most likely not distinguished, but existed alongside one another, spatially and temporally (see Thomas et al. 2001). This can be seen as representing cosmology: ritual practices being in fact "practical activities" that enabled these people to deal with their world(s) (Brück 2001:62).

Social Context

In relation to social structuring principles, we can expect that the transmission of habitus and cosmology occurred through interpersonal relations, through house structures, and through ritual (Bourdieu 1977). Evidence of house structures is reflected by the platforms constructed on the ridge between Toi Meduu and Roisingang, and the houses that were situated here were most likely restricted to individuals with high social status. These houses would have

created structured space, and, as such, a level of social stratification seems apparent. High social status is also suggested by the pots buried, one inside the other, between the platforms, and furthermore ritual significance is apparent in the way both the pots and the platforms are regularly spaced on this part of the ridge (see Chapter Four, section 4.5). That pottery had a special spiritual connection may also be indicated by the use of grog temper in the pottery. It is argued by Rainbird (1999:220) to reflect a means of "reaffirming ancestral connections". Thus, it is probable that an ancestral connection and/or concerns for the spirit world were made manifest through ritual activities, with material culture playing a key role (although not the only role) in communicating the meanings. The fact that pots had special significance indicates the distinctive role that potters had in producing and encoding that meaning. While the organisation of these social groups was influenced already by descent and kinship, it is likely that these principles were becoming more significant in the way social groups were structured, and rituals were one way of transmitting these principles. However, the landscape does not appear to have been highly formalised in terms of large settlements, and it is likely that social relations and boundaries across the island were still relatively fluid and dynamic. In light of the absence of evidence for large, structured settlements, settlement authority was most likely not centralised (*contra* Liston & Tuggle 2001); instead, groups of people remained relatively independent and dispersed, although they were linked by the ridgeline and meanings associated with it. However, we begin to see changes around 2000 BP, when both landscape and habitus were undergoing processes of re-formation.

Terrace Burials and painted pottery

Evidence indicative of a transformation in habitus and the experience of landscape can be seen on Ngemeduu and Rois. An explicit concern for the dead is revealed by burials on the upper terrace of Rois. While construction of the terrace was not highly monumental (as it was not a large, steep terrace), it

nonetheless appears to have been formed for the interment of individuals around 2000 BP (Phear et al. 2003; Liston 1999a). Five burials were recovered, and analysis suggests there were three adults, one sub-adult, and one infant. A layer of sea sponge was recovered over one of the burials, and three whole pots were placed between two of the burial pits. Although not painted, these vessels share remarkable similarity with painted bowls. Two circular pots, one placed like a lid over the other, were found in one pit. Each had dual sets of pierced holes, and had a body thickness of around 7 mm. The other bowl was oval, placed in a separate pit, and it also had dual piercing. Additionally, stone alignments and mounds were observed on the surface of the burials, and in non-burial locations.

It is on Ngemeduu around 1700 BP that we see the first evidence of a structure and human activity. As stone platforms are present on Toi Meduu, and a stone path of the similar style was observed on Ngemeduu, it is plausible that this structure does not mark the beginning of activities at this location. This proposition is in fact supported by the radiocarbon determination from LVIII, the initial hill surface, of 2060 – 1900 cal. BP (ANU-11685). The practices that occurred on Ngemeduu are distinctive because they are associated with red-painted pottery.

As discussed in Chapter Eight, red painted pottery is connected with cave burials and 'spirit leaping' in other locations in Palau, and current evidence suggests it was manufactured in the interval ca. 2000 to 1400 BP. This pottery is remarkable for two main reasons. Firstly, the form and shape of the vessels (6-15 mm thick, large bowls, pots, plates/dishes) illustrates a change from the earlier thin vessels (≤ 5mm), dominated by outcurving rims: small bowls, jars and cups. The use of red ochre for decoration is also a notable feature, along with pierced holes for either attaching lids or for hanging from rafters or walls. Where before, non-decorated pottery may have communicated ideas and meaning, the addition of red painting and designs suggest a change in the way

these meanings were to be communicated. This pottery has implications in understanding changes in the way the landscape was experienced, the way meaning was transmitted, as well as conceiving changes in habitus.

The negotiation of social change

It is suggested that several things are happening to the landscape at this time. The landscape was being moulded, physically and conceptually, for particular practices related to burial and the spirit world. The ages of those buried (an infant, youth and adults) and the special treatment of the dead is suggestive of a stratified society in which some people had higher social status than others. This is also suggested by the pots (although not painted) which are either a mark of high status, or grave goods with metaphorical connotations in the afterlife (or both). The mat of sponges suggests a connection with the sea, although whether this is real (in the sense that the person was a fisherman, for example) or metaphorical (e.g. that the dead travel through the sea to reach their afterlife) cannot be discerned. A new place, Ngemeduu, the highest point on the ridgeline, became a locus of activities, and the red painted pottery is suggestive of high status individuals and/or ritual significance. By building a path on its western extent, people were structuring the way the place was to be experienced, and therefore constraining the way practices were to be carried out in experiencing the landscape.

Change was generated directly through practices, and it seems that cosmology as to the way the dead were to be treated was being re-created. By turning a 'natural' place into a constructed space in which to bury the dead, a new relationship with the ancestors and the land was created, as well as social differentiation. Space, and in particular places within the ridgeline, were becoming more formalised. Through building a terrace, the place became structured in relation to the way in which it could be approached, and as such it likely restricted the type of activities and practices that could be carried out at

that place. Everyone's experience of the landscape would have been different, depending on their age, gender, social distinction and knowledge. Yet constant negotiation between practices and individuals, especially through interpersonal relations, were the means of shaping some homogeneity in practice through judgements and assessments between one's self and other members of a group (Hodder 1986). In fact, it is in the continuation of practices after this point that a fundamental change is generated in which we see a new, monumental expression of habitus.

