Agricultural Terracing in the Fiji Islands. (Volumes I and II).

Robert Thomas Kuhlken

Louisiana State University and Agricultural & Mechanical College

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Agricultural terracing in the Fiji Islands. (Volumes I and II)

Kuhlken, Robert Thomas, Ph.D.
The Louisiana State University and Agricultural and Mechanical Col., 1994
AGRICULTURAL TERRACING IN THE FIJI ISLANDS

VOLUME I

A Dissertation

Submitted to the Graduate Faculty of the
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in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Geography and Anthropology

by

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May 1994
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ABSTRACT

Agricultural terraces form a distinctive element in the cultural landscape of Fiji. These skillfully fashioned earthworks were developed for the irrigated cultivation of one specific cultivar — taro (Colocasia esculenta), a long domesticated edible aroid. Constructing pondfields on slopes represents an intensification of production, with taro yields responding favorably to higher levels of labor input. In Fiji, irrigated terraces on the leeward side of larger islands also served to overcome seasonal conditions of drought or soil moisture deficits. Nearly all of these intensive agrosystems have been abandoned. But the carefully sculpted hillsides endure, and serve as poignant reminders of past travail. Taro terracing in Fiji shares many design characteristics with terracing found elsewhere in the Pacific, most notably the tarodières of New Caledonia.

A case study considers the location, extent, and cultural-historical significance of the largest and most aggregated set of agricultural terraces ever constructed in Fiji. Neglected for more than a century, these gardens were built along contours on open hillsides in a dry rainshadow area of northern Viti Levu. Their location on the northern flanks of the Nakauvadra Mountains, traditionally considered the most sacred region in the entire archipelago, provides a mythico-religious dimension to the investigation. Culture change induced by European contact, imposition of colonial authority and control over land use, and the establishment of a plantation economy along with subsequent changes in diet and food preferences, have rendered these intensive agricultural landforms obsolete.

A second case study examines one of the few irrigated taro terrace systems still operative in Fiji. Located on the remote southern island of Kadavu, the gardens at Ravitaki display the indigenous technology required
for the delivery and control of water to hillside pondfields. Although villagers cite the advantages of overcoming drought and cyclone hazards, irrigation is not required for growing taro in this region. Hence, these terraces are more of an expression of culture than an adaptation to adverse environmental conditions. Communal labor organization and ceremonial and ritual purposes of production are also important factors contributing to the persistence of agricultural terracing in the Fiji Islands.
CHAPTER 1
INTRODUCTION

This is a geographic study of agricultural terracing in the Fiji Islands. As such, it focuses on human interaction with environment. It investigates landscape modifications undertaken by people of a particular culture that evolved within the setting of a group of islands in the western Pacific Ocean (Figs. 1.1 and 1.2). This study presents spatial information that helps to elucidate the significance of those modifications.

Agricultural terraces are durable and persistent artificial landforms that speak of effort, skill, responsibility, and forethought. They represent the creation of what some researchers have termed "landesque capital" (Blaikie and Brookfield 1987:9), and reflect local confidence in the ability to maintain a productive and sustainable relationship with agronomic resources. They survive as palpable evidence that we have gone this way before, and that we really did try to live in harmony with our environment.

Even when abandoned, agricultural terraces impart social and cultural signification to an impassive and otherwise merely physical location. They are lasting intimations of the distinctly human process whereby space becomes place (Richardson 1974, 1989; Tuan 1977). These earthworks reveal the story of place-making as an inventive activity — the formation of familiar territory. Terracing is part of the personality of Fiji, imprinting landscape with sense and meaning (Sauer 1941; Dunbar 1974; West 1993a).

The people of Fiji constructed agricultural terraces for the production of one specific cultigen — taro, or, in Fijian, dalo (Colocasia esculenta). This root crop is an edible aroid of great antiquity, and still serves as a staple food item in many areas of the world. Nearly without exception, taro terracing in
FIGURE 1.1 The Pacific Islands. Adapted from Manoa Mapworks, 1991.
FIGURE 1.2. The Fiji Islands. Adapted from National Geographic Society, 1936.

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Fiji was irrigated, thus forming the saturated pondfield environment so favorable to the maintenance of a healthy and robust yield.

Most of these terraced agrosystems are now abandoned. Gardening strategies have evolved with changing social and political conditions. Native taro has been displaced by exotic introductions, such as cassava (*Manihot esculenta*), that are more tolerant of poor soils and reduced labor inputs. Irrigation infrastructure and other landscape elements of intensive agriculture have been neglected, but the sculpted hillsides endure as haunting reminders of past travail. A few areas of irrigated terraces remain operative, and these provide a rare and valuable opportunity for augmenting historical and archaeological inquiry with ethnographic and agronomic analogs.

The research presented here is necessarily wide-ranging in time and space. To properly comprehend the conditions that prompted the creation of the terraces, this study places Fijian cultural-ecological relations in diachronic perspective. While creation of pondfields on slopes is seemingly obligatory for shaping the environmental medium required by wetland taro, the actual roots of terrace-building may be found at deeper levels, among the culture traits shared in common by a majority of Pacific islanders. This study looks further into that possibility by reviewing the evidence for subsistence methods and horticultural adaptations among the founding human populations of many of the islands. Moreover, intriguing patterns of divergence emerge upon examining ethnographic accounts of agricultural activities of various Oceanic peoples.

Agricultural terracing on Pacific islands has captured the attention of numerous authors. Nineteenth-century travelers often noted the superb engineering skills of native irrigationists, although some expressed disbelief
that the technology they encountered was of entirely indigenous design (Spriggs 1981a:4). Perry (1916) and Rivers (1926) published early accounts of irrigated terracing in Oceania, and scholarly interest was rekindled by several articles in the journal *Pacific Viewpoint*, by Spencer and Hale (1961), Wright (1962), and Wheatley (1965). In a more general article addressing what the authors termed “anthropogeomorphology”, Golomb and Eder (1964:5) wrote that “among the surfaces deliberately fashioned by man, agricultural landforms are the most venerable, the most extensive and in many ways the least known and the most ignored. Certainly among the most spectacular are the terraced landscapes of the world.”

The infrastructure of agricultural intensification has received increasing scrutiny by geographers and anthropologists. Many of these research efforts have focused on Latin America (Parsons and Denevan 1967; West 1968; Denevan 1970; Armillas 1971; B. L. Turner 1974; Mathewson 1984; Wilken 1987; and Doolittle 1990). These studies have looked at prehistoric, historic, and contemporary aspects of intensive agriculture. Terracing in particular has been investigated by Field (1966), Donkin (1979), B. L. Turner (1983), Healy, et al. (1983), Schjellerup (1985), Guillet (1987), Brush (1988), and a team of geographers associated with a University of Wisconsin project in Peru’s Colca Valley (Denevan 1986; Treacy 1987, 1989). Doolittle (1990b) and Williams (1990) considered the questions of terrace origins and evolution in Latin America.

Landscapes of intensive agriculture on Pacific islands exhibit an almost bewildering array of forms, types, and variations. The study of these artificial landforms is both a satisfying field experience and a rewarding exercise in terms of approaching wider problems and general theoretical issues. As Golson (1972:19) has suggested, “there are some structural features
associated with horticulture and the use of cultivated plants in the Pacific which may be expected to contribute to the study not only of the age of horticulture there but also of the origin and development of some of its particular techniques." Denevan and Turner (1974) listed a number of Pacific island locations in their survey and discussion of tropical raised fields outside of the western hemisphere. Spriggs (1980) issued a call for further research on traditional taro irrigation technology, and has since provided a number of valuable responses based on exhaustive fieldwork (Spriggs 1981a, 1981b, 1982a, 1982b, 1984b, 1988). Scholarly attention to Oceanic terracing, of course, is immediately pertinent to the current study. Accordingly, Chapter 4 offers a compendium of research focusing on irrigated terraces found throughout the Pacific. The contents of other chapters are as follows.

Chapter 2 establishes the scope of the research undertaken here, presents a set of hypotheses, and introduces the methods used to recover data. Chapter 3 reviews diverse aspects of Oceanic agriculture, and determines the broad cultural-ecological setting for the specific Fijian conditions of agricultural intensification and disintensification. Chapter 5 outlines the natural and cultural history of the Fiji Islands, emphasizing those factors deemed most likely to influence traditional horticulture. While there is no single chapter comprising a separate literature review, these preliminary chapters feature most of the relevant source material by other scholars. The next three chapters relate the body of original research derived directly from fieldwork.

Chapter 6 contains an inventory of intensive agricultural landscapes found in the Fiji Islands. It regards areas of drained fields, raised beds, and irrigated terraces. Aerial photographic reconnaissance and pedestrian observation supplement published accounts and unpublished source material.
in the compilation of an atlas featuring the location of terracing. The following two chapters are detailed case studies. Chapter 7 highlights what is perhaps the most extensive and aggregated set of agricultural terraces ever constructed in Fiji. Long abandoned, these old garden platforms still exert a powerful pull on the imagination. Their location on the northern flanks of the Nakauvadra mountain range, traditionally the most sacred region in the entire archipelago, provides an added dimension to the investigation.

Chapter 8 portrays the workings of an active irrigated terrace system on the remote southern island of Kadavu. Villagers there persist in cultivating taro in a pondfield environment for a number of reasons. They speak of drought and cyclone hazards, of higher yields and preferred taste, but also tell of perpetuating the obligatory custom of serving irrigated taro for feasts. Additionally, they cite the advantages of the communal labor required for maintenance of the terraces and associated infrastructure. Ethnographic data gleaned from this particular research indicate the social context within which cultural-ecological relationships are imbedded. Chapter 9 provides a summary and some conclusions.

Finally, a word about the title. It is general and all-encompassing on purpose, inclusive of the diffuse lines of evidence brought to bear on the topic at hand. There are no delimiting subtitles for good reason. While its guiding spirit derives from descriptive cultural geography (Wagner and Mikesell 1962), this study utilizes a variety of methods. It operates on several temporal and spatial scales. It considers any number of questions and theoretical issues related to Pacific islands cultural ecology and agricultural intensification. There are numerous tangents, but fortunately, the harness of narrative structure precludes them from being entirely open-ended. These various vectors of inquiry should not be viewed as haphazard or
irrelevant. Rather than following the narrow dictates of conventional positivist investigation, this study consciously assumes a more exploratory manner. Discovery of the unknown ought to have an element of surprise. Happily, there is still room in geography for such inquisitive ramblings. Research parameters reflect both the constraints and contingent opportunities that were presented to me as this process unfolded, and are discussed along with methods and hypotheses in the next chapter.
CHAPTER 2
RESEARCH PARAMETERS, HYPOTHESES, METHODS

This study examines agricultural terraces as landscape modifications. It represents an attempt at synthesis by considering the environmental factors that prompted the creation of those modifications, along with the social forces governing human lives that enabled them to take place.

The research presented here is spatially oriented, but it also emphasizes change. Just as the environment is more than a static setting to which cultures must respond, so a given society undergoes transformation in its perceptions, expectations, and adaptations to that environment. Cultural-ecological relationships exhibit dynamic attributes that can only be appreciated by applying historical analysis. Such a perspective is necessary to interpret the interplay of social and environmental factors through time. As Bayliss-Smith et al. (1988:12) noted, “in the island world as elsewhere all geography is historical geography.” And, as Frost (1979:80) pleaded more specifically, “one may hope that future research will be able to delve into the processes of ecological adaptation and sociocultural development that led to the unique aspects of Fijian prehistory.”

Agricultural infrastructure is a logical focus of geographic inquiry. Golson (1972:19) noted that “terracing persists as a feature of the landscape susceptible of study in the field.” Butzer (1982:38) included “terraced fields and irrigation works” among the primary components of geo-archaeological study, and remarked that “even when partly washed out by severe storms or after abandonment, such terraces remain conspicuous landscape features over many millennia” (1982:150-51).

Intriguing as human landscape creations are in their own right, terraces can also represent identifiable contexts of social or cultural
development. Thomas (1986:65) suggested that research in Fijian agricultural landforms might lead to a greater understanding of political evolution: "one area ... which requires further work concerns the Fijian system of production, which needs to be analyzed both from a technoeconomic and a sociological point of view. The implications of the various forms of horticulture and the relationship between productive bases and political structures is at present rather unclear." The current study seeks to address some of these concerns. Much of the data directly derived from fieldwork is enveloped in the two case studies toward the end of the report. Chapter 7 is an historically informed look at an abandoned terrace system, while Chapter 8 is an ethnographically driven consideration of an active irrigation complex. These case studies are integral parts of the overall research design.

But I break no new methodological ground here. The strength of this research lies in its synthesis of the diverse aspects of a geographic problem with many dimensions, spatial and temporal, social and environmental. Although I have relied upon cultural-ecological perspective and direction, this is not a nutrition based input-output systems model of cultural ecology. Nor is this a study in prehistoric or so-called primitive agricultural economics. The handling of econometric data, agricultural or otherwise, is beyond my training and expertise. This study is not a spatial-analytical exercise, which too often, in my opinion, tends to ignore chronological pitch.

Nor is this strictly an archaeological report whereby data uncovered through excavation are interpreted and conceptualized into a comprehensive depiction of past subsistence landscapes and the minutely detailed organization of the societies that inhabited them. Archaeological aspects of the investigation are used to arrive at some general ideas concerning the
function of the intensive agricultural landforms themselves, and how and when they may have been constructed. The underlying problem throughout this study, of course, revolves around why the terraces in Fiji were constructed. And any attempt at answering this question requires gathering more than archaeological field data.

This is a cultural geographic study in that it emphasizes spatial information as conveyed by the presence in the landscape of anthropogenic structures. It provides baseline data for understanding the geography of agricultural terracing in Fiji. This study presents factual material that has, until now, only been guessed at or pointed to using obvious illustrations. For example, terracing is often mentioned in the context of the upper Sigatoka Valley where it is, of course, quite evident. But who, other than the odd itinerant Irish novelist (see Chapter 6), has noticed the neighboring upper watershed of the Ba River, where terraced landscapes are just as evident and equally dramatic? This is not to disregard the methodical documentation and excellent research reports provided by scholars such as Watling (1984), Parry (1987), and Hashimoto (1990), who have elucidated aspects of irrigated terracing in Fiji at a fine scale. Indeed, as is readily apparent from the contents of the present inquiry, I hold case studies to be an important method for achieving investigative depth. But it should also be clear that what is offered here is more comprehensive observation at the meso-scale.

Some social-scientific research on oceanic islands has purported to be of profound significance, the apparent isolation of such places enabling a claim to be made for natural experimental conditions (Evans 1973, Keegan and Diamond 1987). But islands are not bell jars. Kirch (1986:2) warned against taking the ‘island-as-laboratory’ theme beyond reasonable utility: "Too often it has been assumed that because islands are discrete and isolated,
their societies have developed as closed systems." But islands were almost never cut off from contact with other places. Indeed, the sea that separates islands often seemed as much a connective medium as it did a barrier to connectivity. Superb navigation skills and the ability to construct ocean-going vessels allowed islanders to establish trade networks and to deliberately seek out new lands for colonization. As Irwin (1992:204) remarked, "although anthropologists usually study people on single islands, in prehistory, communities were commonly connected in a wider social world of moving items and ideas, and were mutually if differentially exposed to changing circumstances."

Thus, the present study has been conducted with full awareness of the open-ended nature and unobstructed heading of the many lines of inquiry. Indeed, these often seemed but azimuths on an open sea. This research had the potential to travel in any number of directions. Limits to the exploration are inherently arbitrary and necessarily self-imposed. Because this is not a general treatise on Fijian society or culture, or land tenure, or environmental relations, I was able to avoid the temptation to indulge in massive and prolonged treatment of those topics. Where I have strayed it is with the hope that readers will sense the relevance of such ancillary digressions to the subject at hand. I have attempted to sequentially plait a logical series of chapters moving from the general to the particular and roughly, from the past to the present. With a geographer's attention to features on the surface of the earth, I have tried to stay focused on the agricultural landform as artifact. Even so, questions revolving around the social, cultural, and political ecology of agricultural terracing grant an intriguing and often perplexing dimension to the investigation. These problems are outlined in the following set of hypotheses.
Hypotheses

1. Horticulture was a significant component of traditional Oceanic subsistence strategies. Fijian environmental adaptations reflect a cultural base shared with other Pacific islands.

2. Agricultural intensification in Fiji was caused by a combination of factors, and was never simply a response to population pressure on agronomic resources. It was a process that reflected a number of causal determinants, including mandatory production of surplus for tributary or ceremonial purposes, and territorial circumscription associated with chronic warfare.

3. Agricultural terracing was constructed exclusively for the irrigated cultivation of taro (*Colocasia esculenta*), which was once both a significant food crop and an important item in ritual and social context. Terraces were a type of "landesque capital" representing confidence, risk management, and system stability, and cannot be justified by "least-effort" explanations.

4. Colonial and capitalist transformations of Fijian society have resulted in changes to land-use patterns, crop compositions, and agrosystem technologies. The encounter between Fiji and the emerging World System caused alterations in local food preferences and diet, in labor allocation, and the very structure of village land and life.

5. Irrigated taro terracing persists in Fiji for social and cultural reasons rather than from a strictly environmental rationale. Its continuation, while grounded in the need to overcome drought hazard, also represents a deliberate adherence to traditional gardening practices.

Methods

Pacific cultures and cultural-ecological relationships have long been a diverse and interesting subject of investigation, frequently requiring
cross-fertilization of viewpoints and modes of research (Brookfield 1973a, 1984b). Garanger (1982:132), an anthropologist, called for an “interdisciplinary” approach for “studying the past of Oceania.” Geographers Brookfield and Hart (1971:78) noted that “the growing number of researchers concerned with the interpretation of cultural ecology and its evolution in this region thus find unusual opportunities to interweave the approaches of archaeology and palynology with those of ethnography, ethnobotany, and ethnohistory.” Specifically calling for attention to irrigated taro cultivation practices, Spriggs (1982a:318), an archaeologist, stated that “the need for basic agronomic research on traditional water-aided agricultural systems in Melanesia cannot be overstressed.” Geographers are able to contribute substantially to studies of this kind because synthesis may be viewed as the specialty of their discipline (Turner 1989).

Geographic research, by its very nature, tends to be a multi-faceted method of investigation. In this study, several lines of evidence and types of data are brought to bear on the topic of agricultural terracing in Fiji. I utilize the methods of “landscape archaeology” to combine various trajectories of inquiry (Armillas 1971; Spriggs 1981a; Mathewson 1986; Parry 1987; Treacy 1989; Doolittle 1990a). Guided by these methodological models, this study essentially consists of a synthesis of 1) comprehensive aerial photographic analysis; 2) archival research and ethnohistorical investigation; 3) review of existing data from archaeological studies; 4) field mapping and limited excavation of an abandoned terraced landscape; and 5) field documentation of an ethnographic analog in the active contemporary landscape. Such broad-based inquiry formed the core of much of the early academic training in cultural geography in this country, and it remains a
powerful and fruitful approach for investigating human-environment relationships manifested in the cultural landscape (West 1993b).

**Aerial photography**

Aerial photography was a fundamental tool in conducting this study. Much of the data presented in Chapters 6 through 8 derives from aerial photographic interpretations of the signature images of intensive agricultural landforms. For the comprehensive survey of terracing contained in Chapter 6, I examined numerous stereo-paired images, including nearly 2,000 for Viti Levu alone. I used 1978 photography because it was the clearest imagery that covered the entire archipelago. Excessive cloudiness over Taveuni resulted in the use of 1977 imagery for that island. Very sharp, high contrast photography was produced for the 1990 agricultural census, but the runs only covered areas of commercial agriculture. And, as we shall discover, these areas are not among the typical locations for traditional irrigated terraces.

To recover the data presented in Chapter 6, I worked at the Koronivia Agricultural Research Station outside Nausori. The amount of aerial photographic prints that I examined is listed in parentheses after the island location: Viti Levu, including Ovalau and the Yasawas (1,942); Vanua Levu and Taveuni (1,255); Kadavu (143); Gau (40); Koro (30); Moala (30); Lakeba (20); and assorted stereo pairs for the smaller islands in the Lau group.

For the detailed examination of terracing developed within the case studies of Chapters 7 and 8, I purchased aerial photography from the government Department of Lands and Survey. Again, the 1978 overflight proved the most useful, although 1951 photography for the Nakauvadra area illustrated a greater extent of the agricultural terracing there due to the
dearth of subsequent revegetation. I used standard 9" x 9" stereographic pairs as well as enlargements of specific prints.

Aerial photography has proven its utility throughout this investigation. Other scholars have also endorsed its merits. Kedar (1958) and Vogt (1974) offered valuable examples of its use in the determination of traditional agricultural activities. Parry (1987) has outlined a number of methodological concerns when dealing with aerial photographs to delineate intensive agricultural landforms in Fiji.

From my own experience, terracing shows up well if you know what you are looking for. It is helpful to have in mind the several different types of irrigated pondfields likely to be encountered in a given area. The loosely grouped, often staggered pattern of small, discrete gardens is the most difficult form to detect on an aerial photograph. For this type, it is important to look for clues when scanning an area that is obviously under agricultural use: proximity to a stream or water source; linear markings that may indicate canals; or the reflection of ponded water from the gardens themselves. The more regular, continuously contoured systems are immediately apparent on a stereo pair as parallel squiggle lines.

Once an apparent terrace complex has been spotted on the aerial photograph, care and some examination time is necessary for positive identification. Two other processes can create similar patterns, and I will mention these briefly as a warning to other researchers. Many areas of the country where terracing was a gardening method are in the leeward “dry zone”. These are also typically the areas that have been subsequently and extensively used for grazing cattle. When ruminants traverse a hillside, they tend to stay at the same level. Over time, a series of parallel stock trails develops on slopes, and these features may be mistaken for abandoned and
eroded garden terraces. In some areas, where forest cover or other original vegetation has been removed by past land-use practices, and where soil cover has been stripped by further abuse, apparent terraces may form by erosion and differential weathering of sedimentary layers of regolith.

A seemingly obvious limitation in aerial photographic analysis is the large area under forest. For example, almost half of Viti Levu retains substantial tree cover. Likewise, there is still dense vegetation in the mountainous areas of most outer islands. For several reasons, this is not as limiting a factor in using aerial photography as it may seem. Agricultural terraces represent an investment in labor in excess of that required for more extensive, dryland cultivation. As such, they tend to be located in close proximity to villages. Even in the densely forested areas of eastern Viti Levu, villages are always visible on aerial photography because of the characteristic open space between dwellings and the easily detected central commons (rara) essential to the spatial context of Fijian nucleated settlement (see Toren 1990). These settlements are few and far between, and are almost universally located along major rivers or their larger tributaries. The garden areas associated with these villages show up well enough for identification on aerial photography.

Furthermore, with few exceptions, agriculture in the forested regions of the country consists of extensive, bush-fallow, dryland cultivation. Because of sparse population, even this type of subsistence strategy does not alter the landscape to any appreciable degree. In describing the evidence for these swidden agrosystems, a government-sponsored forest survey reported that “study of the aerial photographs shows how little land the Fijian population in the forested interior has under cultivation at any one time” (Berry and Howard 1973:31). James Turner (1983:25) offered
ethnographic corroboration for a predominance of extensive agriculture in
the heavily forested areas of Viti Levu: “more intensive methods are not
practiced in the Wainimala area.” And Rutz (1976:172), who has conducted
fieldwork among villages along the Waidina River in eastern Viti Levu,
concluded: “evidence indicates that the precontact political economy was
based on two factors working in relationship to each other: (1) a large
number of small, mobile, relatively autonomous, groups living in proximity
to each other; (2) an adaptation of field-fallow methods for cultivating
primarily taro and yams on thin hill soils of the subtropical rain forest.”

Historical geography

Because much of the terracing in Fiji is no longer utilized, I found it
necessary to employ the methods of historical geography. One aspect of such
research involved delving into the oral historical accounts for specific land-
holding groups, in order to plot past village placements and relocations. It
was also imperative to analyze the larger social and historical forces at work
to understand the need for constructing terraces in the first place, and to
explain their subsequent abandonment. It is this meeting of the specific
event with the greater cultural-historical edifice that Sahlinns (1981, 1985;
Kirch and Sahlinns 1992) has defined as “the structure of the conjuncture”
(see also, and especially, Biersack 1991). Much of the historical discussion
within the present study represents my own attempt at merging the local
with the global. There is a focus on events that happened at certain times in
particular places, events that may have been structured by circumstances
beyond the control or even the awareness of the agents involved. But by
placing these events in spatial and temporal perspective on several levels,
one gains a greater understanding of the situation as it unfolds.
Oral traditions in the Pacific are an especially valuable data set because of the relatively recent occurrence of European contact. Garanger (1982:132) has stated that oral traditions should indeed be given more attention, and not merely in terms of semantics or structuralist analysis: “traditions and myths in Oceania are on a more pragmatic level — an historical atlas, a civil code and a land register.” In the case studies presented in Chapters 7 and 8 I have used the chronicles set forth in the *Tukutuku raraba*. These are oral historical records collected by government officials during the late nineteenth and early twentieth centuries, and they are now held under strict security at the headquarters of the Native Lands Commission in Suva. Researchers require special permission to gain access to them. Even then, no photocopies are allowed, although audio tape recordings of NIC staff reading from them are permitted. I recorded the following *yavusa* histories from staff recital on December 16, 1992: Namacuku, Naqeniganivatu, Nabaqatai, Vaikitu, Naisogoliku, Naikoro, Bua, and Burelevu, from the Nakauvadra area; and Vita and Ravitaki from Kadavu. They were translated with the most capable assistance of Raijeli Raravula.

The *Tukutuku raraba* are used to document the land claims of various tribes (*yavusa*) and clans (*mataqali*). For this reason, the narratives at times exhibit a forced conformity as colonial administrators sought to standardize their format across Fiji. This occurs particularly toward the end of each chronologically ordered record, since the boundaries of territories as perceived by each group at the time of the Cession of the islands to Great Britain stand as a benchmark of tribal tenure. Each history typically concludes with words to the effect that “these lands were surveyed and divided according to our understanding and we confirm the boundaries of our *mataqali* and *yavusa*.” France (1969:10) noted, however, that the
beginning portions of each of these accounts have "substantial accuracy". and he gave a positive assessment of their utility in historical reconstruction: "the body of each story, which deals with tribal migrations in pre-contact times, is a free narrative of events and is not adapted to any preconceived pattern" (France 1969:11). Moreover, Sayes (1984:7) has remarked that "unless conclusively shown to be pure fabrication, Fijian traditions cannot be ignored."

The National Archives of Fiji offered additional opportunities for historical research in unpublished source material. Assorted reports and letters by colonial administrators, along with the official minutes and other notebook entries from various provincial council meetings proved invaluable.

Archaeology

Archaeological investigation was also required to gain a glimpse of past landscapes and gardening strategies. Golson (1972:27) perhaps best described the type of archaeological methods used in this study: "field or topographical archaeology ... involves the systematic search for the archaeological field evidence produced by man's past activities, detailed recording in local areas of their characteristics, number, size, location, and distribution, and selective excavation to answer specific questions about their function, age, chronological relationships and incidence of reuse."

Published as well as unpublished archaeological reports from various Fijian locales proved useful not only in outlining the culture history contained in Chapter 5, but also in the survey of intensive agricultural landscapes in Chapter 6. When combined with aerial photographic evidence, colonial archival records, and the written accounts left by the first European
visitors to the islands, it became possible to reconstruct places that were important or essential to intensive agricultural production in the past.

In the first case study, at Nakauvadra, reconnaissance archaeological methods allowed a more detailed formulation of settlement pattern and related agricultural features in the landscape. I located former habitation areas, defensive earthworks, and, of course, the terraces themselves, along with vestiges of associated irrigation infrastructure. These data are mapped in Chapter 7. Under the direction of Andrew Crosby, a trained archaeologist working with the Fiji Museum, I also conducted limited excavations of several features. These include a trench through a set of contour hillside terraces to uncover stratigraphic details which serve to indicate construction method; excavation of an earthen canal that once delivered water to one of the larger terrace systems; and several trenches across the face of a rock-walled streamside garden. Where soil samples were taken, they were identified by color after air drying, following standard Munsell notation.

Additionally, surface pottery collections from nearly all the old village sites along the northern flanks of the mountain were submitted to the Fiji Museum. Unfortunately, the overworked staff there has been unable to perform a full ceramic analysis on these collections, although preliminary rough estimates regarding date of manufacture are probably accurate. I also collected a sample of marine shells from one of the rockshelter middens, and submitted this, along with a charcoal sample from one of the excavations, to the radiocarbon dating laboratory at Beta Analytic, in Florida. These results have allowed more precise chronological reckoning.

Ethnography

This investigation also makes use of ethnographic method, an approach that is particularly valuable for cultural-ecological research

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(Frake 1962). In the second case study, at Ravitaki, I was able to document the dynamic relationship between society and environment as expressed through the operation of an especially dramatic intensive agricultural landscape. This set of irrigated terraces constitutes a carefully managed agroecosystem, and represents, at least in function if not form, a model of intensive taro cultivation practices in Fiji. The data presented in Chapter 8 were gathered through informant interviews and participant observation.

I also took the opportunity in this segment of the study to make use of videographic technology. A small grant from the Institute of Pacific Studies at the University of the South Pacific allowed me to engage a video camera crew from the Media Centre on campus. We flew across the Kadavu Passage and spent several days at the Ravitaki terraces, where the villagers were enthusiastic and active participants in the documentary. Later, I spent countless hours in the editing booth, splicing footage and constructing a logical sequence of scenes. Marsha Schoeffler, videographer at the Media Centre, offered technical assistance in finalizing the edited version. I enlisted the help of two friends at the university — Aliti Vunisea and Seini Sukanaloka — in translating the narration, and then digitally added subtitles to the tape. I realize that I came nowhere close to exploiting the full potential of this powerful medium, but the final product is an essential element of my field data. *Na laua ni Ravitaki* is a 28 minute documentary, expertly narrated by Anare Coka Delaivuna, of Namanusa Village. This video highlights the operation and design of one of the last active terrace systems in Fiji. Of course, still photography was not neglected. I often carried two cameras — one with black and white film, and the other with color slide film.
Cartography

As should be the case with any geographic investigation, this study utilizes cartographic methods throughout. Small scale area maps were constructed from a government published topographic base. Data from aerial photography and field based ground truth were subsequently added. Maps from the Native Lands Commission and the Department of Primary Industries also proved useful for cultural information. Locations of old village sites and terrace system components were determined in the field through the use of a hand held barometric altimeter, calibrated daily. In compiling the larger scale maps of the terrace systems, I laboriously conducted tape and compass surveys, using a hundred meter steel tape along the longitudinal axis, and two 50 meter fiberglass tapes on the perpendicular axes.

Root crops such as taro are categorized in Fijian dietary typology as *kakana dina* — "true food" — and no meal is deemed complete without them. Thus, maps are the *kakana dina* of geographic repasts. Much of the data in this study, therefore, are presented in cartographic format. This is the essence of the meal. Though a few were drawn by hand, most of the maps were produced on the Macintosh LC III, using a variety of drafting and graphics software.
CHAPTER 3
PACIFIC ISLANDS AGRICULTURE

This chapter presents a perspective on human-environment relations in Oceania as expressed through the application of traditional agricultural knowledge and technology. As throughout this study, an attempt is made to weave together the social and ecological aspects of growing food. Hence, physical factors are not presented as a static setting to which the workings of culture must adapt. The emphasis is on the strategies and techniques themselves, and on the particular cultigens that represent staples within the subsistence system. But crops require cultivators; hence agriculture is a lens for viewing culture. We cannot discuss crops without discussing the people who grow crops. And we cannot understand the people without examining the way they work the land that sustains them.

In the first section I review the literature on Oceanic agriculture and present a synopsis of gardening strategies. The essential activity in agriculture, of course, is the cultivation of particular crops. By using the term “crop complex” I mean to include the human side of the equation, to merge the merely academic viewpoints of agronomy and anthropology. Successful agriculture requires more than just competent adaptation to edaphic and climatic conditions. As Barrau (1958:8) noted, “it is difficult to dissociate traditional subsistence agriculture from its social background.”

The next section looks at the development of irrigation technologies in the Pacific region. Irrigation may have developed when tropical tubers were taken by migrating horticulturists from hearth areas of adequate moisture into areas that experienced periodic drought or seasonal dry spells. Terracing was developed as an associated means of water control rather than strictly a measure to prevent soil erosion.

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The third section focuses on the specific cultigen responsible for the creation of agricultural terracing throughout Oceania. Taro is an ancient crop, and one that is inextricably linked with Pacific island cultures. It formed the staple food in the diet of many islanders, and was further infused with ceremonial and ritual significance.

The compound forms of Oceanic agriculture lend themselves to the development of theories concerning social stratification and political evolution. Intensification — the increase in labor inputs to a given parcel of land within an agrosystem — has been a central and key concept in examining the development of polity and hierarchical social structures. But the presence of intensive agricultural landforms does not always signal a higher level of social organization. The next section examines some theories surrounding the process of agricultural intensification as it has flowered in the Pacific islands.

The final section of this chapter explores the variation among the islands, as each cultural group has come to express its own identity through particular crop preferences or idiosyncratic application of traditional ecological knowledge and agricultural technologies.

**Crop complex**

A complementary combination of tree and root crops characterizes Oceanic agriculture. Throughout the Pacific, islanders cultivate in different proportions and with varying degrees of intensity, the following six cultigens: taro (*Colocasia esculenta*), yams (*Dioscorea* spp.), sweet potato (*Ipomoea batatas*), breadfruit (*Artocarpus altilis*), coconut (*Cocos nucifera*), and plantains (*Musa* spp.). These food plants formulated what has been termed the Pacific islands crop complex. Bush spinach, or *bele* (*Hibiscus manihot*) and sugar cane (*Saccharum officinarum*) were additional crops.
traditionally cultivated on several islands. Minor root crops included arrowroot (*Tacca* spp.), the giant taro (*Alocasia macrorhiza*), the giant swamp taro (*Cyrtosperma chamissonis*), and the so-called elephant yam (*Amorphophallus campanulatus*).

With the exception of sweet potato, a prehistoric introduction from tropical America (Yen 1974; Hather and Kirch 1991), most of these crops are of Indo-Malayan origin (Yen 1973, 1980). The names for them have cognates not only across the island groups in Oceania, but in island Southeast Asia as well (Roosman 1970:220). Regarding sweet potato, Hather and Kirch (1991:892) recently presented archaeological evidence from the Cook Islands "unequivocally establishing the presence of *Ipomoea batatas* in central Polynesia by around AD 1000." Linguistic variations of *kumala* likewise indicate widespread adoption of the sweet potato throughout the Pacific. Hather (1992:76) further commented that "it is likely that the outer reaches of Polynesia, New Zealand and Easter island, lying outside the tropics, could only have been colonized by a people with a staple crop that could survive, and even thrive in, its cooler temperatures. The sweet potato was among the suite of staple root crops known to the Polynesians prior to Western contact and is the only component of this suite of plants that successfully grows as a staple in sub-tropical latitudes."