9.4 Altered representations: the formalisation of landscape

It has been proposed that the Ngaraard earthworks were part a settlement pattern in which villages were dispersed along the ridgeline. Separating these habitation areas were the crown and ditch fortifications as well as the construction of dryland agricultural terraces, through processes of intensification and expansion (Liston & Tuggle 2001:13-15). In this proposition, the prime movers are "population growth, pressure on the limited coastal agricultural base, and commensurate competition between villages" (Liston & Tuggle 2001:15). The defensive complexes are said to be located on the northern and southern borders of the polity in the ridgeline with additional crowns serving as look-out points and signal towers. In the CRDR volume, we see that on the chief is bestowed the power to have commanded the labour of his neighbours to build the earthworks (Liston 1999a). This places construction and control on one individual, on a leader who had the power to either command or enforce the labour of his 'subjects'.

Taking a lead from Pauketat (2001:84), it may be suggested that this political-behavioural model makes several unquestioned assumptions. One is that the actions and representations of the non-elite are irrelevant; another is that the forces of change are not in the behaviours but are external to peoples' practices. Thirdly it implies that all complex societies are alike in this manner, particularly

in the Pacific. However, by looking at the history of the ridgeline social landscape, an alternative interpretation can be offered. We can propose that cultural processes had formed a social context in which the conception and construction of the earthworks was realised. Cosmological principles were exhibited through repetitive practices centred on ritual and ancestral realms of social and cultural life. It is within this social landscape that the actions and representations of the people become most apparent, and I argue an important part of the building of the earthworks was the *construction process* itself.

Before detailing my interpretation, however, there are two main levels of explanation that need to be addressed. The first concerns the actual process of transformation of these places into monuments, and consideration of what this tells us about the people who built earthworks. The second level concerns the use or role of the monuments once they were completed, and deliberation on how the social landscape became transformed through practice, that is, though processes of negotiation.

Who built the earthworks?

In the age range 1350 – 1290 cal. BP (ANU-11686), we see the first evidence that Toi Meduu had been transformed into a monumental construction and construction activities began soon after on Ngemeduu. While dated evidence for human activity has not been found earlier than this on Toi Meduu, there is a collection of radiocarbon determinations from the hill surface layer of Ngemeduu that indicates use of the hill from ca. 2000 – 1310 BP, and the results of the vegetation analysis indicate that burning and thus clearance activities were continuing to take place. So what changed?

The way Ngemeduu was to be experienced, seen and arranged was permanently altered by earthwork construction. That Ngemeduu, the hill, was a place of importance to inhabitants of the area is suggested by the presence of the material remains discussed in the foregoing section. In particular, the

deposition of painted pottery in the initial layers of the crown (the hill surface layers) indicates a way in which specific meanings and ideas were transmitted to those people involved in the construction process. It is through experience and action in the places in the landscape that memories and traditions are inculcated.

By altering and constructing the earth into a specific shape and appearance, the people were formalising the landscape and their beliefs in many ways. However, it was not a straightforward materialisation of the current ideology, because as the landscape of monuments took form, habitus and social meaning would have been in a constant process of change and negotiation. The processes of modification are seen in the altered spaces. Instead of an open hilltop, the hill was reconstructed to become a place in which space was subdivided and where particular practices took place. While the hill may have been experienced by all before, the transformation began to restrict access to the hill. By enlarging the area around the crown more space was being created, but at the same time the construction of the crown gradually restricted space, visibility and access to the top. This would have created a prescribed order and movement on the hilltop during its formation (see Bradley 2000). This signals a change in the *way* the place was 'used', and, in essence, by altering the practices and people's habitus, it also transformed the social landscape into one of constraint. While movement was most likely restricted, it also placed constraints upon the future landscape transformations and negotiations in the ridgeline.

In light of my interpretation of the importance of the place to all inhabitants, I argue that the earthworks were not built as fortifications in a centralised polity; they were an alteration of a cosmology linking the people to the land and their ancestors. This introduces the idea that building monuments like earthworks was a means in which *inclusive social movement* was constructed (after Pauketat 2000:114). By this I mean that the 'commoners' built the earthworks, and that in doing so their habitus also shaped certain elements of the earthworks. This does

not mean that the construction was not guided by key figures, but that people were not unconscious 'ciphers' acting out the bidding of their 'superiors'. Even if there were processes in place that compelled the people to come together, the very process of construction would have helped to create a sense of group identity (Hodder 1989:264-5). By establishing a clear continuity of place, a context was created in which the negotiation of social change could take place (Cooney 2000).

It is useful here to consider the concept of practices in further detail. A significant feature of practices (the embodiment of habitus), or what Shennan (1993) calls "surface phenomena," is that they are not completely understood by actors. The point is that like the idea of practical consciousness, or non-discursive knowledge (doxa), "people often act without any conscious understanding of what their actions mean" (Pauketat 2000:116). Pauketat explains that in this way, people actively involved in any such negotiation, that is in practice, are likely only to be partially aware of the 'deep structures' that might underlie their dispositions, or habitus. If we consider groups of people involved in building monuments,

> [i]ndividuals might only have intended to perpetuate their limited understanding of tradition, but the outcomes of practice, given the ever-changing contexts of disposition formation – not to mention changing external conditions – might have diverged profoundly from these intentions and from some usual range of outcomes (see Giddens 1979; following Merton 1949; cited in Pauketat 2000:116).

Thus, while the people may have thought they understood the implications for of their involvement in carrying out practices, e.g. in building the earthworks, the outcomes could have been completely different due to the processes of constant negotiation involved in social practices. This has implications for monument building and sociopolitical change (see next section).

In addition, evidence suggests that Ngemeduu, Toi Meduu, and the terraces of Rois were not built rapidly. The recovery of pollen in all earthwork layers, as

shown by the vegetation analysis, implies a slow process of construction, allowing enough time for pollen to be deposited and in some cases plants to grow on the sites. Further support is found in the crown and terrace site of Tund in Chol (Northern Ngaraard) (see Chapter Four) where evidence illustrated at least three phases of construction over a 300 year period, of which several phases of burning and pottery deposition occurred, including of two partial pots (Liston 1999b:42)[1]. Therefore, it appears that crown and terrace sites were transformed over multiple generations, before culminating in the full form. The processes that built the earthworks were the practices of the people (after Pauketat 2001), and this process was never static; the landscape continued to be transformed and so too people's experiences of the ridgeline landscape.

Monument 'completion'

Continuing on from the interpretation above, I argue that the meaning and use of the earthworks in the ridgeline changed from the start of their transformation, to the end, or 'completion'. I will begin with consideration of Ngemeduu, and then discuss the major differences evident in the structuring of space and what that means in relation to the social landscape.