Oceanic agrosystems varied locally, but there was a general reliance on Southeast Asian or Malayan plant materials (Golson 1972:17). Tropical coastal environments of this region, in particular, have been deemed the most likely source areas for these cultigens. Sauer (1952) postulated that such a setting represented a hearth for the very beginnings of agriculture. The recipe for this revolutionary development, Sauer figured, would have required two catalytic ingredients: plant material able to be vegetatively
propagated rather than by seed, and a people with enough leisure time to experiment. These parameters pointed to fishing societies along the rivers and shorelines of the Old World tropics.

The particular crops associated with Pacific island colonization and settlement were introduced by the Lapita culture. Chapter 5 discusses in greater detail the initial occupancy of most of the insular Pacific by these dynamic voyagers. Additional food resources were developed from local source material wherever Lapita colonizers settled. Golson (1972:17) has emphasized this flexibility on the part of these early migrants, when he related how it is "often said that horticulture was a prerequisite for man's successful colonization of the Pacific islands ... that food plants — and animals — were introduced and distributed as a complex ... [however] ... botanically the colonists of the Pacific islands ... were moving into a familiar world and indigenous plants came to play a not insignificant role."

Islanders later embraced exotic introductions which fit into their traditional crop typology. These include the banana (Musa sapientum), the papaw or papaya (Carica papaya), the tannia or American taro (Xanthosoma spp.), and the manioc or cassava (Manihot esculenta). These last three plants originated in tropical America. Unlike the sweet potato, they were all introduced to Oceania during the historic (European contact) period. Langdon (1989:18) concluded that "Fiji must have been the point of entry for the papaw in the Central Pacific." He traced Carica's introduction to Fiji to the sandalwood trading ship General Wellesley, which stayed at Bua from October 6, 1808 through June 2, 1809. Langdon reasoned that the Fijian word for papaya — oleti or weleti — derived from the name of the ship, and which for the natives of Bua, was "the nearest they could get to her difficult
sounding name" (1989:19). Interestingly, on nearby Futuna the papaya is called *la'a'akufiti* — “Fijian tree” (1989:20).

Regarding *Xanthosoma*, there is a confusing vernacular nomenclature for this particular cultigen due to cross-introductions among several island groups. For example, in Fiji it is known as *dalo ni Tana* — “taro of Tana” — indicating it is from one of the islands in Vanuatu. But in Vanuatu it is called *taro des Fidji*. Weightman (1989:100) figured that it was probably introduced to Vanuatu by nineteenth-century plantation workers returning home from Fiji, and wrote that “*Xanthosoma* has won an important place in subsistence cropping systems, in particular providing greater food security where yams are, or were, the principal crop and land is generally too dry for *Colocasia*.”

Cassava has become such a ubiquitous component of Pacific island gardens that Thaman and Thomas (1980) referred to its introduction as an “invasion.”

Data presented within Chapter 8 display the typical Fijian expression of this pan-Oceanic crop complex as revealed in the diversified subsistence agriculture on the island of Kadavu. Because *Colocasia* was solely responsible for the development of irrigated terracing throughout the Pacific (Barrau 1958:21), a separate section within the present chapter deals with its cultivation and significance. But first, we must consider the development of irrigation in the Pacific islands.

The wet and the dry

Irrigation in the Pacific might have originated only after tropical root crops were taken out of their humid hearth areas and transplanted to locales with more arid conditions. The cultural groups who had come to depend upon these tubers as staple food items were thereby coaxed into developing irrigation strategies. Brookfield and Hart (1971:82) stated that taro “is a crop of the tropical rainforests ... hypothetically, terracing and other forms of
irrigation developed when it was carried to more seasonal climates." Some researchers have hypothesized, however, that the hearth for tropical root crop domestication may actually be located in seasonally dry environments rather than moisture abundant rainforests (Harris 1972, cited by Flutterer 1976:226). Ambiguous origins notwithstanding, on the many islands across the Pacific, where environmental conditions vary more than one might expect, the new settlers often found it necessary to apply irrigation to produce adequate yields of their favored crops. The intensity associated with this new (or not so new) technology also varied according to the degree of agronomic stress exerted by climatic and edaphic conditions.

The vastly different locales to which the Oceanic crop complex was transported by founding populations resulted in an irrigation diametric that Barrau (1965b) termed "the wet and the dry." Thus, some islands developed irrigation where others found it unnecessary. This initial impetus toward differentiation is perhaps responsible for the greater cultural divergence which will be outlined in the final section of this chapter.

This is not to say, of course, that certain islanders came to rely upon irrigation in the absence of alternatives. Wetland taro was probably never a required cropping strategy, only a relatively fail-safe one. It was but one aspect of a multifaceted set of agronomic resource converting techniques. Ward (1982:14) portrayed the broad-based design of Oceanic agrosystems, which entailed intercropping, staggered plantings, and a more intensive component that served to overcome hazards and provide additional certainty of securing adequate yields:

The typical Pacific island garden, or swidden, contains a mixture of crops, interplanted, to provide a series of storeys, shade and cover for the soil, an extended harvesting period and thus conservation of effort in clearing, weeding, and pest controls. The long bush fallow leads to robustness. Where elaborated, as in the sophisticated cultivation of sweet potato in the Papua New
Guinea highlands or the terraced and irrigated cultivation of taro in New Caledonia, Vanuatu, Fiji, or Rarotonga, labour investment and water control provided the security. But this was at the cost of considerably higher labour inputs.

Out in the insular Pacific, beyond Papua New Guinea, the one crop receiving most of this lavish attention was taro.

Cultivation and importance of taro

In Pacific agrosystems, starchy tubers formed the basis of subsistence, and none was more important than taro (*Colocasia esculenta*). Taro is "grown throughout the Pacific and may have originated as a cultigen in equatorial Indonesia" (Bellwood 1979:139). Vegetative propagation links taro with human settlement and agriculture, and Hill (1939:113) called it "one of the oldest of cultivated plants." Spier (1951:69) wrote that "dispersion of the plant into Polynesia apparently followed human occupation of the region."

But Yen and Wheeler (1968) provided firm evidence, based on chromosome numbers of variant cultivars, that taro indeed accompanied humans in their earliest migrations into the Pacific. It once formed the main item for meals on many islands in Oceania. Taro also has ritual and ceremonial significance (McCutcheon 1985), and the labor required for its production goes beyond simple subsistence justification.

Taro is a crop of ancient lineage. It is known to have been grown in southeast Asia at an early date, and the first written records of taro come from China (Merlin 1982). Pliny saw it growing in Egypt during the first century A.D. (Greenwell 1947:277). Some scholars have asserted that the irrigated rice terraces of the Philippines and other Southeast Asian locales may have been originally designed for the production of taro. Lewis (1992:28) cites Keesing and Keesing in their claim of the antecedence of taro in the irrigated terraces of northern Luzon. Conklin (1980:38) believed that in the past, "terracing for rice and taro cultivation ... may have been
practiced" in the Philippines (italics added). The magnificent *Ethnographic Atlas of Ifugao* includes a photograph of taro in a terraced pondfield that is planted mostly to rice (Conklin 1980:23).

Mythological parallels offer important clues to unraveling the potential for ancient connections between the Philippines and the tropical southwest Pacific. Roosman (1970:219) related that the Polynesian culture hero Maui has been associated with a similar figure in Bontoc Igorot mythology. And, just as rice probably displaced root crops in Southeast Asia, the role of taro in folktales has been replaced by rice (Roosman 1970:227). The authors of a South Pacific Commission report on root crop production summarized the evidence: "Originating in the Indo-Malayan centre, taro spread with the original migrations to the Pacific. Evidence of the early dispersal may be found in irrigation terraces in South East Asia which are believed to pre-date the culture of rice" (Anon. 1976:7). Spriggs (1982b:12), citing Spencer, notes that "for much of Island Southeast Asia there is historical evidence that rice was not a major crop until after European contact."

Taro produces a starchy corm that provides adequate nutritional benefits and has been a traditional staple in many South Pacific societies. Massal and Barrau (1956) stated that "*Colocasia* tubers constitute the most important food in South Pacific territories." Leaves from younger plants are also used as a green vegetable, but these must be cooked properly to disintegrate calcium oxalate crystals that would otherwise irritate mucous membranes in the mouth and throat. In Fiji taro leaves are called rourou and are usually cooked in coconut milk (*lolo*). Using traditional cultivation methods, the edible portion of the root weighs between 1.5 and 2.5 kg (Horne
Corm lengths can range from 25 to 45 cm, depending on the variety of cultivar. In Fiji taro is usually marketed in bundles of three (Fig. 3.1).

Yields typically range anywhere from 12 to 20 tons per hectare, depending on labor inputs and level of intensification. Barrau (1958:39) reported taro yields averaging 8 tons/ha (dry), and 15 tons/ha (irrigated). Weightman (1989:96) stated that “average annual yields of taro in Vanuatu are probably in the region of fifteen to twenty tons per hectare for dryland plantings, and double this for irrigated taro.” Lasaqa (1963:52) reported, from northeastern Fiji, yields of between 14 and 19 tons/hectare, although one area — “the alluvial plains of the Tavenu and Vatudele Creeks” — yielded 24 tons/hectare. The wide range in yields is indicative of the response of taro to varying levels of intensity in production systems.

The cultivation of taro optimally takes place within a wet “pondfield” environment, provided either by a naturally swampy site or through irrigation technology (Fig. 3.2). Infrastructure often involves diversion dams, aqueducts, and terracing using logs or stone-faced walls. Taro agrosystems in the Pacific have been the focus of a number of studies, most of which are cited in the next chapter.

In most cases, irrigation is not required for the successful cultivation of taro. Although lower thresholds have been reported, Weightman (1989:87) suggested that dryland taro can be grown in areas “where annual rainfall is well distributed and totals 2,500 mm or more.” The significant qualifier here is “well distributed.” As we shall learn, seasonal fluctuations in precipitation prompted the development of irrigation on islands throughout Oceania. But Colocasia is still cultivated as a dryland crop most everywhere that rainfall will allow, including many of the islands in Fiji.
FIGURE 3.1. *Colocasia* for sale at the Suva market. Larger taro is typically sold in bundles of three roots, as seen here in foreground. Note cassava on table, coconuts to the right, and yams in baskets against the back wall.
FIGURE 3.2. Taro in pondfield. *Colocasia* grows best when irrigated by slowly moving water.
Theories of intensification

This section outlines theoretical issues surrounding the process of agricultural intensification. Oceanic agricultural landforms seem to offer particularly appropriate models within which to explore causal linkages between cultural-ecological systems and regional evolution of social and political structures. As Brookfield and Hart (1971:119) declared, "intensity in Melanesian farming is clearly a key to a rather large number of doors."

Population pressure on resources has been a pivotal focus of hypotheses attempting to explain the process of agricultural intensification. The relationship between population and environment as expressed through agrosystemic change is central to a body of theory articulated most recently by Ester Boserup, Clifford Geertz, and Harold Brookfield. Boserup (1965) postulated that agricultural intensification is triggered by population increase exerting pressure on resources. Geertz (1966) illustrated how only certain agrosystems are capable of absorbing higher inputs of labor and technological skill given the constraint of a land base that remains constant. Both models are based on least-effort assumptions in the production of minimum subsistence requirements. Concerning those assumptions, Zipf (1949) presented a wide-ranging treatment of the "principle of least effort", and in one chapter, investigated "the effect of geographical givens upon the economical procurement of raw materials (1949:347)." The emphasis, somewhat in the abstract and using idealized terrain, is on economizing production efforts to the degree capable of providing sustenance, and no more. Zipf (1949:543) concluded that "each individual will adopt a course of action that will involve the expenditure of the probably least average of his work (by definition, least effort)." Knapp (1991) used Zipfian principles in his analysis of traditional agricultural activities in highland Ecuador.
Brookfield (1972a), however, has revealed evidence of the different purposes of production, with social or ritual needs along with trade requirements assuming a substantial share of yields. He concluded that "the relation of population density to agricultural intensity in the Pacific is by no means clear" (1972a:36). Similarly, Bayliss-Smith (1980) attempted to delineate carrying capacity based on perceptions of social welfare, by looking at taro cultivation systems within population-resource models. Brookfield later expanded the notion of a social theory of agrarian change, differentiating innovation from intensification, and pointed to areas in the Pacific where "much less elaborate systems based on wild fallow coexisted alongside pockets of agro-technically complex land management" (1984a:23).

These concerns lead inevitably to questions of social organization coincident with strategies of agricultural intensification such as irrigation and terracing. Irrigation, especially, has been widely presumed to have correspondence with the development of higher levels of social structure. This is based on the creation of surplus, increases in labor requirements, and the need to control water allocations. But irrigation does not necessarily require social stratification and hierarchical modes of production. In contrast to Wittfogel (1957) for example, Hunt and Hunt (1976) suggested that local community control was sufficient for the development and maintenance of irrigation systems. Based on his fieldwork on the island of Kaua'i, Earle (1980) found that Pacific island irrigation systems were quite manageable at the household level. Even the massive terracing and irrigation systems of the northern Philippines were evidently constructed in the absence of hierarchical society: Conklin (1980:38) determined that "there is no evidence that this Ifugao pattern ever required, or resulted in, a complex bureaucratic organization, a widely based form of political
integration, or recognition of a centralized authority." But Yoon (1981:275) has pointed out that "Wittfogel made a clear distinction between hydraulic agriculture which involves large-scale irrigation works requiring a centralized authority (organization) to coordinate, discipline, and lead mass labour, and hydro agriculture which involves small-scale irrigations by a family or small group of neighbors that do not require any far-reaching organizational steps of labour." If we adopt this terminology, it would seem that the irrigated terraces of Fiji should be classified as examples of "hydro agriculture". As Brookfield (1972b:22) noted, "Melanesians were dominantly agriculturalists, practicing root crop cultivation by methods that varied in intensity from the simplest forms of shifting cultivation to highly elaborate and intensive technologies, including swamp reclamation and terrace irrigation. But the incidence of the latter technologies did not correlate with any more complex organization of society."

Lack of hierarchical social structure notwithstanding, there is unquestionably a correspondence between intensive agriculture and population density. By examining the vestigial evidence for intensive agriculture that survives in the contemporary landscape, we may be able to more fully understand prior population levels. During his study of the agricultural landforms known as *metepantli* — what he termed "semi-terracing" — in Middle America, West (1968) found that the present day distribution of the *metepantli* coincides with areas of densest population in pre-Columbian Mexico. Examples from the Pacific likewise link higher population densities with intensive agriculture. At Waialua, on the island of O'ahu, where four large streams enter the bay, "dense settlements of people and large complexes of irrigated taro fields were situated on the floodplains" (Kirch and Sahlins 1992, vol.1:20). In Kiribati, where giant swamp taro
provides the staple food and is intensively cultivated in excavated pits. Watters and Banibati (n.d.:62) asserted that “the vital importance of babai (Cyrtosperma chamissonis) in the pre-European economy and the large population once supported on Abemama is evident from the large number of babai pits.” In Fiji, Ward (1965:18) stated that the remnants of extensive terracing in the upper Sigatoka Valley “provides evidence of a considerable population in that locality in earlier times.” Once a high level of population has been ascertained, of course, the problem of maintaining a balance with resources, and concepts embodied in currently fashionable buzzwords such as “sustainability”, emerge as theoretical concerns.

Oceanic islands, especially, are seen to be prone to the dangers of too many people depending on a limited subsistence base. But island resources, while practically by definition limited and finite, should not be misconstrued as being meager. And in that apparent paradox lies the key to understanding the effects of a rapid population increase. Many islands — especially the high, volcanic type — provide rich, fertile soil and abundant precipitation for agriculture, along with bountiful marine ecosystems just offshore in the lagoon and reef areas, and beyond, in the deeper surrounding waters. Indeed, Golson (1972:17) has characterized the marine shore life of the West Pacific faunal province as “the richest in the world.” Such a magnanimous resource combination allows cultural-ecological adaptation to expand to the limits of its potential. Discussing such a predicament in Hawaii, Stannard (1989:40) wrote that this “environmental situation — what some British archaeologists call the ‘double larder’ phenomenon because of the extensive nutritional support of both environments — can permit enormous population densities in island settings.”
If increases in population were solely responsible for agricultural intensification, then it would naturally follow that disintensification or abandonment of agricultural landforms that are designed to increase productivity would be caused by depopulation. But given the possibility of other reasons for intensification and innovation, then possible reasons for abandonment also become manifold. Social needs went beyond mere subsistence requirements, and were partly responsible for the intensification of agriculture in general, and the development of irrigated terraces in particular. Regarding Pacific island cultures in general, Farrell (1972:38) remarked that “the practice of producing a surplus in excess of immediate food requirements was well developed in response to social and ritual demands.” And Allen (1991:121), based on her research on irrigated terraces on O’ahu, pointed out that Hawaiian agriculture “functioned within a complex cultural system that eventually required the production of large quantities of foodstuffs for purposes well beyond simple subsistence.”

Pacific island societies were known for the lavish feasts that were presented as part of an economy based on competitive display and reciprocity. Assessing the possible reasons for terrace development on Palau, Lucking (1984:168) stated that “in Pacific stratified political systems, there is often a stress on feasting, food presentation, and exchange.” But formal presentations of vast quantities of food were the rule even in more egalitarian Melanesian cultures, where “nonhierarchical societies dominate, with feast-giving as the route to social success” (Doran 1981:52). The requirements of fulfilling these ritual and ceremonial obligations provided no small incentive for boosting agricultural production.

In Fiji, Wilkes (1845:233) took note of the preparations for a feast at Macuata, on Vanua Levu: “Hogs, yams, taro, and turtles, were continually
brought into town, and it was said that the king of Muthuata had collected a hundred hogs and ten thousand yams." During 1855, Calvert (1858:197) was a witness to tributary presentations recognizing the end of the Bau-Rewa War:

On the Monday very large quantities of cooked food were brought from the towns subject to Rewa. From one district the row of cooked taro was thirty-three yards long, and two feet square. It was held in by a lining of sail mats, which were supported by posts, entirely covered with small sinnet.

At Namosi, in the interior of Viti Levu, Seeman (1862:168) was treated to a feast that was probably typical: "We counted as many as 2,000 taros, after which the baskets came in so fast that we lost count."

Political-ecological factors may also contribute to the creation of landscape modifications designed to boost crop productivity (Harris 1973:404). Regarding Fiji, Thomas (1986:26) has argued that intensification of agriculture (as well as specialized fishing technologies) "did not arise from ecological needs, but rather from the requirements of a competitive political system." The presentation of huge amounts of food by subservient tribes in ceremonial tribute to more powerful polities was commonplace and expected. Yams and taro, along with turtles, were the customary components of these mandatory contributions. Such tribute may be seen as a larger scale extension of the more quotidian gifts of food within the exchange network operating at the village level. The provision of perquisites by dependent vanua (local chiefdoms) granted membership in a larger social structure, and paid for the protection offered by this association with one of the emerging centers of political power. In that respect, such homage could also be seen as simple extortion. In any event, these tributary offerings placed unavoidable demands on local agrosystems. Failure to meet them resulted in death and destruction for the hapless village. There are numerous accounts of punitive expeditions mounted by matanitu (confederated high chiefdoms)
that had not received their anticipated allotment of tribute. Thus, warfare enters the cultural-ecological equation.

There exists a three way relationship in the minds of some researchers linking population, warfare, and agricultural intensification. Golson (1972:27) suggested that "instances of prehistoric fortifications, of settlement in less desirable areas, and of agriculture in marginal conditions ... suggest the build-up of population." His theoretical stance postulated population pressure on resources as the ultimate cause for agricultural intensification, but operating by way of the demographic stresses that induced warfare.

Regarding fortifications in Fiji, Frost (1979:71) noted "the densest distributions [of forts] fall where two important food resources, *dalo* (taro) and *via kana* (a tarolike plant) are intensively cultivated today." Thus, the location of fortified sites offers an interesting geographic parallel to former areas of intensive taro cultivation. Frost (1979:70) suggested a two-fold classification of these features: ring-ditch sites on flat terrain, and ridge forts on "ridges, hills, headlands, or any kind of natural promontory." Other research on Fijian fortifications was conducted by Palmer (1969), Clunie (1977), and Parry (1977). These forts were often surrounded by taro gardens -- drained fields and raised beds around ring-ditch forts, and irrigated terraces adjacent to ridge forts. The implication is that agricultural intensification may have been triggered by warfare rather than population pressure. The necessity for maintaining subsistence production in close proximity to secure habitation sites could be responsible for terracing, and thus an end to hostilities may explain terrace abandonment.

In a seminal publication fronting on these issues, Carneiro (1970) set forth an ecologically based theory of political evolution. This theory holds that "territorial circumscription" of limited arable land created hostile
competition that ultimately resulted in the formation of the state. Using case studies from the valleys of coastal Peru, Carneiro claimed that population increase in areas of “circumscribed agricultural land” prompted cultural-ecological changes: “tiling of land already under cultivation was intensified, and, new previously unusable land was brought under cultivation by means of terracing and irrigation” (1970:735). Continued population pressure led to warfare over land, and, ultimately, to political integration. Thus, in Fiji, the terraced landscapes within circumscribed valleys may represent politically an intermediate stage on the evolutionary journey toward statehood. We know that such an endpoint had almost, though not quite fully, materialized in the islands by the historic period. In a more recent paper, Carneiro (1990) specifically addresses the Fijian situation with regards to “the centrality of war in political evolution” (1990:190). He noted that in Fiji the prowess of the warrior was self-validating, and resulted in the rise of chiefs rather than chiefdoms: “success in war at the chiefdom level often did more to increase the power and status of the paramount chief than it did to enlarge his domain” (1990:207). This would seem to indicate that competition over land and agricultural resources may not have played a major role after all.

Viewing this tripartite relationship from another perspective, Thomas (1986:63) has suggested that warfare arose not as a direct result of population pressure on resources, but as a consequence of the political evolutionary process itself:

The endemic warfare arose not from the Fijian mind, but from the particular character of the system of social reproduction. It is notable that there appears to be a consistent basal date of around 1200 A.D. for Fijian fortifications. It may be that this was about the time the matanitu initially developed.
Discussions within Chapters 5 and 6 will further consider the possible connections between defensive modification of settlements and the landforms of intensive agriculture in Fiji.

Finally, amid all of these grand theories seeking to find ultimate causes for agricultural intensification, we should consider what is really, after all, a basic human need: to improve one’s way of life. People apply irrigation because it increases the yields of their crops. Period. People build yam mounds because it results in bigger yams. Simple pride may be as much an incentive as the involutions of political ecology. There does not necessarily have to be pressure from increasing populations, warfare, tribute requirements, or other factors influencing a farmer to raise the best possible produce. Cultures modify their environments because it brings about better living conditions. Food supply is more reliable, there is more leisure time, and the uncertainties of the forces of nature are held at bay. We would do well to recall the conclusion reached by Kirch and Yen (1982:368) following their exhaustive research into the historical cultural ecology of the Polynesian outlier Tikopia: “island cultures ... reach out to embrace and create their ecosystems, rather than the reverse proposition.”

Cultural-ecological divergence

The cultures that developed on various Pacific islands often manifested a certain favoritism in their choice of which cultigen within the basic Oceanic crop complex was to be targeted for intensive cultivation. Such specialization may have come about due to a combination of cultural and ecological factors. Kirch (1989a:225) stated that the “taro-yam complex ... takes myriad agronomic expressions in response to varied environmental conditions.” But the social environment was an equally cogent ingredient. Clark (1986:15) related that the various traditional cultivation practices in
Hawaii “represent the flexibility of the intellectual component of the agricultural package, acting on an agrarian complex, in response to local environmental conditions, to take new pathways and thus produce new adaptive patterns.” Furthermore, cultural-ecological adaptation usually takes place within an environment already modified by previous human agency, lending anthropogenic feedback to the process (Davidson 1972).

Some of the larger islands exhibited a great variety and wide range of intensive agricultural landforms. No particular crop was singled out, nor did specialization occur. Both yams and taro received lavish attention on New Caledonia, for example: “deux plantes ... sont les bases presque essentielles de l'alimentation végétale du Néo-Caledonien, et pour la culture desquelles il exécute des travaux d'art vraiment remarquables ... l'igname et du taro” (Giaumont 1897:41). Bensa and Antheamu (1982) more recently examined New Caledonian landscapes that featured both yam mounds and the irrigated terraces known as tarodières.

The more common agrosystemic development, however, manifested a measure of cultural-ecological divergence. On one level, it operated as an extension of “the wet and the dry” situation discussed above. But even in these cases, environmental conditions did not always act as determinants. In the Solomons, for example, around one particular section of the island of Kolombangara, informants told Miller (1979:133) “that wet taro was always secondary to dry taro in this area.”

In some places, such as Vanuatu, individual islands were culturally differentiated by areas of “yam people” and “taro people” (Bonnemaison 1991). On Tikopia, such divergence was associated with totemic classification: “Taro is ritually linked with the clan of the Ariki Taumako and is dedicated to
its principal deity, just as the yam is to the Ariki Kafika, coconut to the Ariki Tafua, and breadfruit to the Ariki Fangarere" (Kirch and Yen 1982:35).

Cultural-ecological divergence could also be evident across entire island groups, defining one place from another. Again in Vanuatu, on the island of Tanna, for example, it was yam rather than taro which was the important staple and the tributary and ritual surplus item (Spriggs 1986:17). Indeed, Weightman (1989:29) has asserted that “the islands of Vanuatu are either predominantly yam growing or taro growing.” Clark (1986:6) discussed the traditional agricultural geography of Hawaii:

Niihau, for example, was well known for its production of yams (and to a lesser extent sweet potatoes) while yams constituted only a minor part of the produce of other islands. Kauai was noted for its taro production and, relative to the other islands, coconuts. On the island of Hawaii, windward districts were the best sources for taro while sweet potatoes were abundant in the leeward districts.

This differentiation could also generally develop within entire archipelagos to such an extent that those islands became identified with certain crops. In Polynesia, food preferences combined with favorable environmental conditions to produce signature cultigens for several island groups. Samoa, Tahiti, and the Marquesas were breadfruit lands, while the Hawaiian Islands emphasized taro. The Cook Islands seemed to be in an intermediate position — breadfruit was important, but taro also received special attention, resulting in intensive agricultural landforms. Tahiti was so well known for its breadfruit that a British ship under the command of William Bligh was dispatched there in 1789 to gather saplings for transplanting to the Caribbean as a potential source of cheap food for plantation slaves. The chronicle of the ensuing mutiny has become the stuff of legend. Roosman (1970:225) explored the mythic elements of this cultural-ecological divergence in eastern Polynesia, and discovered that “one finds a more developed mythology on the breadfruit in the Marquesas and Tahiti.”
Pacific islands also exhibited differentiation for crops other than food. Tapa or *masi* was made from the bark of the paper mulberry (*Broussonetia papyrifera*), and was the traditional article of clothing manufacture throughout a wide area in the Pacific. Seeman (1862:350) speculated on one of the reasons tapa making did not occur everywhere, but was relegated to certain locations: “The manufacture of native cloth is entirely left to women of places not inhabited by great chiefs, probably because the noise caused by beating out of the cloth is disliked by courtly ears.” Likewise, customary narcotic use displayed an interesting divergence in Oceania, with some islands chewing betel nut while others drank kava or *yaqona*, made from the roots of a bush in the pepper family (*Piper methysticum*) (Brunton 1989). *Yaqona* ceremonies are a characteristic feature of traditional Fijian culture.

But let us return our attention to the intensive agricultural landforms specifically designed for *Colocasia*. The next chapter reviews the distribution of irrigated taro terracing across Oceania.
CHAPTER 4
THE GEOGRAPHY OF TERRACING IN OCEANIA

The distribution of agricultural terracing in the insular Pacific region is presented as Figure 4.1. The islands of Indonesia and other areas within southeast Asia are excluded from our discussion here, although their importance as possible source areas for this cultural-ecological technology cannot be underestimated. Nor is the Philippines represented, yet they also deserve special attention due to the outstanding terraced landscapes documented by Conklin (1980) and others, and for the possibility, discussed in the previous chapter, that irrigated taro cultivation may have been initially responsible for the creation of those landscapes. In all cases, Oceanic terraces were constructed for the irrigation of taro (Barrau 1958:21; Brookfield and Hart 1971:82).

In studying the map, it becomes apparent that there are curious discontinuities in the distribution of terracing in Oceania. If terracing was a culture trait derived from Southeast Asian origins, and brought into the Pacific islands, then why is it not evident in the eastern Solomons or on the island groups northeast of New Guinea, where environmental conditions are similar to areas to the east and west, and which would seem to favor its development? This might be explained by the relatively late arrival of the Lapita culture, which staged its rapid settlement of remote Oceania only in the last few millennia. As we will explore further within Chapter 5, Lapita is considered to have been the founding population of most of the islands from Bougainville eastward (Spriggs 1984a). Evidence from radiocarbon samples dated to several thousand years before the arrival of Lapita attests to the prior occupancy of much of the area that is largely devoid of terracing. This would seem to indicate that terracing may have been a Lapita culture trait.
FIGURE 4.1. Distribution of agricultural terracing in the Pacific. Data from sources discussed in text. Map by Petelo Ioane, Dept. of Geography, University of the South Pacific, Suva.
Another area where terracing is conspicuously absent is in the neighboring archipelagos of Tonga and Samoa. This might seem curious in light of the Tonga-Samoa-Fiji triangle being the Polynesian hearth (see next chapter). We can see from Figure 4.1 that terracing is evident throughout the rest of the Polynesian realm. This can be explained through the workings of both culture and nature. The lack of terracing in Tonga is easy to understand. This archipelago comprises a number of small, relatively flat islands, including coral atolls, without extensive areas of topographic relief. Thus, there are few hillsides, and furthermore there are no rivers providing sources of irrigation water. The major cultigen of Tonga is the yam, as noted in the previous chapter. Samoa is more of a riddle. Its mountainous environment is similar to other high volcanic islands within Polynesia. Yet, Davidson (1991) stated that her archaeological investigations yielded no evidence of terracing. She earlier had written that “the lack of agricultural intensification in Samoa and Tonga” perhaps derived from geographical factors of size: “neither Samoa nor Tonga is large enough to have a distinct inland population zone” (Davidson 1981:105). As noted in the previous chapter, the predominant cultigen of Samoa is the breadfruit. Perhaps this points to crop preferences being partially responsible for agricultural intensification. The predilection for taro by specific groups of people might stimulate terracing, thus adding considerable weight to the argument that terracing operates on more of a cultural than an environmental level.

Research review

There have been a number of scholarly studies specifically focusing on agricultural terracing in the Pacific. Research has been conducted on islands within the three broad culture regions of Micronesia, Melanesia, and Polynesia. In addition, many books and articles by geographers,
anthropologists, and others include some discussion of these landscape modifications. Such studies provide a comparative base from which to explore Fijian systems.

In Micronesia, the massive terraces of Palau were the subject of a dissertation by Lucking (1984). She wrote that “the Palauan terraces have neither the elaborate stone facings and borders found on pond field terraces, nor do they have complex irrigation and drainage systems. What they do have is size” (1984:28). Traditional taro cultivation as practiced on Palau, at least at the time of European contact, comprised wetland *Colocasia* and *Cyrtosperma* gardens, though not on terraces. Based on structural and design considerations, however, Lucking concluded that the terraces were built for both agricultural and defensive purposes, and determined that they “had already been long abandoned at contact” (1984:169). The geographic proximity of Palau to the Philippines should not be ignored. Elsewhere in Micronesia, though terracing is not featured, Falanruw (1990) reported on the intensive methods used on Yap for the cultivation of *Colocasia*, *Cyrtosperma*, and *Dioscorea*; while Hunter-Anderson (1991) has published an excellent review of intensive agricultural practices on the high islands within the region.

On New Guinea, Williams (1928:136) found “regular and level” terraces on the hillsides at Bartle Bay, along the far eastern north coast. Curiously, at virtually the same location, Kahn (1984) described an elaborate taro irrigation system comprising dams and aqueducts, though not utilizing terraces, at Wamira: “the canal winds its way along the base of the hill before reaching the level plain and the gardens” (1984:211). Conventional wisdom has held that terracing was largely absent from Papua New Guinea. Yen (1971:8), for example, wrote that terracing is “probably the most significant
agricultural discriminate between New Guinea and Oceania." But recent
evidence indicates that terracing may be more common in Papua New Guinea
than previously believed. Sullivan, et al. (1987) investigated prehistoric
vestiges of terraced gardens in the Arona Valley in the eastern highlands,
and suggested that the cultivation of taro was responsible for these
agricultural landforms, which may or may not have been irrigated. The
local people now plant sweet potato, and do not recognize the terraces as
being man-made. Bourke, et al. (1991) recently developed a mapping
strategy addressing intensive agricultural practices in Papua New Guinea,
and have delineated an area in Chimbu where "soil erosion barriers [are]
commonly constructed." This could indicate incipient terracing, or
alternatively, may prompt further investigations into finding ancient
terrace remnants.

In the Solomons, irrigated terracing has been discovered on only
three islands: Bougainville, Kolombangara, and Guadalcanal. Riesenfeld
(1950) mentioned terracing on Bougainville without giving any details. On
Kolombangara, Yen (1976:69) described stone faced terraces that he
concluded were the remains of pondfields. These features were further
investigated by Miller (1979:148), who stated that "the best known feature of
traditional Kolombagara subsistence is the taro terraces." These intensive
agricultural landforms were especially common "at the headwaters of the
streams that run into Viru Harbor" and were probably "abandoned in 1929"
(Miller 1979:133). Yen (1976:69) noted that "the Kolombangara terraces were
last planted to taro sometime before WWII, when some of the lower terraces
are said to have been reactivated by the Japanese." Regarding Guadalcanal,
Yen (1976:61) referred to a 1568 account of that island that "describes
irrigated fields on hill-slopes, leaving little doubt of the practice of water-
controlled terracing at that time." Roe (1989) recently documented the irrigated terrace system in Kolevu valley, on western Guadalcanal. Among the Polynesian outlier islands in the Solomons, Kirch and Yen (1982:46) noted "dryland terracing on Anuta for the cultivation of taro and manioc on its undulating mountain plateau."

Moving eastward, we arrive at what seems to be a pivotal region in the elaboration of agricultural landforms in the Pacific. Golson (1972:19) agreed with Yen's claim that agricultural development in Oceania has resulted in "a formative role for the islands of the East Melanesian/West Polynesian border zone, reflected in discontinuities with New Guinea and western Melanesia but providing the complex of agricultural practices and associated traits out of which the East Polynesian subsystems were derived." One of the distinguishing characteristics of this cultural-ecological complex is "the practice of agricultural terracing mainly for the irrigated cultivation of taro" (Golson 1972:19).