The crown of Ngemeduu is unlike most crowns. It has two depressions and a knoll on its eastern extent. The results of analysis indicate the depressions were formed in at least two phases, and that this is related to their use. After the crown had been formed, the depressions were excavated out of the surface. A structure that required post supports in the form of basalt cobbles was then placed in the west depression. Some sort of activity took place here. The proposition by Krämer (1926) that the depressions resembled house foundations may have some significance. However, no living debris was recovered from the excavations to support an argument for a domestic

[1] Of significance is that the partial pots bear great resemblance to the unpainted pots from the Ngemeduu assemblage. A 'polished redware sherd' was also recovered in the first layers of crown construction, and may be similar to or actually be a red-painted sherd (see Liston et al. 1998).

dwelling. The structure may actually have been in place for a short period, in order to complete a ritual or activity on the surface to commemorate the monuments' final form. This proposition is supported by the fact that the structure was removed, and the depression filled in with soil that appeared to have come from an area that had not undergone settlement. This action can be seen as both concealing the activity, and also as an act of 'finishing' or 'sealing' the ritual activities and elements of their meaning within the monument.

Although structural evidence for Toi Meduu is limited, we can see that the hilltop underwent similar changes, although it does not appear that the crowns were completely constructed – rather cut and moulded. The north-west terrace was formed through removing soil back to the saprolite, then levelling the surface by application of soil 'fill'. A stone platform of some sort was placed on the terrace after its completion. Although the articulation of the backsloping terrace with the crowns situated above it is still not clear, it is possible that this terrace was built prior to the hilltop modification. A ditch was cut between the two western crowns around 1370 BP, just prior to initial modification of Ngemeduu, and it is likely that the other ditches at the site were formed at this time. Thus, it appears that the crown had a long-history of use, and was clearly a place of diachronic significance to the inhabitants of the area. While the meaning could have changed through time, through differing practices involved in its construction, the formalisation of space suggests it was a significant place in the history of the social landscape.

The Rois terraces span centuries. In fact, it has been suggested that this was the first area to undergo clearance by people, and long before modification of the hilltop locations (see Chapter Seven). While the exact temporal relationship between the burial terrace and the lower terrace studied in this project is not known, it is proposed that the lower terraces were built last in the terrace set based largely on stratigraphic evidence. Construction may have taken place consecutively over many years, as with the hilltop sites, and an association with

the burials should not be discounted. The use of the terraces in a physical sense is not clear because they are different to the crowns. That some sort of agricultural practices occurred on the terrace after its construction is a possibility. That agriculture was not the impetus for construction is suggested by the association of the terraces with the burials, and the fact that the lower terrace would have been built towards the end of the terrace 'period', rather than the beginning. However, in their construction we see a clear ordering of space and the creation of place; in this sense the landscape has been transformed and shaped for particular experience and movement, similar to the hilltop sites.

Formalised space

By the time the earthworks were finished, the ridgeline layout had been formalised. By this I mean that a certain order had been imposed through the clear structuring of hilltop places and the paths linking space and place, and this henceforth impacted upon experience of the landscape. The arrangement of the upper terraces and crowns of Ngemeduu and Toi Meduu in a sense graded the way the place was to be experienced. Through its construction, the space would have been constantly negotiated by building practices. Once they were complete, a clear segmentation of space had been made between insiders and outsiders, i.e. the people that were allowed to see what was going on, on top of the crown, and those who could only look or experience the place from a distance.

The ditches are important here. While others have viewed them directly as defensive structures, to keep the enemy out, I would argue that ditches were a means of reinforcing the importance of the place, and a way of distinguishing between different conceptual levels of social visibility (also see Rainbird 1996; 2004). The ditches were visible signifiers that told the people that access was not for all; they created and reinforced social boundaries. Furthermore, it is likely

that they played a role in ritual and sacredness. Although cultural deposits were not recovered from the Toi Meduu ditch, an encircling ditch hilltop in Melekeok had a red painted pot buried deep within it. Placing burials and offerings in ditches has been a common finding in many of the earthworks of Neolithic England (Evans 1988). While I am not claiming any direct connection with the earthworks of Palau, the point is that ditches had metaphorical meaning as well as physically demarcating the way space and place were to be experienced in the social landscape.

A final point is that it is unlikely that there was a single meaning for the earthworks. This is because meanings are not fixed, and they are "more likely to change than remain constant" (Layton & Ucko 1999:14). As such, different social contexts could have created the context in which some earthworks may have been used as places of refuge, or to grow crops. Throughout the time an earthwork was under construction, which appears to have been many years, changing social conditions could have altered the way in which it was inscribed with meaning. In fact, I argue below that the earthworks became negotiated through socio-political activities, which led to a change in habitus. Thus, the key point is that within an ever-changing social landscape, the meanings of the earthworks would not have been static and fixed throughout their physical existence, and that no single meaning resides in the moment of the construction of the earthworks (see Barrett 2000). As such, earthworks need to be studied in detail on a microscale such as this, in order to distinguish the processes related to their materialisation in different parts of Palau.

A changing landscape

Over time, the ridgeline was transformed into a monumental landscape that was visible from Melekeok in the south, Ngecherlong in the north, as well as from the sea. But where were the people living? The current argument claims that large villages were present in the uplands and on the slopes. Evidence for