The importance of New Caledonia as the setting for what appears to be the most sophisticated and elaborate expression of agricultural terracing in Oceania cannot be overstressed. Perry (1916:17) reported that "an immense amount of terraced irrigation is found in New Caledonia." Barrau (1956a, 1958) documented a variety of intensive agricultural landforms there; regarding irrigated terracing, he called New Caledonia "the home of this method" (1958:21). Curry (1962) has looked specifically at New Caledonian taro irrigation systems. Brookfield and Hart (1971:115) were reminded of another locale when examining the terraced landscapes of New Caledonia: "the most spectacular and widespread form of irrigation is in the large flights of hillside terraces, constructed with a skill which calls to mind the terracing systems of northern Luzon in the Philippines." Yen (1971:8) stated...
that “in New Caledonia, the greatest variety of terracing known in the Pacific is practiced.” He also was compelled to voice a comparison with Luzon when describing the New Caledonia terraces: “Irrigation gardens are built, not only in or beside stream systems in the manner of the eastern Polynesians, but also in the upland ridge areas which require the channel conduction of water from distant watersheds. In their construction the latter resemble those of the Ifugao mountain peoples of the Philippines more than any known Pacific system.” Yen’s differentiation between streamside terracing and upland ridge systems is a useful classificatory device, one that is also offered by Doolittle (1990b), and it is developed further in a later chapter.

The decline and eventual demise of most of the intensive forms of agriculture in New Caledonia have not erased the mark of past endeavors. As Brookfield and Hart (1971:115) remarked, “The New Caledonian agricultural system has been greatly modified as a result of the major dislocations of the colonial period, and only limited parts of the old system remain in use: however, the scale of earthworking involved has left a durable mark on the landscape, especially in the central and north-central parts of the island.”

In Vanuatu (formerly the New Hebrides), Yen (1971:9) reported “temporary terracing” of logs and wooden fences as water control devices under rainforest cultivation, but also abandoned sites similar to New Caledonia systems, which he felt indicated “an earlier widespread application of taro irrigation.” Barrau (1956b) also reported on the terraced cultivation of taro in Vanuatu; and Bonnemaison (1974) presented detailed evidence from two of the northern islands in the group. Weightman (1989:88) wrote that taro “is grown under intensive, irrigated systems in limited areas of Aneityum, Pentecost, Maewo, Vanua Lava and Santo.” His excellent survey of
agriculture in Vanuatu includes a number of ethnohistorical references to taro terraces (Weightman 1989). Spriggs (1981a) conducted exhaustive and comprehensive research into terraced irrigation systems on the island of Aneityum.

Like a fulcrum poised between the two culture regions, Fiji exhibits attributes of both Melanesian and Polynesian styles of irrigated taro terracing. Chapter 6 examines terracing in the Fijian archipelago in greater detail. Suffice it to say at this point that terracing was distributed across Fiji on a number of islands.

Several studies have reported on terracing from within the Polynesian cultural realm. Northeast of Fiji and just to the west of Samoa lie several Polynesian islands known as Wallis and Futuna. On Futuna there is evidence of valley floor terrace systems on most of the rivers, but no hillside terracing (Yen 1971:9). Burrows (1938:220) had earlier reported that “taro is the main vegetable staple of most Futunan villages ... nearly all of it is raised by irrigation on terraces at the mouths of the valleys.” Barrau (1963) and Kirch (1978b) also looked at agriculture on the islands of Wallis and Futuna. Di Piazza (1990) recently reported on her detailed ethnoarchaeological investigations of Futunan taro terraces.

Wallis (also known as Uvea) is an atoll and exhibits much less relief than neighboring Futuna. There are no rivers on Uvea, or as Burrows (1938:215) put it, “the interior has no running water.” Furthermore, Uvea assumed Tongan cultural overtones after warriors aboard a fleet of canoes from that formidable kingdom conquered the island, “probably in the fifteenth century” (Burrows 1938:216). This is an instance of topography and culture acting as parallel determinants in limiting the development of agricultural terracing in two otherwise unrelated archipelagos.
We have already noted the lack of terracing in Samoa and Tonga. Moving further eastward into the heart of Polynesia, the next island group is the Cook Islands, a far flung archipelago encompassing tiny atolls in the north and high volcanic islands and makateas (islands consisting of a raised coral plateau) in the south. Allen (1971) gave an account of irrigated taro terracing on Mangaia, one of the southern islands. Neighboring Rarotonga is the largest island in the group. Irrigated taro terraces have been constructed in a number of radial valleys emanating from this island’s mountainous core. Terracing is still very much in use in several of these valleys, especially Takuvaine (Fig. 4.2). Bellwood (1978b) documented an abandoned terraced agrosystem in Avana Valley. During a visit to Rarotonga in the course of my research in the South Pacific, I located the terraces mapped by Bellwood in his 1978 publication, and was surprised to find them being rejuvenated (Fig. 4.3).

In the islands comprising French Polynesia, terracing is evident, though not widespread, on Tahiti, Mo’orea, and in the Marquesas (Handy 1930, Green 1961, and Suggs 1961, respectively). As previously mentioned, breadfruit was the leading cultigen of eastern Polynesia. The lower position of taro more than likely obviated the need to develop intensive landforms for the cultivation of root crops.

Irrigated taro terracing reached its elaborative zenith within Polynesia on the northern Pacific islands of the Hawaiian archipelago (Clark 1986:5). Stone-lined canals and rock-faced lo‘i (pondfields) attest to the importance of irrigated taro in Hawaiian agrosystems (Riley 1982). Numerous studies, mainly by archaeologists, have examined Hawaiian terrace systems and their possible association with social and political development. Environmental conditions also entered the equation, thus rendering
FIGURE 4.2. Taro terracing at Takuvaine, Rarotonga, Cook Islands.

FIGURE 4.3. Rejuvenated terraces in Avana Valley, Rarotonga.
irrigation a cultural-ecological variable. With few exceptions, only western Hawaii (O'ahu, Kaua'i, Moloka'i) favored irrigation development; in eastern Hawaii (Hawai'i, Maui, Lana'i) dryland taro was grown (Kirch and Sahlins 1992, vol.2:5). This differentiation had political ramifications since it figured in the plans of chiefs from eastern Hawaii to conquer the western islands for their rich agricultural resources (Kirch and Sahlins 1992, vol.2:7).

Earle (1978) conducted research among the terraced landscapes of Halelea District on the island of Kaua'i. Riley (1975) and Kirch (1977) reported on abandoned terraces on Moloka'i. Yen, et al. (1972) supplied evidence of sequential agricultural intensification in the Makaha area of leeward O'ahu. Smith and Schilt (1973) noted disintensification of taro agrosystems due to depopulation in the Kohala district of Hawai'i. In a case study of this same district, Clark (1986:2) noted that “social demands and cultural tastes were critical factors in agricultural production.” While many of these studies postulated agricultural intensification linkages with historic and proto-historic population build-up and socio-political development, Allen (1991:120) found evidence of much older systems in place on O'ahu:

“Although the extensive terrace systems that occupy most major valleys in the Hawaiian islands were once considered a late phenomenon, recent findings indicate that, at least on O'ahu, some were in use by the fifth to seventh centuries A.D., predating the emergence of the state and even the ahupua'a system by many centuries.”

We cannot leave Polynesia without mentioning the terraces that may have been used for agriculture in Aotearoa (New Zealand). When Polynesian voyagers first colonized these enormous southern islands, they found that the yams and taro that were such an intrinsic part of their subsistence base did not grow in the colder climes. The sweet potato did, however, and so the
*kumara* became the staple root crop of the Maori. Irrigation, of course, was unnecessary. But warfare and competition for land eventually led to the development of hilltop fortifications known as *pa*. These modified landscapes were often terraced, and encompassed storage pits for the *kumara* (Fox 1976). It is unclear if this terracing was ever used for cultivation. Fox (1976:63) stated that the *pa* were built for "prestige, rather than just utility." Marshall (1987) examined terracing at Pouerua Pa on the North Island, and found in its design and form what she considered to be multiple functions — defense, gardens, and habitation platforms. Interestingly, some of the terraces exhibited stone facing, most likely a later development that occurred during the proto-historic period (Marshall 1987:178).

**Diffusion or independent invention?**

One of the key problems concerning agricultural terracing in the Pacific is the question of its origins. Was it an independent, spontaneous development reflecting similar environmental conditions? Or was it more of an inherited technological solution that was transported as cultural baggage on voyaging canoes? The problem becomes even more intriguing after reviewing the discontinuous distribution of terracing across the Pacific. Brookfield and Hart (1971:82) noted that environmental factors "only partly account for the distribution of taro terracing in Melanesia."

Williams (1928:136), reporting on terraces along the northern coast of New Guinea, seemed to imply that environmental conditions dictate the obvious solution: "The paucity of good land and the steepness of the hills about Bartle Bay have necessitated another improvement, viz. terracing ... there are few localities in the northern division where the same conditions prevail." But at another place, between the mouths of the Mambare and Opi Rivers, he told of a situation where farmers have simply improved upon what
naturally occurs as steep lands are cleared of tree cover: “For those trees which fall across the slope or diagonally become paths or standing places for the gardeners, and as detritus falls and builds up against them, they become virtually terraces ... it is easy enough to imagine that the idea of terracing might originate independently in the way I have suggested” (1928:136).

In emphasizing the cultural factors behind the indigenous development of agricultural resources, Golson (1972:19) cited the exhaustive research by Yen (1971), who “suggested a formative role for the islands of the East Melanesian/West Polynesian border zone, reflected in discontinuities with New Guinea and western Melanesia but providing the complex of agricultural practices and associated traits out of which the East Polynesian subsystems were derived.” Golson further noted that one of the distinguishing characteristics of this cultural-ecological complex is “the practice of agricultural terracing mainly for the irrigated cultivation of taro,” and implied diffusion when he stated that terracing is “not necessarily viewed as originating in the area: the analogues of terraced agriculture are well known in mainland and island Southeast Asia” (1972:19).

Yen (1971:10) believed that agricultural techniques are a culture trait, “one example of cultural association whose motivation must fall outside of any natural environment explanation.” Brookfield and Hart (1971:81), while noting the puzzling distribution pattern discussed earlier in this chapter, were equally clear in their assessment:

The skilled terracing found in some of these islands recalls the wet-field methods found throughout the Austronesian language area as far west as Madagascar, and it seems more likely that it represents a cultural diffusion than an independent innovation. Yet there is a wide gap between island Melanesia and the putative area of origin of irrigated terracing in Southeast Asia, bridged only by scattered and ill-developed occurrences here and there in New Guinea.
Yen (1976:72) indicated that the “past concentration on taro culture by the irrigation of pondfields” in the western Solomons serves to “bridge the gap in incidence of irrigation between the rice systems of Southeast Asia and the northern Philippines and southern Indonesia — and the taro systems of the New Hebrides, New Caledonia, and the Polynesian high islands.” The suggestion of diffusion, of course, lacks utter proof, and Yen also acknowledges the alternative: “The independent development of water control methods, drainage in the New Guinea area and irrigation in the Melanesian high islands, remains as a possibility” (1976:72).

The most radical proponent of Pacific island cultural diffusion was Alphonse Riesenfeld, whose book *The Megalithic Culture of Melanesia* posits a direct connection between people on various islands who have created stone structures. These constructions, which include rock-faced taro terraces, were attributed by Riesenfeld to groups of “stone-using immigrants” — people who he has proposed formed a recognizable “megalithic culture.” He is so strident in his pronouncements, however, that we may tend to dismiss important ideas. Likewise, the immense scholarship undertaken in the study should not be treated offhandedly, even when it is presented in a confusing manner. In one section of the book, for example, he gets tangled in a web of causal influences regarding irrigated taro terraces by invoking and overlapping otherwise discordant references to cultures exhibiting “dual organization” social structure, lighter color skin, and the use of kava (1950:558). Careful reading should prevent a total dismissal of the book. There are many gems of wisdom, such as this concluding statement to a brief discussion on drained fields: “Since we have actually found good reasons for attributing the practice of draining ditches to the stone-using immigrants, we are inclined to conclude that drainage and
irrigation are but two different forms of one genetically identical custom, the one supplying the gardens with water which they lack, the other withdrawing the superfluous water” (1950:561). At times contradictory, yet always provocative, Riesenfeld's arguments ultimately lack full explanatory prowess because their unequivocal stance allows for no alternative but cultural diffusion.

Diffusion and migration seem to have negative connotations in Pacific anthropology. Hunt (1986:22), for example, claimed that ‘migrations’ are “a common explanatory theme in Fijian prehistory” but that most scholars who resort to such explanations “fail to specify precisely what a migration might amount to, and how and why such an event would precipitate widespread cultural change.” Migrations are just assumed to bring about great change. Some of these changes are supported by what some researchers have discerned to be different pottery styles evident over time, but this is not supported by detailed stylistic analysis of the ceramics. Hunt does not reject incorporating cultural-historical accounts of diffusion and population movements into a general explanation of change, but “the ways in which sense is made of the empirical record, or how we set out to explain the observed patterns, is the crucial problem” (1986:22). He concludes that “change and diversification probably had more to do with local processes and geographic configurations than with spectacular, romantic, or cataclysmic events” (1986:32). Hunt’s points are well taken. And yet, I don’t see anything all that romantic about groups of people colonizing and settling in specific places and taking to their new homes the experiences and learned behavior gathered from where they lived before. As Terrell (1988:644) stated, “migrations and cultural diffusion are out of fashion among prehistorians as explanations for prehistoric culture change, but both have
unquestionably been key factors in this region's prehistory." Fortunately, most geographers do not recoil from these theoretical possibilities. Thus, I am free to avoid the negative connotations of migration theory in the Pacific islands by invoking the traditions of diffusion that have long been established in cultural geography.

Spatial diffusion has been defined as "the spread of phenomena, over space and time, from limited origins" (Morrill, et al. 1988:7). The seemingly predominant view of this process leans heavily on quantitative models which seek to explain and predict the spread of innovations, a methodology initially developed by Torsten Hagerstrand, and later elaborated by Peter Gould and others (see Blaut 1977). This type of analysis, however, often fails to take into account cultural differences, or at best treats them as negative "barriers to diffusion" rather than as positive agents for the time-space transfer of culture traits. Butzer (1988:102) finds the theoretical diffusion models of Hagerstranad and Gould "have only limited explanatory power" in tracing cultural evolution and adaptation: "The processes of diffusion become intelligible in an economic and cultural context: the development of demand, the facilitation of supply, and social acceptance."

Blaut (1977:348) likewise pointed out the limited applicability of Hagerstranadian diffusion when attempting to understand cultural processes and the evolution of spatial form, and suggested the use of "conceptual diffusion theory" which "owes as much to the work of Fred B. Kniffen as formal theory does to Hagerstrand." He reminds us that "the scope of diffusion theory in the Kniffen tradition is diffusion in its broadest, most adequate sense," and that phenomena studied within such a tradition need not be limited to material culture traits (1977:349). Entrikin (1988:165) recognized that "diffusion studies have been a part of geographical research
throughout the 20th century, but the wide variety of such studies prohibits reference to a single diffusionist tradition within the discipline.” He sees great value in the Sauer-Kniffen approach to diffusion based on culture history, and views it as a parallel line of inquiry rather than a polar opposite to Hagerstrand’s methods.

Thus, while acknowledging a variety of analytical tools and explanatory methods, the present study adopts a concept of diffusion underwritten by cultural-historical sensibility. It is a stance that is applicable to the situation in the Pacific, where Irwin (1992:201) has emphasized the mutual interaction and influence among the many islands: “similarities between societies are seen as the result of interaction, but not according to a model of influence from the more complex situation to the simpler one. The source of change is not seen as external to the wider region, but nor is it uniquely situated in any single polity, which is a position often overlooked by evolutionist and diffusionist alike.”
This chapter outlines the historical developments that contributed to the formation of a characteristic set of traits and customs that collectively identify Fijian culture. It discusses both the particular events and the larger structures that have intersected through time and in specific places. It pays special attention to the relationships between the Fijian people and their environment, and how these relationships have undergone transformation. It encompasses not only cultural ecology, but an adjunct awareness of social and political ecology as well. We arrive at our understanding of Fijian culture history through a combination of evidence provided by diverse strands of research in archaeology, palynology, history, geography, and anthropology. We begin, naturally, with the initial occupancy of the islands by humans.

**Lapita**

The first inhabitants of the Fijian archipelago belonged to the cultural association known as Lapita. Golson (1972:10) defined Lapita as "a community of culture in the southwest Pacific straddling the traditional boundary between Melanesia and Polynesia and antedating its appearance." They were brilliant navigators and expert sailors who colonized nearly all the islands in Melanesia and western Polynesia between 1500 B.C. and 1000 B.C. (Bellwood 1989:33). In assessing this remarkable accomplishment, Irwin (1992:3) characterized Lapita as "a burst of sophisticated maritime and neolithic settlement in the remote Pacific." To better understand the cultural-ecological relations that evolved within Fiji, we need to briefly review what is known about Lapita and its significance for subsequent historical developments.
Austronesian antecedents

The precursors of Lapita culture can be traced to southern China or Taiwan. Following various permutations within the chain of islands that now belong to Indonesia, the Lapita culture only fully developed within island Melanesia (Bellwood 1991). Scholars have identified the northwest coast of New Caledonia as one potential hearth area. Spriggs (1984a) has stated his belief that Lapita people were the initial colonizers of most islands east of Bougainville. Spreading eastward, they reached Fiji as early as 1500 B.C. and occupied Tonga prior to 1200 B.C.

Irwin (1992) recently set forth a navigational theory of Pacific settlement, which accounts for the sequence of archaeological dates across the islands with the proposition that voyages of discovery were based on an optimal survival strategy of sailing into prevailing winds, thus allowing for the greatest chance of a safe return. In this model, Irwin (1992:41) sees intentional two-way journeys as a signature characteristic of the Lapita culture. He believes that when Lapita people became established in island Melanesia, “it was by an exploration method that entailed return voyaging” (1992:214). From the Solomons, people thus were able to colonize Vanuatu, New Caledonia, and the Santa Cruz Islands. Fiji was reached easily from either Vanuatu or New Caledonia. The great success of Lapita expansion might therefore rest on the geographic fact that there always seemed to be more islands upwind.

Lapita have been identified as speakers of the Austronesian language family, which includes people from Indonesia, the Philippines, Madagascar, and Micronesia (Bellwood 1979). Their settlements have been identified archaeologically by a highly decorated and unmistakable type of pottery. Lapita cultural characteristics first made their appearance in the Bismarck
Archipelago just prior to 1500 B.C. While it may be possible to trace the roots of Lapita to Taiwan, based on linguistic associations, it is yet unclear how much of a contribution local, indigenous peoples already living in western Melanesia might have made to the development of the culture that subsequently enveloped most of Oceania (Irwin 1992:32). Lapita peoples were originally considered to be a predominantly fishing and gathering folk who settled exclusively on coastal strands for the proximity of such settings to marine resources. But Lapita cultural-ecological knowledge and technologies may have been more comprehensive than first believed. Excavated bones of pig, dog, and fowl attest to animal husbandry (Kirch 1989:238). There is mounting evidence, moreover, that horticulture was a major component of the Lapita subsistence repertoire.

Direct archaeological evidence for Lapita agriculture has been hard to uncover, and debate continues concerning the primary elements of the subsistence base (Kirch 1989:227). Shutler and Marck (1975) and Bellwood (1991) have linked Lapita inherently with plant domestication. Hunt (1981) offered "provocative new data" that these people practiced horticulture in Fiji at least as early as 2,500 years ago, based on evidence of adventive land snails found in an early rockshelter site. Gibbons (1985:116) concluded that the people of Lapita probably cultivated some plants, but noted that "Best's findings on Lakeba [one of the Lau islands, Fiji] suggest that it took several hundred years" after colonization before agriculture became truly established as a subsistence mainstay. Lapita culture moved quickly into the western Polynesia area, which includes Fiji, based on similar dates for the earliest archaeological sites in that region. Irwin (1992:39) believes "it is unlikely that Lapita expansion was driven by ecological or demographic pressures. Large islands in Vanuatu, New Caledonia, and Fiji had the capacity
to absorb increasing population numbers. If that was the case, but they did not perceptibly slow the rate of advance.

*Lapita formed the basis of ancestral Polynesian society.* Prior to the elucidation afforded by archaeological and linguistic research, fanciful theories regarding the origin of the Polynesians were in vogue during the nineteenth and early twentieth centuries (see Bellwood 1978:16-21). The extremes of such speculation perhaps culminated in Thor Heyerdahl’s hypothesis regarding an Amerindian source. But such theoretical drifts have never established a solid landfall. Maori anthropologist Te Rangi Hiroa (Peter Buck) first proposed in 1944 that the Polynesians developed their culture within Polynesia — that these people became Polynesians *in situ*, and only during the last 2,000 years (Hiroa 1944). Archaeological evidence amassed since the 1950s has supported this argument (Kirch 1986). The proto-Polynesian cultural elaboration first evolved in the three neighboring archipelagos of Fiji, Tonga, and Samoa.

**Polynesian hearth: Fiji, Tonga, Samoa**

From archaeological excavations and ceramic analysis, we know that the same people at roughly the same time came to inhabit the relatively proximate islands comprising Fiji, Tonga, and Samoa. Davidson (1978:386) noted that Lapita pottery is similar in all three archipelagos, and that the “pottery was changing in similar directions throughout the region.” Kaeppler (1978:246) reinforced the notion that this cohesion stems from a common origin, and stated that “Fiji, Tonga, and Samoa form a larger social system, while each is culturally distinct.” Frost (1979:79) affirmed that “Fijian culture was one shared with the ancestral Polynesians and different from that of the Melanesians.” Derrick (1957:5) remarked that “Fiji, Tonga, and Samoa are the points of a triangle within which there was considerable
intermixture of peoples, accompanied by the exchange of property and ideas, and a diffusion of culture.” Davidson (1978:386) concluded that “during the first 1,000 to 1,500 years of settlement it can be assumed that some form of regular contact was maintained throughout the region, by which ideas about pottery manufacture and probably about many other aspects of culture, were relatively rapidly diffused.”

The orthodox view of Polynesian culture history has held the notion that there was a ‘pause’ in Lapita expansion in the Fiji-Tonga-Samoa triangle, and that this allowed for Polynesian culture to have a recognizable place of genesis. But Irwin (1992:73) refutes this: “The West Polynesian pause was a timetrap set by latter-day theorists of culture change for the ancestors of the Polynesians, but has not held them very well.” Terrell (1989:625) has even suggested that Lapita had not attained recognizable status as a cultural entity until colonization had proceeded at least as far east as Fiji: “It is reasonable enough to talk about ‘a Lapita people’ when we talk about Fiji and Polynesia. Not so for island Southeast Asia/Melanesia.” With or without a hearth, Lapita may be seen as representing ancestral Polynesian culture and society across the Pacific.

Archaeological evidence from Fiji

Kirch (1986:3) has reminded us that Fiji was the site of “some of the earliest archaeological excavation in Oceania (by E.W.Gifford in 1947).” Lapita pottery unearthed from Natunuku near the Nadi river along the west coast of Viti Levu provides us with evidence of the earliest known human occupation in Fiji (Fig. 5.1). Radiocarbon testing has yielded a date of 1290 B.C. (Frost 1979:64). Yanuca rockshelter in coastal southwest Viti Levu is around the same age (Hunt 1986:23). The nearby Sigatoka sand dunes area cradles a Lapita site exhibiting multiple periods of settlement. Previous
FIGURE 5.1. Archaeological sites in Fiji. Key: 1, Sigatoka sand dunes; 2, Yanuca; 3, Vuda; 4, Natunuku; 5, Navatu; 6, Rewa delta; 7, Navua delta; 8, Taveuni; 9 Lakeba; 10, Beqa; 11, Wakaya; 12, Totoya. Adapted from Hunt (1986), with further additions for Beqa, Wakaya, and Totoya from Crosby (1988), Rechtman (1992), and Clark (1993), respectively.
excavations have revealed a stratigraphic sequence beginning in 510 B.C., and recent reconnaissance surveys of alluvial flats just inland from the littoral strand indicate additional areas of Lapita settlement (Crosby 1995). Shutler (1971:16) proposed that the height of Fijian Lapita culture centered around 1,000 B.C.

Hunt (1986:21) reviewed the Fijian cultural sequence that had earlier been established by Roger Green (1963). In that model are four main horizons, based on ceramic analysis: 1) Sigatoka phase (Lapita ware; pre-500 B.C. - 100 B.C.); 2) Navatu phase (paddle impressed ware; 100 B.C. to A.D.1100); 3) Vuda phase (incising, applique, but also plainware; 1100 - 1800); and 4) Ra phase (increase in incised ware; 1800 - 1900). Implicit in this sequence is the notion of additional contacts from Melanesian islands to the west. Such a premise, again, is based on shared attributes of ceramics.

Fiji becomes Fiji

Fiji is an amalgam, a mixture of diverse cultural ingredients stemming from the multiple migrations and subsequent interactions of different peoples. Frost (1979:61) wrote that “Fiji stands alone as an apparently unclassifiable product of many influences.” Bellwood (1978a:51) affirmed that “the present Fijians are in fact a very important population, intermediate in most respects between Polynesians and Melanesians.” Indeed, these culture regions are simply a cartographic construct, and the boundary between the two may be viewed as merely an arbitrary divide. Thomas (1986:1) has made the assertion that “the radical separation of Melanesia from Polynesia is analytically unproductive, and cannot be justified on linguistic, archaeological, or ethnographic ground.” In any case, we must ultimately agree with Hunt (1986:31), who contends that
“prehistory in Fiji is likely to be far more interesting and complex than many have allowed for.”

**Melanesian interaction**

Evidence for further influx of Melanesian migrants into Fiji comes from the ceramic record. While pottery manufacture diminished in the newly coalesced Polynesian cultures to the east, Fiji was characterized by the appearance of new ceramic styles (Davidson 1978:386). Even during Lapita colonization, there was probably inter-island contact between Fiji, Vanuatu, and New Caledonia (Irwin 1992:68). Gifford (1951a, 1951b) concluded that several waves of early settlers arrived from islands to the west. Such population additions would account for the darker complexions of Fijians as compared to the Polynesian peoples. But these subsequent introductions failed to counteract the cultural composition of the original inhabitants. Frost (1979:80) maintained that the “Melanesian gene flow did not overwhelm the Polynesian vector of Fijian culture.” Hunt (1986:31) has warned repeatedly against placing too much emphasis on Melanesian diasporas: “Most scholars would now agree that an orthodox culture history of Fiji calling upon three migrations to somehow explain change and human diversity across the Fijian archipelago is not only too simplistic, but dangerously misleading.”

There can be no doubt, however, about continual cultural interaction between Fiji and the neighboring islands to the west, notably New Caledonia and Vanuatu (formerly known as the New Hebrides). Golson (1972:13) remarked that the early cultures of Fiji and New Caledonia, “defined in terms of their pottery, have much in common, though the end-products of the cultural process are substantially different. In addition, both have some relationship with the central New Hebrides.”
Traditional cultures of New Caledonia, in particular, exhibit several traits that seem to be closely related to those found in Fiji. Riesenfeld (1950:549) remarked that in addition to rock grave perimeters and tumuli, "many other types of Fijian stone-work also are similar to that of New Caledonia, such as monoliths, stone walls, and house-mounds." Canoe forms from these two island groups likewise displayed certain affinities (Haddon and Hornell 1975, Doran 1981). Doran (1981:88) depicted the sharing of an end-symmetrical canoe design between Fiji and New Caledonia. He noted the "spotty alternation of end symmetry and its absence" in Melanesia, and declared "how the trait reached Fiji is a puzzle" (Doran 1981:88). The Fijian d r u a , a huge double-hulled canoe, "was the largest and fastest sea-going vessel ever designed and built by natives of Oceania" (Haddon and Hornell 1975:319). Noting that "the nearest relative to the d r u a is the indigenous double canoe of New Caledonia," Haddon and Hornell (1975:335) believed that "the relationship is ... a distant one and must go back to a common ancestor." Music is yet another culture trait that may indicate close linkages between New Caledonia and Fiji. As explained by ethnomusicologist Mervyn McLean (1979:735) in an analysis of data from across the Pacific:

New Caledonia is almost universally considered to be a part of Melanesia. The present study, however, reveals its strongest musical links — especially for music structure — to be with Fiji, and — through Fiji — ultimately with western Polynesia. Thus, for music, New Caledonia and Fiji belong with Polynesia rather than with Melanesia.

A map indicating the combined attributes of musical instruments and music structure portrays a strong association between New Caledonia and Viti Levu (McLean 1979:726). Perhaps the structure of agricultural landforms is a parallel linkage between Kanaks and kai Viti.
The Tongan connection

From all accounts, interaction between Tonga and Fiji probably continued sporadically from the earliest Lapita occupation. Following the period known as the Tongan Dark Ages, there was an apparent renewal in ties between the two archipelagos. Captain James Wilson of the missionary ship *Duff*, en route to Tonga (at that time still going by the name that Cook bestowed), passed through the southern Lau group in September, 1797, and noted that “with these people the Friendly Islanders carry on a trade” (Im Thurn and Wharton 1925:xxvii). Based on ethnographic research in the Lau group, Laura Thompson (1938:190) maintained that contact with Tonga “began before the eighteenth century.” She also indicated that development of trade and economic exchange “was initiated and carried on by the Tongans, mainly on account of the hardwood of southern Lau [for canoes]” (1938:190). Other Fijian articles in demand included sandalwood from Bua, and red feathers from Taveuni, the last which was then traded to Samoa. In return, Tongans offered goods such as “whales’ teeth, barkcloth, and inlaid clubs. They also paid in services, such as the loan of their women and help in warfare” (Thompson 1938:190).

These social and economic relationships became established and seemed to have been institutionalized according to Tongan hierarchical demands. Labeling trade goods between Fiji and Tonga as “manifestations of social relationships,” Kaeppler (1978:251) has further investigated the role of such relationships in the proto-historic trade patterns between Fiji, Tonga, and Samoa. Male spouses for Tongan women were sought from Fiji, and goods, especially wooden implements, came with the Fijian husbands as wedding gifts to their new brides, thereby influencing the emerging trade patterns (Kaeppler 1978:248). Political interaction also took place. Fijian
ingress in the Tongan royal line dates back to the establishment of the Fale Fisi (House of Fiji), an event which "may tentatively be dated about mid-seventeenth century" (Kaeppler 1978:248). Young Tongan males of royal lineage subsequently established a tradition of spending several years in Fiji in a sort of western Polynesian version of the wanderjahre.

**Socio-political structure**

There were a number of regional variations in social structure in Fiji, and the consolidation and relative cohesion of tribal groups differed from place to place. When colonial administrators sought to protect indigenous land rights during the latter part of the nineteenth century, they based their regulations on a standardized rendition of social relations which, while it may not have been representative of the entire archipelago, nevertheless offered a consistent model as a basis for determining territorial claims. As reflected in this model, society was organized in a nested hierarchy of kin-based groups, starting with the extended household (*itokatoka*), a number of which formed the larger kin group known as the *mataqali*, translated as "clan" by most early ethnographers. Several *mataqali* typically banded together in a tribal arrangement known as *yavusa*, and this formed the social unit of the village. It is through the traditions of their *yavusa* that Fijians are able to trace their connections with particular places. But these connections were often reconstituted with each movement of the village, or as a result of divisions among the *mataqali*. As Derrick (1957:9) related, "*yavusa* were subjected to the disruptive influences of war, internal strife, and migration."

Perhaps partly resulting from the fragmentive, centrifugal nature of these tribal relations, a wider polity evolved that was inclusive, and went by the name of *vanua*, a complex word that can also mean "the land" or the
symbiotic relationship of a people to their land. In socio-political parlance, 
vanua can be translated as chiefdom. Colonial authorities would later use the 
vanua as the territorial base for administrative districts known as tikina. 
Further indigenous political integration resulted in the formation of 
confederated matanitu. Derrick (1957:9) explained the process: “Many of the 
original yavusa were broken, scattered, merged wholly or in part with 
others; aggregations of their people formed, under stress of circumstances, 
new groups or confederations, called vanua, each under a paramount chief 
strong enough to seize and hold the position, which thereafter became 
hereditary. As the political structure developed, certain of the vanua were 
united, by conquest or accretion, into kingdoms (matanitu).”

The matanitu level of political organization was not, however, a 
uniform development throughout Fiji. There was a distinct difference in 
political evolution between eastern and western portions of the archipelago. 
While eastern Fiji witnessed the rise of seven “high chiefdoms”, possibly as a 
result of Polynesian influence, “the remainder of Viti Levu was still as it had 
been for a long while, the home of small isolated and mutually hostile tribes, 
untouched as yet by the increasing powers of the seven leading political 
units” (Burns 1963:26). The western regions manifested simpler structure 
even in the lower hierarchical levels of society. Thomas (1986:12) found that 
the model of traditional social organization adopted by the colonial Native 
Lands Commission was not widely applicable: “in some areas, notably western 
Viti Levu, there was no unit which corresponded to the yavusa.” He also 
commented on the broad political structure in the highlands of western Viti 
Levu: “the upland polities were relatively unconsolidated politically, and 
there were no regionally extensive networks of tributary relations which 
ensubomaped subordinate places” (Thomas 1991:222). This tradition of
independence and opposition to the elite regions of eastern Fiji has continued, and has created what amounts to an internal periphery in the political landscape of Viti Levu (Durutalo 1985).

The political situation in the eastern part of the group was succinctly described by an early European observer who lived in a Fijian village for almost a year. William Lockerby was a sandalwood trader who was left stranded at Bua, on the western end of Vanua Levu, in 1808. He reported in his journal that "on this island there are four persons who call themselves kings ... besides these four kings there are a great number of petty chiefs, who have districts allotted to them, and have a fort or place of defense in each, but still considered as subject and under the control of one or other of the four kings" (Im Thurn and Wharton 1925:21). Erskine (1853:214) revealed that "there exists a carefully-defined, and (by the Feejeeans themselves) well-understood system of polity, which dictates the position the different districts stand in with respect to each other, as well as the degree of submission each dependant owes to his principal." Scarr (1984:6) stated that in eastern Fiji, "complex chiefdoms in the late 18th century were successor states to Verata." Situated on the eastern coast of Viti Levu, Verata was the first matanitu to emerge in Fiji. Its political fortunes may be linked to hereditary lineages stemming from the sacred mountains of Nakauvadra. For this reason, the case study in Chapter 7 considers Verata in greater detail.

From all accounts, then, political evolution prior to contact with Europeans had approached the formation of the state, particularly in eastern Fiji, where the Tongan influence was strongest. Brookfield (1972b:26) noted that by the middle of the nineteenth century, "rudimentary kingdoms had emerged in Fiji." Hierarchical levels of authority and control had developed from kinship structures, and hereditary chiefs became powerful leaders of
groups of villages, smaller islands, and eventually, entire regions. Interestingly, none of the larger islands (Viti Levu, Vanua Levu, Taveuni, Kadavu) ever came under the domination of a single ruler. By the time Europeans arrived in the islands, the diverse alliances and local coalitions had combined their allegiances into seven powerful and often competing *matanitu* (Fig. 5.2).