occupation of these 'villages' in the ridgeline, however, is only evident until 1860 BP (Welch 2001). This overlaps with activities on Ngemeduu before it was modified, and with the burials in the Rois terraces. There is some evidence in the Ngeterchong village locale that human activities may have been occurring in this location (prior to stonework village construction), which may indicate an area of habitation. However, apart from this locale, no evidence has been found for village occupation while Ngemeduu and Toi Meduu were being constructed. While it may be the case that archaeologists simply have not been looking in the right places, and/or that villages were located on the coast and they have been obscured by eroding sediments and progradation (a common argument for the lack of cultural remains during the 'colonisation' phase), there is an absence of settlement remains on Babeldaob in general during the time when earthworks were constructed. This is a perplexing puzzle, and further field work should aim to remedy this deficiency. However, the lack of evidence may be due to the incorporation of past settlement remains into earthworks such as in Ngemeduu. The excavations made clear that abundant basalt cobbles, pottery and coral, were included as 'fill', and these remains have been interpreted as having come from past upland settlements. Could it be that once people had finished building a monument, the remains of their settlement were included in the next one? This would certainly account for a lack of settlement remains in the ridgeline. However, if we recall here Hijikata's (1993) description of the hill called Roisang (Chapter Four, section 4.5) a different possibility is presented. Roisang is near Elab, close to the ridgeline, and it had a platform on which coral was placed, along with two stone skull-faces. Thus, the remains in Ngemeduu may be derived from a sacred site such as this one (Rois – being associated with the Gods). In fact, the earthwork site of Roisingang is relevant here. Although it is not known exactly when Roisingang was built, what is important here is that it not only has a burial in the 'knoll' that was underneath a coral boulder, but one of the top terraces has a retaining wall made from coral (see Chapter Four, section 4.5). Thus, by incorporating basalt boulders, coral,

and pottery into the earthworks, this action would have physically and socially implicated not only the ancient ancestors, but possibly immediate descendants of the people helping build these monuments.

However, an additional explanation is that the lack of settlement remains may be because social groups were still relatively dispersed at this time, and not controlled by a centralised polity and chief (*contra* Liston 1999a; Liston & Tuggle 2001; Wickler 2002). Rather, people were moving around, or were involved in 'shifting settlements' around the island. I am suggesting that social boundaries may still have been somewhat fluid, and that competition and warfare was not as 'developed' and rampant as others have proposed (e.g. Liston & Tuggle 2001). This is not to say that people did not have settlements to which they would return; to the contrary, through the act of earthwork building, people were encouraged to return to the land in which their ancestral connections were actively reaffirmed. However, the possibility is that settlement of this kind might not have left the structured remains that we usually categorise as 'villages'.

This issue of fluidity in social boundaries is related to the question addressing how and in what ways people transmitted ideas and habitus, particularly in relation to the earthworks, throughout the island. In today's landscape, each major area of traditional village settlement on Babeldaob also has visible earthworks, and each area has its own earthwork features. Those earthworks that have been dated indicate that the earthworks on Babeldoab were built over the same expanse of time, with a cluster of dates from 1600 – 800 BP (Phear et al. 2003). I argue here that it is through the above model of dispersion and fluidity that people transmitted elements of habitus to and between other social groups on the island. In fact, it is not unreasonable to suggest that people may have stayed with other groups in differing locations for social and economic reasons, and it was in this way that a certain 'consensus in meaning' and 'homogeneity in practices' may have been transmitted. Artefactual remains

clearly indicate trade and interaction of common goods and ideas throughout the archipelago. For example, painted pottery was dispersed over different locations: Ngaraard, Koror, the limestone 'Rock Islands', Melekeok, the megalithic site of Badrulchau in Ngerchelong, Ngchesar, and the island off the northern coast of Babeldoab, Ngerkeklau. A way in which structuring principles encoded in this pottery could have been transmitted is through collective rituals, in which the pottery would have "broadcast the meaning and would likely have enabled emulation by potters inside and, ultimately, outside the region" (Puaketat 2001:85). Similarly, the technique and manufacture of pottery appears to have been remarkably similar across the island, including the use of grog as temper. For pottery to have been found on the Rock islands (e.g. Ulong, Peliliou) illustrates movement of people and/or goods by water and terrestrial travel. It is through such movement that 'roots' of 'ties of mutuality' may have been founded; relationships which were of central importance in traditional Palauan social organisation (see Smith 1983).

By the latter end of monumental construction, when the ridgeline was permanently transformed by earthworks, it is proposed that the level of dispersion and fluidity between groups had slowed. As I have argued, one of the outcomes (and possibly one of the initial aims) of building the earthworks was the process, that is, bringing groups of people together to establish cohesion and inclusiveness. One can expect that as the social and physical landscape became transformed through these repetitive practices, the process itself began to change. It is at this point that I argue socio-political transformation occurred in the social landscape, and that is why we see the change from monumental earthworks to permanent villages and stonework architecture; a change in habitus.

9.5 Social transformation and the formalisation of villages

It is still not clear exactly when people began to construct their villages with stone architecture, and current evidence suggests it was only in the last couple of hundred years of village occupation. Yet the move into highly structured villages appears to have begun not long after the landscape was filled with monumental earthworks. Liston and Tuggle (2001:15-16) argue that this move was one based on economics,

> [t]he shift around AD 1000 to coastal settlement and the construction of stonework villages was made possible by coastal sedimentation and associated expanded wetlands and mangrove forests. Large areas were then available for various forms of intensive wetland taro cultivation.....When this new resource began to be exploited for its high productivity, the upland dry cultivation terraces were abandoned, and again, villages were moved near the areas of primary agriculture.

However, in the alternative view presented here, the processes of change are not argued to be related directly to economic factors such as agricultural production, because from *a practice perspective,* "causes of change do not exist as abstract phenomena outside the realm of practices" (Pauketat 2001:85). Rather, any external causes operated through mechanisms of internal change. The processes were in the practices of the people actively transforming the landscape. Thus, it is within the realm of practices that change is generated. A change from open landscapes to 'occluded' villages suggests an alteration in habitus. How could this have occurred?

If we return to the theory of practice, central elements of habitus are doxic referents, that is, those 'non-discursive', 'un-conscious' or 'commonsensical' forms of knowledge (Bourdieu 1977). Habitus is inculcated through people's experiences vis-à-vis these doxic referents in fields of action and representation (practices) ranging from the localised, daily routines to larger politicised rituals (Pauketat 2001:80). It is these doxic referents (see Chapter One, section 1.6) that can be politicised to varying degrees, in which we get 'orthodoxies' or cultural hegemonies. Thus, I propose it was through construction of the ridgeline - of the social landscape - with monumental earthworks that practices (habitus)

became negotiated and altered. Doxic referents became politicised by the very way in which the process of construction and ritual not only brought people together and created a sense of attachment and history to the land, but also created monuments serving to reinforce memory and create tradition. A point was reached where nearly all the highpoints had been transformed by these repetitive practices and movements, and perhaps a point where the process itself shifted to accommodate a new relationship with the land, with different social circumstances and structured formalisation.