Some have argued that it was only European contact and the use of muskets in warfare that led to the consolidation of political structures in Fiji. The case has been made, for example, that the beachcombers who attached themselves to the powerful ruler Cakobau were directly responsible for the ascendency of Bau (see, e.g., Derrick 1957). But others have claimed that this distorts the relatively insignificant influence of such interlopers, who "were no more than the privileged servants of chiefs" (Thomas 1991:116). Most scholars now hold that the evolution of *matanitu* was clearly an indigenous development (Scarr 1984, Sayes 1984, Routledge 1985). As Thomas (1991:115) remarked, "the thesis that hierarchical confederations did not exist before contact collapses in the face of abundant evidence for both political expansion before consequential contact and similar earlier centralized states."

The study of historical linguistics provides another clue to the cultural differentiation found within Fiji. The language spoken in Fiji belongs to the Oceanic branch of the Austronesian language family. Most scholars agree it shares a common origin with ancestral Polynesian. This "proto-central Pacific" group of languages probably developed within Fiji, then "broke up" between 3,000 and 4,000 years ago (Pawley and Sayaba 1971:412,414). Early writers were somewhat overwhelmed by the regional differences in Fijian dialects; some suggested distinct waves of immigration. Pawley and Sayaba

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FIGURE 5.2. Matanitu in Fiji at time of European contact. Adapted from Sahlins (1991).
(1971:411) stressed the initial unity of Fijian, however, and claimed that “although it is likely that Fiji was settled more than once in ancient times, the linguistic evidence for this is quite slender.” They noted that Fijian is composed of probably hundreds of “communalects” — divergent “speech traditions” that developed locally — but stated that there is “only one major dialect boundary.” This line runs north-south through the center of Viti Levu, and represents an “ancient split” that may be more than 2,000 years old (Pawley and Sayaba 1971:405).

Hocart (1915:74) had earlier taken notice of this boundary, and wrote that “there is no gradual transition from Western to Eastern dialects; the line of demarcation is quite sharp; it is formed by the great dividing range which runs from Tomanivi, the highest mountain in Fiji, southward between the Rewa and Sigatoka Rivers.” Schütz (1972:51) agreed with the findings of Pawley and Sayaba, and cautioned against treating the Polynesian similarities in eastern Fijian dialects (or communalects) as recent borrowing rather than indications of a shared lineage. Geraghty (1983:382) slightly modified this view by tracing the evolution of separate “dialect chains” within Fiji, and concluded that the development of Fijian languages “was probably not a simple process of divergence.” His research led him to believe that “at an early stage, Kadavu, Ra, and much of Vanua Levu were in close contact with western Viti Levu, but these areas more recently have come under the influence of the coastal Southeast Viti Levu prestige area” (Geraghty 1983:349). He also noted the shared features between Melanesian and western Fijian languages (Geraghty 1983:389).

Land and life

The cultural-ecological relationships comprising the Fijian genre de vie developed out of the founding Lapita culture, and were modified through
adaptations to the particular environmental conditions found in Fiji, as well as through subsequent social interaction with neighboring archipelagos. Subsistence strategies shared characteristic traits with both Polynesia and Melanesia, and thus were distinctly Fijian. There was a basic crop complex common to most of the South Pacific islands, consisting of three tree crops (coconut, plantains, and breadfruit) and three root crops (taro, yams, and sweet potato), supplemented by various greens, both cultivated and wild, and a variety of wild tubers and fruit and nut trees. Wild yams are especially prized even today, and the search for these delectables growing among the reeds and tall grasses is the cause of many of the fires that scorch the talasiga ("sun-burnt land") country on the leeward side of the larger islands.

For those settlements near the sea, marine resources supplied a significant percentage of the native diet. Women gathered mollusks from the reef and used nets to fish the shallow lagoons, while men took their canoes out to deep water to pursue pelagic species and turtle. Many coastal villages constructed fish traps on the tidal flats. Called ba ni ika ("fish fences"), they consisted of linear barriers of boulders built high enough to allow fish to enter an area during high tide, but which detained them as the tide went out and exposed the rock enclosures. Parry (1992) included these structures in his recent research on Fijian subsistence landscape modifications, based on aerial photographic analysis.

Intensive forms of agriculture, including irrigated terraces for taro, may have formed an element in subsistence strategies from the very beginning of settlement. Yen (1971:9) noted that "methods of cultivation, as we can reconstruct them from the early contact records of Fiji, Tonga, and Samoa, do not accentuate the role of terracing, but that some forms were present in earlier times." Intensity in early Fijian agriculture, however, was
manifested in other ways, such as intercropping. Wilken (1987:255), in his study of traditional agricultural technology in Mesoamerica, classified basic multiple cropping as a relatively uncomplicated technique of “space management.” But such practices could involve “scheduling” and phased planting, which “may also assume more complicated forms, as when crops with different growth and maturation periods are planted together or at staggered planting dates so that crops in the same fields are at different stages ... by this means it is possible to continuously use not only horizontal but also vertical spaces that would otherwise go unoccupied” (Wilken 1987:255). It was Waterhouse (1866:304) who perhaps best captured this aspect of Fijian cultural ecology with the following portrait:

By inclination and habit he is a cultivator of the soil; though he could contrive to live on the mere produce of his forests, were he so inclined. He loves to watch the growth of his vegetables, and seems to venerate the earth for its yield of increase. In the yam-planting months, he allows no other engagement to interfere with the business of the season, and, though he is not actually pressed for time, he indulges himself in the pleasing fiction that he is. He understands the art of planting simultaneously two or three crops of various kinds, to arrive generally at maturity during successive periods.

Besides scheduling and intercropping as ways to ensure provision of fresh vegetable foods throughout the year, Fijians learned to overcome the problem of storage in tropical climates by developing fermentation processes. Madrai was a food made by burying breadfruit in the ground for various lengths of time until it was properly fermented. Taro could also be used for madrai, but more typically went into an assortment of puddings known as vakalolo.

Fijian horticultural expertise was also directed at crops other than those providing nutritional sustenance. One in particular deserves special mention here: kava or yaqona (Piper methysticum). This member of the pepper family yields a root that is dried, pounded into powder, and infused
into a liquid beverage that produces a mild soporific effect. The plant does not require irrigation, and is cultivated on many Fijian islands, although yaqona from either Koro or Kadavu seems to be favored. Brunton (1989) has traced the origin of this drug to the Bismarck Archipelago, northeast of New Guinea. His cartographic data (1989:84) show the probable route of diffusion of kava eastward through the Solomons, Vanuatu, and into Fiji, from where it reached the rest of Polynesia. Brunton, citing Green, and Kirch, considers kava drinking to have been a Lapita culture trait. It is still used throughout much of Oceania, and has become the subject of increasing attention (Lindstrom 1987, Lebot et al. 1992). DeBunce (1992), for example, recently examined the role that ceremonial kava consumption plays in the shaping of cultural landscapes on Pohnpei, in Micronesia. In Fiji, it was once reserved for nobility, but is now widely (some would argue too widely) consumed by one and all, including Indo-Fijians. Nevertheless, there are still important rituals associated with its ceremonial use (Ravuvu 1987), and yaqona is always served to welcome distinguished guests to a village (Fig. 5.3). Less formally, on any given evening, in most villages people will gather at somebody’s house to drink “grog” and spin yarns.

In traditional Fijian society, labor was organized according to the complexity or social and cultural significance of the task. The massive projects associated with large scale terrace-building or construction of irrigation systems would have required a substantial work party organized by chiefly dictates. Deane (1921:101) was quite clear on this point: “All large works are carried out by clan labor ... if a large canal had to be made, the members of the mataqali, or several mataqali excavated it.” The general term for this labor obligation is lala, which Deane (1921:104) defined as follows: “This custom is the privilege extended to the chief, by which he may call the
FIGURE 5.3. Ceremonial kava drinking, Vatukacevaceva. Yaqona is still used to formally welcome visitors to a village, and drinking “grog” is a common social ritual in most areas of Fiji.
clansmen together at a moment's notice, for the purpose of carrying out any large undertaking." Hocart (1929:102) wrote that “yam planting was formerly done by ‘clan statute labor’. One field would be planted by the village (were vakoro), one by each clan, one by each group of households (vakavuvale).” On Vanua Levu, the obligation to perform garden work was known as tave, and was often necessary for constructing irrigation infrastructure: “the building of ponds is difficult and may engage the labor of the entire village” (Quain 1948:136).

Other labor needs were met through the spoils of war. In his study of the Rewa delta, Parry (1979:49) remarked that “the labor required in the creation of major earthworks such as ring-ditch fortifications and swamp gardens was often provided as tribute by conquered people.” Thompson (1938:189) documented a range of tributary labor relations: “There were three grades of dependency between groups: mbatchi [bati], nggali [qali], and kaisi. The mbatchi included those groups which were compelled to respond when the chief called for help in warfare; the nggali included conquered groups from whom the chief extracted regular tribute in food and industrial produce; and the kaisi included defeated groups reduced to slavery.”

Villagers handled common tasks at the level of the household (itokatoka), and usually organized work along gender divisions. In agriculture, men performed heavier chores such as clearing land or digging up a new garden, while women did the weeding and occasional harvesting. Wilkes (1845:332) noted that women “keep the house clean, take care of the children, weed the yam and taro beds, and carry the roots home after the men have dug them up.” As with most Fijian culture traits, there was great variation throughout the archipelago. Robert Coffin, the stranded crewman
from a wrecked whaler who stayed for awhile during the 1850s, was most familiar with the Lomaiviti group of islands in central Fiji. He wrote that men “would work to build a house, dig up a yam patch or a taro bed, but the women tend the growing crops and the harvesting” (Coffin 1941:83). Turner (1983:94) likewise reported that in eastern Viti Levu, the clearing, planting, and harvesting of taro is men’s work, while weeding, kelivaka (building a hole around the plant), and bulubulutaki (mounding) are women’s work. Regarding the far western chain of Fijian islands (the Yasawas), Raven-Hart (1956:112) remarked that even weeding “is chiefly carried out by the men and lads, the women being busy in the village with household tasks, washing, and gathering firewood.” In Cakaudrove, “the majority of women never do gardening” (Sofield 1985:60). Women also do no gardening in the Lau Group. Thompson (1938:193) wrote: “Perhaps it is also through Tongan influence that Lauan women do not work in the fields, whereas in other parts of Fiji they are responsible for a large part of the gardening.” Thomas (1986:222) reiterated the origins of this customary division of labor when he noted that in eastern Fiji, “a Tongan-type division of labor applies: women do not garden.”

The cultivation of yams in Fiji was, and apparently still is, an exclusively male activity. One informant on the island of Beqa told me that “a man cannot be a man unless he has a yam garden.” At Dawasamu-bure, in northeast Viti Levu, Lasaqa (1963:54) noted how “it is in the cultivation of the yam that the village elders demonstrate to the younger men and youths their skill as agriculturalists, for which the pattern and success of a yam garden is locally considered as the measuring rod.” Based on his research on Vanua Levu, Quain (1948:127) declared that each man must have a yam garden, but also “an ample supply of taro.” Cumming (1881, vol.1:170) also noted that
yams are men's work: "he is accounted a sorry idler who sends his wife to dig in the distant yam garden." Curiously, age must provide an exception to this customary rule, for in the cultivation of yams on Kadavu, Campbell (1881:168) noticed that "men are often working on these yam-grounds, and sometimes the older women."

Land tenure was another variable institution among the different groups of people inhabiting Fiji. Generally, land was held communally by kinship groups. Brewster (1922:290), who lived among the Fijians for over thirty years and was a keen observer of their customs, stated that "except in a few isolated instances there is no individual proprietorship in land in Fiji, which is held by the unit of the family and the tribe." While there was no private ownership of property as construed by western concepts, the rights to land in all areas of Fiji was "absolute in the social unit" (Roth 1953:52). But this may have applied only to those lands currently occupied by each yavusa, rather than to a specific ancestral territory. Using archival records from the 1890s investigation conducted by the Native Lands Commission under Basil Thomson, France (1969:138) revealed that because of warfare-induced mobility, "the various social units were unable to produce a body of tradition identifying themselves with particular localities. Indeed, their evidence told of ceaseless tribal skirmishing and a constant ebb and flow of population allowing for no permanent relationship between Fijians and the land across whose face they moved as the fortunes of war dictated." Chapelle (1976:60) argued that Fijians were not so much associated with particular parcels of land as they were fiercely attached to land in general. In any case, the inalienable connection between Fijian communities and land continues to be reflected in many customs and institutions. To "work in the manner of the land" is na cakacaka vakavanua, and identifies an activity as being
connected with traditional values (Toren 1990). Brookfield (1972b:166) has claimed that the “social role of land” in Fiji enhances its worth, due to “the absence of any other viable base for identity and security.”

As noted in Chapter 3, a number of theoretical constructs link population levels with agricultural intensification. Is it possible to assess the pre-contact population in Fiji in relation to the forms of agriculture we have thus far encountered? Any attempt at answering this question would have to consider the extensive swidden based subsistence economy as much as the remnants of intensive agricultural landforms such as raised fields and terraces. More detailed discussion must await the summary and conclusions within the final chapter, following presentation of data from the case studies. For now, we can review and cite the few sources that have pondered the relationship between resources and population in Fiji on the eve of European contact.

Population estimates of the Fiji Islands at the time of European contact vary. A later section in this chapter discusses the more reliable assessments. Were population and environment more or less “in balance”? Or was sufficient pressure placed upon resources to cause cultural-ecological adjustments? If such were the case, what form did these adjustments assume? In a Boserupian observation, Ward (1964b:484) connected intensive agricultural landforms with population build-up: “some early observers thought the interiors of the main islands were probably sparsely populated, but later exploration, and evidence of terracing revealed by aerial photographs, shows that the interior was well populated.” Further regarding this relationship, we may read with great interest a curious comment made by Garanger (1982:30), who stated that when Tonga needed to expand in the first century A.D., they moved toward Samoa rather than Fiji, “which had for
long been overpopulated.” This is all the more puzzling since we know that Tonga in the nineteenth century did indeed pose an expansionist threat to Fiji.

**Human impact on landscape**

Geographers and anthropologists have come to realize that people shape their environment in a number of ways (Thomas 1956). Adaptation of island societies to their physical setting was the focus of a symposium volume edited by Fosberg (1963). Kirch (1980, 1983, 1989; Kirch and Yen 1982) has continued to examine the specific matrix of Polynesian cultural adaptation and environmental modification. Spriggs (1985, 1986) presented evidence of “man-induced landscape enhancement” on several Pacific islands, and linked such cultural-ecological alterations to political evolution. Data assessing the human impact on landscape in Fiji during the several millennia prior to European arrival are meager. Bayliss-Smith et al. (1988:13) have deftly presented the most comprehensive review and analysis of studies that have addressed this problem:

We do not have the capacity to attempt cross-sectional reconstructions of the processes operating within pre-colonial landscapes, so we focus instead on three major ‘vertical themes’ of landscape change: the changing coastline, the retreating forests, and the accumulating swamps. These themes faintly echo Darby’s (1951) well-known vertical themes in the historical geography of Europe (clearing the woodland, draining the marshland, reclaiming the heath, etc.), but they are not designed, as was his approach, to define what constitutes ‘geography’ as opposed to ‘history’ in the Fijian context. Rather, we are concerned simply to establish the broad nature of the relationships, past and present, of the Fiji islanders to the resources that they use.

The authors also confronted the established stereotype of Pacific islanders as noble savages living in harmony with their environment: “this is the notion invented by eighteenth-century romantics and sustained by twentieth-century prophets of ecological crisis, that the South Sea islands once
represented models of optimum resource use, Gardens of Eden in a degraded world or biosphere" (Bayliss-Smith et al. 1988:14). Furthermore, they were careful to note that “ecosystem change might reflect sea level or climate change, rather than the impact of human factors” (Bayliss-Smith et al. 1988:22). This particular question has puzzled more than one observer of Fijian landscapes. Much of the debate has focused on the formation of the talasiga (“sun burnt lands”).

Precipitation patterns over the main islands are discussed in the next chapter (see Fig. 6.3). Although the leeward areas of the larger islands exhibit a pronounced dry season, there is still adequate rainfall to support forest species. Brookfield and Hart (1971:49) delineated these areas as capable of supporting “dry zone vegetation,” but many of them are now covered with exotic (introduced) grasses. These lands are basically a “derived savanna ... characterized by tall grasses that came in after forest clearing/burning” (Hills and Randall 1968:14). This phenomenon is not limited to Fiji, for, as Whitmore (1975:159) stated, “it is most probable that all tropical grasslands ... are entirely derived from woodlands or forests as a result of long-continued burning.” Other examples of anthropogenic grasslands have been described in Papua New Guinea (Haantjens, et al. 1965), and in “the so-called patanas of Ceylon” (Broun 1912:84).

Because of human agency (especially since the establishment of plantation cropping of sugar cane), the reconstruction of the original floristic composition of the talasiga is problematic. Smith (1979:21) stated that the former vegetation most likely consisted of “light forest or shrubby growth,” and Gorman (1975:152) characterized it as a “sclerophyll forest.” The patches of undisturbed vegetation and scattered remnants of tree cover, moreover, often occupy micro-habitats that may not be representative of the
larger area. From what we can tell, the natural vegetation of this zone was somewhat intermediate between the coastal strand and montane types, with many species adapted to a marked seasonality in precipitation. In effect, this was a seasonal dry tropical forest, and its occurrence on the islands of Fiji has been irretrievably lost as a result of cultural interference.