I suggest that social organisation had shifted. The processes of constructing social inclusiveness and social cohesion had altered. Groups were larger, and organisation had to become formalised. Ancestral connections to land had been made and were reinforced by the visible earthworks, but the social impetus changed: villages became permanent, and habitus became expressed in the village structures, both social and conceptual. Relation and movement became more controlled and was connected to enhanced levels of social stratification, and the meaning and memory of the earthworks altered to the extent that over time, they became part of both the foregrounded and backgrounded landscapes. In relation to the former, the earthworks in a sense 'blended in' with everyday surroundings, but by the same token are remembered as 'background', as something that the gods built a long time ago.

The construction of villages in the lowlands may be connected to taro pond-field production, but in terms of a practice perspective the pond fields did not directly *cause* the change. Change was generated through the negotiation of practices in the social landscape that created and perpetuated elements of habitus, practices inherently connected to the monumental landscape. It was the historical process, the creation and recreation of landscape, which created the social structures in which such a change could be accomplished. This is not to say that the causes of change do not include, or were not influenced, by external elements, such as climate and environment. Only that the way in which change

is negotiated is through practices. Nero's (1992a:236) quote is most relevant here,

> Palauan history is the history of transformation, of re-creation out of the structure and essence of the past. The physical world, the cosmological sequences of worlds – even the gods themselves – are created out of their precursors.

Thus, archaeological remains must be considered in a diachronic framework that includes the history of the social landscape.

Traditional Villages: structure, hierarchy and formalisation

What were the main differences in spatial and social configuration that made traditional village organisation so different from the social landscape reflected by the earthworks? It is appropriate here to explore Ngetcherong village.

Results from the IARII excavations reveal that Ngetcherong village is in fact built on small terraces extending down the slopes of the ridge spur. Liston et al. (1998a:303) argue that the terraces predated the appearance of village features,

> the thickly forested terraced hillsides within Ngetcherong village share certain similarities with their savanna counterparts. Evidence of cut and fill construction is visible in the truncated layers on the downslope side of the terrace tiers.....the considerable height and formidable, near vertical, slope of several of the highest (the western) terrace tiers is likewise similar to that often encountered within the savanna terrace complexes (Liston et al. 1998:303).

A major point of consideration is the fact that this village, and indeed most traditional villages, are located in forest. However, in order to build the terraces, some sort of clearance must have taken place. This clearance, though, was not permanent, and it appears that these villages were meant to be situated in forested locations. What does this tell us about the social landscape?

The structure of space has completely altered: when before, the emphasis was on cleared, visible stretches of grassland, in which important places were visible (particularly in the uplands), the change is now to enclosure by means of the forest. While this may in some part be related to geographical and

environmental constraints, there is still a different concept of space and place being represented here. Additionally, the use of terraces has significantly undergone transformation, with a clear habitational use in this part of the landscape. It is possible that the construction of the terraces was made after the ridgeline had been modified, based on the change in the way space was conceived and used. This is the first evidence we have of practices related to large village settlement, where the land was being prepared for the construction of houses for large, permanent, village settlement. Concepts of privacy and seclusion are reflected here: space is highly formalised, with specific social elements hidden in the layout of the village, emphasising the insider/outsider dichotomy.

The highly formalised villages are most visible once they were constructed using stonework architecture. The focus was clearly on the lowlands, evidenced through living areas, agriculture, fishing and trade, and through the construction of docks and defensive walls. In the villages, we see the clear demarcation of space (physically and conceptually) and a formalisation of experience through the location of paths, bathing pools, houses (*blai*), and meeting houses (*bai*). Movement was prescribed formally through practice, and the cosmologies and structuring principles became encoded and transmitted through cultural expressions such as *bai* paintings, and the embellishment of wooden vessels with pearl shell designs and red pigment, the meaning of which varied depending upon age, gender and social position within an hierarchical society. Pottery too had begun to change around AD 1000, and pot forms became dominated by large flanged bowls and storage jugs, with an absence of painted designs. However, these transformations cannot be viewed in isolation of the landscape and its social history.

While movement through the uplands certainly still took place during traditional village occupation, the meaning of the monumental earthworks was 'lost' in the sense that the principles that they encoded became less important

and significant in the ensuing society. One can perhaps liken this to the complex structural and geophysical processes altering the earthworks – processes of erosion and creep gradually wearing away the original form and activities that occurred on the earthworks. In the same way, the meanings and significance were 'eroding' from people's memories. Yet, there appears to be a snippet of continuity in the name used for some earthworks – 'Rois', which in the 1920s were recorded as being places for the Gods (Hijikata 1993:56). Even the history of the earthworks eventually became related as being built by the Gods during the flood of Milad. Yet, the very fact that there is little memory of the earthworks in the current day attests to the complexities involved in the creation and recreation of the social landscape in which they played a part; of habitus, and thus tradition, where meanings never remain static, but constantly undergo change and transformation through processes of practice.

Summary

Through looking specifically at the landscape history of the ridgeline with the earthworks as a cultural unit, the above discussion has made apparent the complexities involved in trying to understand the processes and social context in which they were formed. In the case of the ridgeline, there is clear evidence of antecedent practices and human actions that reflect a physical landscape redolent in meaning *before* it was modified through earthwork construction. By considering those precursory elements of the social landscape, it was found that Ngemeduu, Toi Meduu and Rois were constructed in places that encompassed elements of ritual and/or sacred significance. Through consideration of the evidence recovered during the excavation of these earthworks, the picture formed was not one of defences, or agricultural intensification; rather, a formalisation of the meanings and significance associated with the land and the ancestors, with the construction process being essential in forming group identity and social inclusiveness. The processes were in the practices of the people actively transforming the landscape over many generations.

The meanings of the earthworks are not, and would never have been, static and unchanging through time, and this is evidenced through the socio-political transformation that took place once the monuments had altered the ridgeline landscape. I have argued that through the political negotiation of practices, doxic referents became politicised by the very way in which the process of construction and ritual not only brought people together and created a sense of attachment and history to the land, but also created monuments serving to reinforce memory and create tradition. A point was reached where the process itself shifted to accommodate a new relationship with the physical landscape, to that centred on the lowlands rather than the uplands, and a social landscape that was defined by structured control and order. Thus, a relationship of permanence accommodating different social circumstances was materialised in stonework villages.

9.6 The Monumental landscape of Melekeok

This section is not intended to investigate the archaeological remains of Melekeok and offer alternative interpretations within a landscape history. It is intended solely to identify similarities and differences, and address the processes that may have been involved in the transmission of ideas, habitus and culture between different groups that inhabited Babeldoab in the past, particularly in relation to the earthworks. I will begin by providing a synthesis of the evidence for occupation in Melekeok, and a discussion will follow.

Melekeok: settlement remains

Background

Melekeok State is situated on the east coast of Babeldaob, in the central region (Figure 2.2). Ngiwal borders the north, Ngchesar the south and Ngeremlengui to the west. The central ridge system, Rael Kedam, extends through Melekeok on its Western extent, and the highest point is an earthwork site, Tochobei Hill.

The coast is marked by sandy beaches, and ridge spurs extend to the coast. There is a general mix of savanna and forest, and within Melekeok's boundaries is the fresh water pond, Lake Ngerdok.

Melekeok has 13 terrace sites, and 10 traditional stonework villages, with all but one of the latter situated close to the shoreline. In general, taro fields and terraces are close by the villages. Only five villages are currently settled in Melekeok: Ngerubseang, Ngerang (Ngerames), Ngermelech, Ngeruliang, and Melekeok. They are located in the coastal area, and Melekeok village holds administrative control. Melekeok is one of the children of Milad, one of the four cornerposts of Palau (see Chapter Three). The second paramount chief, *Reklai*, lives in Melekeok, and is from the highest ranking clan, the Udes. Additionally, the highest ranking woman of the Udes clan is also the highest ranking woman on the east coast of Babeldaob (Liston & Kaschko 1998).

There are considerably fewer earthworks and traditional villages in Melekeok compared to Ngaraard. Like most of the other States on Babeldaob (except Ngaraard and Ngechelong), Melekeok's boundaries encompass only one coastline (the east) and her territory meets with an eastern State in the middle of the island, here specifically, Ngeremlengui. With this in mind, there are obviously geographical factors to consider in relation to the siting of earthwork and villages. However, the aim here is to describe the earthworks surveyed and studied in Melekeok. Few sites have undergone substantial excavation, with most projects undertaking survey work. Additionally, the majority of information from excavations has stemmed from CRM projects in the last five years. Differentiations between site types have been made and I shall present a précis of sites within these two categories.

Terraces and crown and terrace sites

Most of the terraces in Melekeok were surveyed by Lucking (1984). She also undertook small soil tests at some sites. A point to make about the Melekeok

earthworks is that the majority of sites have been modified by Japanese trenches and fortifications that they built during WWII. But in some cases, this actually allowed the investigation of stratigraphy within terraces in trench walls.

Most terrace sites are described as being of step terraces, slope terraces, or a mixture of the two. A seemingly characteristic feature of most of the sites is that there does not appear to be great depth between the top of the terrace fill layers and the C horizon (indeed some sites appear to be largely moulded rather than built), as the latter was discovered in many cases at only 30 cm below the surface (e.g. B:ME-5:2, B:ME-6:2). At B:ME-1:2, a terrace set with a deep ditch (10 m deep), Lucking placed soil cores but hit an impenetrable clay pan around 20 cmbs. She states many of the terrace sites had this hard pan. It is suggested that it may be an iron pan due to its location close to the surface (Lucking 1984).

Tobi Hill (B:ME-2:2) has a crown and steep and sloping terraces, as well as a ditch, and it is currently a cemetery for Melekeok. Lucking (1984) placed a test pit on a terrace to the south of the crown. Thin black pottery was recovered, and the C horizon again was only 31 cmbs.

Lucking also placed small test pits in three crown and terraces sites. One, B:ME-7:3 is described as having slope terraces, and crown and a ditch. The crown has a shallow depression in which Lucking placed a test pit. In contrast to the terrace sets, the test pit extended 40 cmbs but it was halted before it reached the C horizon. A notable point is that Lucking recovered three sherds with red exteriors and black interiors within the depression.

Osborne placed three test pits on the Roismelech terraces (B:ME-4:3). He obtained one date from a combination of charcoal from three different terraces, dating to 1060 ± 80 BP (UCLA 1762 G), 1170 (960) 790 BP (Phear et al. 2003:259). Liston and Kaschko (1998) also surveyed the terraces and recorded a stone platform on one terrace, which was reported to have nine graves.

Wickler et al. (1998) also obtained a radiocarbon determination from the terrace site, B:ME-8:2. The date, AD 210-540 (Beta 100021) was on charcoal under redeposited saprolite on a terrace. The cultural association is sketchy, but it does suggest human activities in the area at this date.

Ring-ditch fortifications

Two sites of this type are reported for Melekeok, and they revealed cultural deposits illustrating human activities and potentially habitation in the uplands from an early date. The first site, Ngerulmuud Hill (B:ME-11:1) is a prominent hilltop rising about 70 masl, and about 1.5 km inland from the coast, and it was used defensively by the Japanese during WWII. The notable feature of this site is that is has a circular ditch that partially surrounded the top of the hill (enclosing an area of about 100 m in diameter). The hill is argued to have a natural crown and the site does not have step terraces like most other sites (Welch 2001).

Ngerulmuud Hill has been investigated twice by CRM companies. The first study by IARII was through survey and small scale test pitting (Liston & Kaschko 1998). They discovered an intact cultural deposit on the hilltop formed predominantly of thin black pottery and charcoal. It returned a date of 1770 ± 110 BP (Beta 96307), 1950 (1660) 1290 BP (Phear et al. 2003:259). Pantaleo (2000) returned in 2000 for further exploration, and placed a 1x1m testpit nearby. He obtained a similar date, 1790 ± 60 (Pantaleo 2000[2]), 1870 (1710) 1550 BP (Phear et al. 2003:259). In addition, a posthole was located in the hill surface, with a charcoal deposit at its base. A sample returned a date of 1670 ± 90 (Beta 96306), 1820 (1550) 1350 BP (Phear et al. 2003:259). Two further deposits were dated, argued to be remnants of an occupation floor. They returned the oldest dates for use of the hilltop in association with thin black pottery: 2180 ± 60 (Beta 96305), 2340 (2240) 2000 b BP (Phear et al. 2003:259), mixed with thin black sherds (Liston and Kaschko 1998), and 2220 ± 60, 2350 (2210) 2060 BP (Phear et

[2] The laboratory numbers for Pantaleo's dates are not known as they are not included in his report.

al. 2003:259). While there was an absence of datable material to firmly associate ditch construction (which was up to 2 m deep in places) with the cultural remains, it is argued that the ditch was constructed during initial occupation of the site as a defensive measure.

Engoll Hill is the other 'ring-ditch fortification' in Melekeok, and it is located 2km northwest of Ngerulmuud Hill. It was investigated by IARII, and has a crown with two intersecting ditches (Liston et al. 1998a). These ditches are up 6 m deep in some locations. Through placing several test units through the ditch and crown, IARII found two thin cultural deposits on the crown situated underneath the spoil from ditch building activities. Two dates were obtained: 1750 ± 70 (WK 5932), 1860 (1970)1820 BP (Phear et al. 2003:259), and 1690 ± 80 (WK5931) 1620 (1580) 1410 BP (Phear et al. 2003:259). Primary fill from the ditch also produced a charcoal sample, with a date of 1640 ± 100 (WK 5933), 1820 (1530) 1310 BP (Phear et al. 2003:259).

A very interesting component of this site is that a near complete painted bowl, with red stripes radiating from the base of the external surface, was recovered from deep within the ditch in association with the latter date (above).

In general, Melekeok earthworks have been regarded as having a high level of ditches compared to other States, and a lot of surface pottery scatters on the terraces. The primary function of most crown sites and ring-ditch sites is argued to be defence, with Lucking arguing the brimmed and flat terraces were ideal for agriculture. The dominant form of pottery recovered from Ngerulmuud Hill and Engoll Hill is thin, black sherds, ranging in size from quite small (orifice diameters of 14-20 cm) to quite large (50 cm) (Liston and Kaschko 1998:73-74).

Discussion

In considering the similarities between the Melekeok and Ngaraard terraces, some features stand out. First is the presence of a crown site with a depression

that appeared to have a deeper stratigraphic depth compared to most other sites investigated. Other similarities include both step and slope terraces. Of note is the evidence of cultural activities on Ngerulmuud Hill around 2100 BP, and the clear association with thin black pottery. The hill also had some sort of structure, and thus activities taking place around the same time as Ngemeduu (indicated by the post). That a red painted pot was located in the ditch on the crown of Engoll Hill is particularly significant, and I will return to this matter below.

Yet, there are just as many differences in the Melekeok earthworks as there are similarities. For example, there is a high number of ditches present on the earthworks of Melekeok, particularly on sites with crowns. The ring-ditches are especially noticeable, and that they are located on sites without terraces shows a clear difference. Also, it appears that a lower level of actual earthmoving was involved in construction of a lot of the sites, as the local geology is different, with a low level of surface topsoil on many areas. In fact, there seems to have been more soil excavated to make ditches than to construct the actual terraces and crowns. A final point is that a higher amount of surface pot sherds were observed on the Melekeok earthworks.

Transmission of ideas, habitus and culture

Several components of habitus, culture and ideas appear to have continuity between Melekeok and Ngaraard based on the basic comparison made above. What does this suggest about how ideas were transmitted between people on the island?

My interpretation is that there must have been a significant amount of movement between groups inhabiting different localities of Babeldaob, and it was through interaction and experience in practice that a level of 'homogeneity' of habitus took form. The painted bowl is a clear example here. For it to be present on Engoll Hill suggests that painted bowls played a special role in

upland sites. Specific meanings must have been encoded in these pots and while the meanings may not have been the same throughout the island, elements of specific structuring principles were being communicated through this form of material culture.

For the concept of altering the landscape to build earthworks to be present throughout the island suggests that meanings and habitus, were being transmitted through interpersonal relations, and possibly through rituals. Building earthworks was significant in this prehistoric landscape, and communication most likely played a major role in 'spreading the word', physically or metaphorically through cultural materials.

By the same token, it is clear that the monumental landscape of Melekeok has idiosyncratic features of variability. The high frequency of ditches is of particular note as well as the concentration of pottery on the terrace surfaces. These differences arose directly through practices and the negotiations that went on between people and their cosmologies. In this way, the meaning of specific components of the earthworks cannot be assumed to have been the same in all of Babeldoab. The social landscape of Melekeok has undergone many transformations through time, and consideration of the earthworks has to take place within the social context in which they arose. This includes both physical and social elements of the landscape, because both form an integral part in creating and being creating by practices of habitus.

9.6 The main research question

What significance or meanings can be ascribed to the monumental earthworks of Babeldaob, and what insights does this offer in relation to prehistoric monumental constructions elsewhere in Pacific landscapes?

One of the major outcomes of this project is the view that the monumental earthworks are highly complicated structures indeed. The idea of landscape

incorporates a diachronic framework of the earthworks, one that acknowledges history and views past actions as creative forces in current and future actions and practices. In this sense, the earthworks did not come out of nowhere; they were created by people in an ever-changing social landscape, in which practices were the embodiment of habitus. By looking at the history of human practices in the Ngaraard ridgeline, insight has been gained into some elements of habitus that appear to have been significant and to have had meaning to the prehistoric inhabitants. Through taking a landscape-historical approach, I have attempted to understand the sorts of processes involved in the transmission of ideas and meanings of the earthworks from an emic perspective, by consideration of practice as process, by those everyday actions and representations of 'commonsense' forms of knowledge. A practice perspective is essential here, because

> [t]he idea of practice focuses attention on the creative moments in time and space where change is actually generated. This generative process assumes no essentialist organisations, institutions, or belief systems, but is located instead in the microscale actions and representations. And yet, depending on the context of the practices, microscale processes exist simultaneously at macroscales as well. Such processes as domination, transculturation, communalisation, creolisation, and ethnogenesis are examples (Pauketat 2001:87).

Thus, I cannot identify exactly what the significance of the earthworks was, nor what the meanings were. Probably, they meant different things to different people, because not everyone experienced the landscape in the same way due to differing access and knowledge through social structures. Everyone had different levels of understanding. But, by focusing my study on the ridgeline history (the microscale) I can conclude that the earthworks had great significance in the creation or perpetuation of significant places, and that the meanings were transformed through processes of construction practices. History mattered in the formation of earthworks on Babeldaob. What is required now, then, are in-depth case studies, carried out throughout different monumental landscapes on Babeldaob; studies that incorporate an array of

methodological strategies in order to unravel the complex history of the social landscape of Palau. Only then can we look in detail at the wider picture, and understand the complex history of social change between different groups in Palau's prehistory.

What insight does this offer in relation to prehistoric monumental constructions elsewhere in Pacific landscapes?

1. One important insight is that history matters. Seeking causal relationships between the physical environment, subsistence system, or demographic profile is one way of focusing research. However, *from a practice perspective* "causes do not exist as abstract phenomena outside of the realm of practices" (Pauketat 2001:85). Thus the construction of monumental architecture, for example, is not a consequence of process. Construction itself is part of the 'political' negotiation process that creates complex societies (see Pauketat 1993; 1996; 2000; 2001).

2. A consideration of landscape and practices is needed in order to understand precursor and successor activities related to the construction of monumental architecture. Thus, monuments need to be considered within diachronic landscape transformations.

3. Meaning is not static, it is constantly changing. Just because a purpose is in mind for a monument before it is built, that is not to say that the meaning was realised even during its construction. Thus, intended meaning and achieved meaning are different things, and this needs to be acknowledged by researchers.

4. Interpretations of monuments should not be made on their outward form alone. Such interpretations deny the importance of process in the act of construction and subsequent erosion.

5. Evolutionary based models (such as Hunt & Lipo 2001; Kirch 1990) can provide some insight into why monumental architecture was formed. But we need to consider not only the questions asking why monumental architecture is built, but also questions asking how, both physically and conceptually, the knowledge and meanings of monuments come into being. It is all very well to say that monuments were built for ritual purposes, for legitimating power, and reinforcing and/or creating ideology. That still does not tell us how they came into existence within social groups, and what social structures were in place to create and/or facilitate such changes.

6. Places create landscapes, and places often have a history beyond a monument, both physically and cognitively. This history is fundamental to understanding the social context in which monuments are formed and/or created.

7. Like Torrence and Stevenson (2000), we need to adopt frameworks beyond the normal settlement pattern approach with its orthodox rules of settlement when studying monuments.

9. General models will not allow us to understand the role and emergence of monumental architecture in Pacific Island societies. In-depth case studies need to be made addressing multiple levels of social structure: the way place and space were transformed and formalised and how this influenced experience and thus meanings in different monumental landscapes.

9.8 Conclusion

Most Pacific Island societies have some form of monumental architecture. Throughout the history of archaeological practice in this region, studies have focused on the different forms, for example, the ridgeline fortifications in the Marquesas (e.g. Sinoto 1970) and the ring-ditch fortifications of Fiji (e.g. Field 1998; Parry 1984; Parry 1987), the fortifications and mounded architecture in

Samoa (e.g. Scott 1968), and the *pā* fortifications of New Zealand (e.g. Groube 1970; Higham 1967). Other forms of monumental stone architecture that have been investigated include the *heiau* of Hawaii (e.g. Kirch 1990), and the *ahu* and *moai* of Rapa Nui (e.g. Hunt & Lipo 2001). Prehistoric cultures in the islands clearly structured space and experienced place and the landscape in multiple fashions, and transforming the landscape into constructed architecture and monuments clearly indicates one of the many ways in which ideas, meanings, and habitus, were communicated.

While many of the studies above have sought to explain monumental architecture in relation to systemic settlement models, looking for causes within the realm of demographic pressure, warfare and competition, this thesis has presented an alternative approach. Focus is placed instead on the social landscape in which monumental architecture is formed. I have looked specifically at evidence of practices, that is, habitus. In this way, an emphasis has been placed on understanding a landscape history in a particular area where monumental architecture was created. This has led to identification of the processes involved in inscribing a landscape with meaning, by asking how the earthworks were created, and in what ways the meanings and significance of these earthworks changed through time.

Of significant importance in this study was that it was based on a traditional archaeological field programme of excavation, and it was these methods that ultimately provided a great deal of information on the social and physical landscape of the ridgeline prior to, and during, earthwork construction. Additionally, it was important to incorporate evidence-gathering strategies using a range of analytical methods to look not only at cultural remains, but also at facets of the environment, spatially and temporally. By treating the social landscape in a diachronic framework of negotiation, this study differs from others in Palau, especially those that have investigated and sought to explain the monumental earthworks. This study has demonstrated that by taking an

approach such as this, new areas of interpretation are opened, and this allows room for constructive debate and discussion between archaeologists who study the prehistory of complex societies in Pacific Island environments.

9.9 Future directions

As well as the need for further in-depth case studies of monumental earthworks on Babeldaob, there are also many unanswered questions in the Palauan landscape that need further attention. One includes further investigation of early coastal settlements on Babeldaob through systematic excavation programmes targeting specific locales. Ngaraard, for example, is a perfect location for such an approach because of the long-term evidence of human habitation in the region. By using an approach based on landscape and practices, a detailed landscape history could be written, generating interest and attention to other elements of the prehistoric Palauan landscape. Further afield, application of such a model to, for example, the spectacularly transformed New Zealand landscape could provide new insight and depth to the actual processes involved in building the many different *pā* sites throughout the country. The application of an approach that was not focussed on defence would be useful for addressing how particular social groups created and negotiated the social landscape in which *pā* sites were actively built. It could identify differences in practices, and thus habitus, in the way the earthworks were created out of landscape that was already infused with meaning, and how through their materialisation, *pā* created different meanings and landscapes thereafter. It would be highly beneficial for Pacific archaeologists to at least consider adopting a landscape perspective in their research, because

> the concept of landscape stretches between the physical shape and properties of the land to human use and conceptions of that land, bringing together themes that are vital to an understanding of human history and which would normally remain separated (Gosden and Head 1994:81).

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