Gibbons (1985:115) asserted that at human arrival, all of the islands were forested “from shoreline to mountaintop.” This implies that the characteristic reed and grass complex comprising the talasiga on the leeward side of the larger islands is decidedly anthropogenic. Most authors have no problem with accepting such an implication. The question often debated revolves around the timing of this cultural disturbance. Cochrane (1969) argued that the grasslands were created only after the establishment of European plantation agriculture, and the occupancy of these areas by Indian cane workers. To the contrary, Bayliss-Smith (1977:16) felt that the “severely eroded talasiga country of many Fijian islands [should be viewed as] evidence of long term maladaptive land-use.” An early scientific visitor to Fiji who was at the helm of the U.S. Exploring Expedition, Charles Wilkes (1845:205), remarked on the landscapes of southwestern Viti Levu:

The shores of Viti Levu are here low; but the land within a short distance rises to the height of one thousand feet, and has a brown and barren appearance. It is destitute of trees, except on the low points along the shores, which are covered with mangrove (Rhizophora) and cocoa-nut groves. Here and there is a deep valley or mountain-top clothed with wood, which is seen in other places. This was afterwards observed to be generally the case with the leeward side of all the islands, and particularly of the large ones. I do not think that this can be accounted for by the difference of climate, although it is much drier on the lee than on the weather side; but I deem it probable that the practice of burning the yam-beds and clearing the ground by fire, may have consumed all the forests, in dry seasons.

He concluded that “these islands were once covered with vegetation from the coral reefs to the top of their highest peaks, but below the elevation of one
thousand feet, on the leeward side of the large islands, the original vegetation has been for the most part destroyed by the fires which the natives use to clear their planting grounds" (Wilkes 1845:340). This was several decades before European plantation development.

Cochrane (1969:122) offered an important clue pointing to the predominance of human agency over climatic controls in the formation of talasiga, at least on Viti Levu: “there is scant evidence that grasslands were ever a significant part of the natural vegetation complex of dry zone Viti Levu [because of] a relative paucity of indigenous grass species in the Fijian flora.” Thus, not only is this widespread plant community the direct result of cultural-ecological disturbance, but its principal floristic elements are introduced exotics. Brookfield and Hart (1971:52) stated that in “pre-contact days the natural successor to destroyed forest would have been cane grass (Miscanthus floridulus).” Parham (1953:230), although citing a variant species of the same genus, assessed the situation as follows:

This indigenous induced association in which the reed grass (Miscanthus japonicus) is dominant is by far the more extensive and characteristic unit of the Fijian vegetation. Formerly the whole of the leeward sides of the main islands ... was covered with this tall grass association, unbroken save for occasional trees (Pandanus, Casuarina, Alstonia, Cycas).

As a result of frequent, repeated burning, and the introduction of exotic species, these grassland associations now comprise mission grass (Pennisetum polystachyon), wire grass (Sporobolus indicus), and blue grasses (Dicanthium spp.). Some areas also support bracken (Pteridium) and other ferns (Gleichenia, Balantium), while introduced shrubs such as guava (Psidium guajava) have become a pest throughout much of the talasiga country. In the absence of adequate refugia, these widespread floral transformations act to preclude the possibility for the regeneration of what may have been the natural vegetation on leeward Viti Levu and Vanua Levu.
Soil losses from erosion, along with other pedological changes associated with frequent burning, serve to further hinder revegetation processes.

Climatic controls may be partly responsible for the landscape alterations that have been attributed to human agency. Pollen records from the island of Taveuni indicate a drier period in Fiji between 12,000 and 11,000 B.C. (Southern 1986). Climate thereafter evidently stabilized, and following the initial colonization of the islands by the Lapita culture, appears to have deviated little from that experienced at the present. Thus, climatic factors would seem to be excluded from being considered a causal agent of vegetation transformations. But Nunn (1991:11) presented evidence of late Quaternary climatic change, notably the Holocene Climatic Optimum of 5000 years ago, and the Little Climatic Optimum from 1200 to 650 years ago, when “significant warming occurred.” Nunn has questioned the assumptions causally linking vegetation change on Pacific islands solely to human agency, particularly in the prehistoric period. While acknowledging the undeniable evidence that humans have contributed to deforestation and soil erosion, he stated that “leeward zone grasslands on many Pacific islands may have persisted since the last Glacial and may not be anthropogenic” (1991:9).

Southern (1986:18) cited the research on Lakeba by Hughes, et al., and Rowland and Best, which documents the use of fire in vegetation clearance and subsequent infilling of the swamplands in the interior of the island. This enabled horticultural practices to evolve from hillside swiddens to intensive raised field cultivation in the newly sedimented valley bottoms, as pointed out by Spriggs (1985). Moreover, Bayliss-Smith, et al. (1988:39) referred to studies that demonstrated intentional practices by early Lakebans that were designed to increase sedimentation and alluvial infilling.
Southern’s palynological research in central Viti Levu indicates a sharp increase in grass species occurring around 2090 years B.P. She concluded that “the apparent reduction in forest cover near Nadrau Swamp is difficult to explain in terms of climate change” and attributes it to human clearing and burning for agriculture (Southern 1986:148). Southern (1986:212) summarized the evidence for human impact on Fijian environments, and divided the pre-European settlement history of the islands into five periods marked by increasing landscape degradation of the uplands and greater intensity in the agricultural use of the lowlands, accompanied by the development of fortified villages. She claimed that in the final period of prehistory, from A.D. 1000 - 1800, “inland areas [were] largely abandoned” (1986:212). Thus, it could be inferred that the irrigated terraces found distributed throughout the interior of leeward Viti Levu (see next chapter) may represent one of the few alternatives available at that time for cultivating taro in a severely eroded and degraded environment. For now, however, the evidence is not conclusive enough to warrant such a statement. Further research should be able to account more fully for the potential coincidence of landscape degradation, human agency, and agricultural intensification. Fortunately, the Sigatoka dunes area is scheduled to receive additional scrutiny.

As will be seen in the next chapter, the upper Sigatoka basin exhibits an extraordinary concentration of abandoned agricultural terraces. The Sigatoka River drains nearly the entire southwestern quadrant of Viti Levu. Southern’s pollen analysis was taken from the Nadrau Plateau, which is situated in the upper reaches of the watershed, and in fact forms part of the orographic barrier that results in diminished precipitation across the basin. Some scholars feel that human-induced landscape degradation in the upper
Sigatoka watershed is responsible for the formation of the dunes: "The sand dunes at the mouth of the Sigatoka River, whose catchment extends to the edge of the Nadrau Plateau, are also thought to derive from accelerated erosion of topsoil following anthropogenic disturbance" (Southern 1986:215). Nunn (1991:32), however, has warned against jumping to conclusions, and noted that tectonic uplift and attendant sea level fall may be responsible for the creation of the dunes: "If one allows that sea level fall would have caused slope instability, especially in the middle parts of river valleys, and therefore would have increased sediment supply to lower reaches, there is actually no need to cite human impact to explain valley infilling and coastal progradation in the early part of the postsettlement history of Pacific islands." The Lapita occupational site on the Sigatoka dunes has recently been the focus of renewed interest by Crosby (1993), who is participating in the formulation of an interdisciplinary research project that may answer many of the questions posed above. In any case, the human modifications to landscape fostered by the original inhabitants of Fiji operated on a far less intrusive scale than the sweeping changes wrought by the encounter and invasion of Europeans.

European arrivals

The earliest sustained contact between Fijians and the kai valagi ("people from the sky" — the native name for Europeans) came as a result of the sandalwood industry. This aromatic product was in great demand in oriental markets, and afforded trading ships the chance to realize a profit margin of 600 percent (Derrick 1957:40). The discovery of sandalwood in Fiji came about after a shipwrecked sailor eventually made it to the western end of Vanua Levu. Here, in the environs of Bua Bay, grew the only potentially commercial stands of sandalwood to be found in Fiji. Oliver Slater, who spent
nearly two years in the archipelago after the wreck of the *Argo* in 1800, recognized the valuable tree Fijians call *yasi* (*Santalum yasi*) growing at Bua. After being rescued by the Spanish ship *El Plumier*, Slater reported his find to the merchantmen at Port Jackson, in the recently established British colony of New Holland (Australia). Starting with the arrival of several ships in 1804, “for more than a decade sandalwood made Bua Bay one of the best known and most frequented ports in the South Seas” (Derrick 1957:38).

An engaging contemporary account of the sandalwood trade in Fiji is preserved in the journal of William Lockerby, who arrived at Bua on May 21, 1808 as first mate aboard the *Jenny*, a Boston merchant ship, and was left ashore either by accident or design when the ship departed for China. From Lockerby’s journal (Im Thurn and Wharton 1925) we are able to learn not only of the developing relationships between Fijian and foreigner, but also of the power of the chiefs over their subjects, and the politics and warfare of Bua. When the *Jenny* anchored at Bua, there were two other ships (from Australia) already taking on a cargo of sandalwood. In order to gain an advantage over their competitors, officers of the *Jenny* presented the chief of Bua with gifts of *tabua* (whale’s teeth — an important and symbolic possession for Fijian nobility) and iron, and “in return the chief undertook to set his people to cut sandalwood” (Im Thurn and Wharton 1925:lxv). At this time there was frequent inter-tribal warfare among the smaller chiefdoms in the area, and Lockerby became involved in helping his new business partners. Crewmen from the *Jenny*, under Lockerby’s command, assisted in the massacre of a village across the bay from Bua. In return for his services, the Tui Bua awarded him a quantity of cut sandalwood (Im Thurn and Wharton 1925:52).
Later, as the trees around Bua Bay were depleted, traders learned of the location of other commercial stands around the headland to the north at Wailea. But warfare again complicated European designs to simply exploit the resource. In 1813, in return for the promise to provide a cargo of sandalwood, Europeans assisted Wailea in an attack on a village at Dreketi (Im Thurn and Wharton 1925:xcii). By this time, the rapidly emerging chiefdom of Bau was also involved, and its war canoes joined in the fray. Bau was seeking to disengage the power and influence that Bua had garnered from its trade with the kai valagi, and in participating in this conflict, also employed European mercenaries.

The period of sandalwood extraction from Fiji only lasted from 1804 to 1814. One ship returned in 1825, but managed to load just a fraction of a cargo (Im Thurn and Wharton 1925:ci). Commenting on the sandalwood era in Fiji, Cumming (1881, vol.1:274) wrote, “there was formerly a considerable amount of this fragrant wood in these isles, but ruthless traders have swept the land so thoroughly, without the slightest thought of sparing young saplings, that now the tree scarcely exists, and the smallest fragment is dearly prized.” When the colonial agricultural specialist John Horne visited Bua in 1878, he counted a mere twelve trees (Derrick 1957:43). The extreme rapidity with which this resource was exhausted belies the importance of this decade in Fijian culture history. As Brookfield (1972b:21) observed, the sandalwood industry represented Fiji’s introduction to the World System, and instigated the “beginnings of indigenous demand for such goods as tobacco, cloth, iron, muskets.” The Fijian experience also established a model for the effective exploitation by Europeans of other Pacific island locales: sandalwood provided the impetus for subsequent foreign incursions into Hawaii, the Marquesas, New Caledonia, and Vanuatu (Brookfield 1972b:20).
Furthermore, the sandalwood trade resulted in Fiji becoming less mysterious and more accessible within the expanding European worldview. Im Thurn and Wharton (1925:ciii) wrote that “one important result of the visits of sandalwood ships to the Fijian islands was the production by Aaron Arrowsmith, in 1814, of the first approximately correct chart of a part of the group.”

The effects of this brief flurry of activity in Fiji should not be underestimated. Politically, the trade enhanced the status of just one among at least seven other high chiefdoms, causing disruptions in the balance of tributary relations and social structure. Verata, itself a waning giant, probably benefited from Bua’s meteoric rise in fortunes, due to the ancient kin alliances between these two places. Rewa, on the other hand, was forced to wait in the wings, and did not gain prominence until after “the power and prestige of Bua Kingdom had collapsed with the end of the sandalwood trade in 1814” (Quain 1948:16). In assuming a preeminent position, Rewa wasted little time. Derrick (1957:56) reported that “by 1817 Rewa had reached the zenith of her power.” Indeed, the lofty status of Bua during this time caused jealous reactions among the eastern Viti Levu chiefdoms, hence the arrival of Bauan war canoes to join in what was essentially a Buan civil war.

The interaction between ships and villages during the sandalwood period caused several changes in the more quotidian aspects of Fijian cultural ecology and lifeways. It took at least two months for a cargo of sandalwood to be cut and loaded on a ship. The *Jenny* arrived in late May, and did not secure a full cargo until the end of July (Im Thurn and Wharton 1925:lxv). With increasing scarcity of the resource, this time period was typically extended, to three or even four months. Labor to cut and load the logs was supplied by local villagers, pressed into service by their chiefs. This
labor represented time and energy away from the normal economic pursuits of gardening, house-building, canoe construction, and fishing.

Additionally, ships' crews required food, and when several vessels lay at anchor at Bua Bay or Wailea, local gardens would feel the impact. Inland Bua was known as the "land of taro" and featured irrigation as a gardening strategy (Quain 1948:7), but the coastal regions seemed to produce more yams, especially during the austral summer. Lockerby often told of receiving from the natives food items such as "breadfruit, yams, plantains", but there was never any mention of taro in his journal up to the time he left Fiji aboard the General Wellesley on June 2, 1809 (Im Thurn and Wharton 1925:73). This may have been because of the season and harvest period, or it may reflect the preference for the more hardy and easily stored yam by ships' stewards. Alternatively, it may indicate regional variations in root crop production, something we have already examined at a broad scale in Chapter 3, and will look at more closely with regards to Fiji in particular in the next chapter.

After the sandalwood industry evaporated, there was a lull of approximately fifteen years before European ships once again began to frequent the islands. This next period of interaction between kai valagi and Fijian was based on the procurement of another natural resource — the sea slug (Holothuria spp.) that was found in abundance on the shallow fringing reefs about the larger islands. Known in Fiji as dri, and among the traders as bêche-de-mer, these marine animals fetched a hefty profit at the market in Manila, where they were transshipped to oriental cities for use in soups. Derrick (1957:67) elucidated the origin of the name: "bêche-de-mer is a gallicized form of the Portuguese bicho-do-mar, meaning 'sea slug'," and stated that during the 1830s, this trade "became the principal medium of
contact between Fiji and the outside world.” Ward (1972:106) wrote that “for almost thirty years bèche-de-mer was the principal export from Fiji.”

Interest in Fijian bèche-de-mer developed gradually. It was first collected commercially in 1813, off the Kaba peninsula, along the east coast of Viti Levu (Im Turn and Wharton 1925:civ), but it was not until American ships arrived in large numbers in the late 1820s that bèche-de-mer became an important object of trade. Ward (1972:97) reported that during 1827-1836 there was “intense activity by Salem vessels,” but in the latter 1830s, the trade declined, and except for a brief revival during 1844-1847, the dri was largely depleted, and exports diminished.

The collection and processing of bèche-de-mer was complicated, and involved even more labor and time than that required for sandalwood. The sea slugs, averaging 8 to 10 inches in length, were first picked up from the floor of shallow lagoons, loaded into canoes and taken to shore. There they were eviscerated, cleaned, parboiled (usually twice), and stretched out on drying racks in long sheds known as vata houses, named after the array of shelves inside. The dri were cured by the heat and smoke of fires built in pits beneath the drying racks. Again, labor was supplied by chiefly coercion: “For building the houses, gathering the bèche-de-mer, cutting and carrying firewood, cleaning and handling the ‘fish’ during treatment, and bagging and loading the finished product, a considerable number of native labourers was needed” (Derrick 1957:69). A significant amount of labor was necessary simply for the collection of firewood. Wilkes (1845:220) noted that “this fuel is purchased from the chiefs, who agree to furnish a certain quantity for a stipulated compensation.” Ward (1972:117), relying on estimates in an 1887 account from Papua New Guinea, stated that it took 9 tons of wood to dry and cure 1 ton of dri.
By geographic coincidence, it was again Vanua Levu that was initially favored in this renewal of European trade relations. The bèche-de-mer were plentiful on the shallow reef flats off Vanua Levu's north coast, in the chiefdom of Macuata. And, just as Bua gained status during the sandalwood boom, so Macuata became a powerful matanitu for a brief period during the 1830s, at the beginning of the bèche-de-mer trade. European articles accepted in trade were iron, whales' teeth, and, increasingly in demand, muskets, which gave the Macuata chiefs tactical advantages over actual or potential adversaries. Political alliances among the high chiefdoms were once again skewed. Quain (1942:235) recounted how the people of coastal Macuata “trace their descent from Bau and Verata.” But by this time the relative rank of both Verata and Rewa had declined against the rising powers of Bau, and it was Bau that challenged the failure of Macuata to submit tribute, declaring war in 1840 (Burns 1963:67). The bèche-de-mer trade continued through 1852, when Cakobau himself fished for dri along the Macuata coast in order to pay for the European sailing schooners he had ordered. But by then the reefs were thoroughly fished out, and the indefatigable king was unable to obtain a full cargo (Derrick 1957:70).

Whaling began in the South Seas around the beginning of the nineteenth century, and reached its zenith during the 1840s and 1850s. American ships from the New England ports of Nantucket and New Bedford formed the majority of the fleet. While plying the waters off Fiji, ships favored a land base at Kadavu, and Tavuki Bay became a well known watering hole for the whalers (Burns 1963:55). While the whaling fleet did not seek to exploit the terrestrial natural resources of the islands, they nevertheless had an impact on them. Fresh water and food provisions were required at regular intervals. Ships crews and local villagers engaged in assorted
exchanges and trade relationships. Since Kadavu was the geographical locus of the whaling industry in Fiji, a more detailed account of these activities is included in Chapter 8.

After the sandalwood boom, the continued sequence of European contact quickly began to conform to the typical pre-colonial pattern of extraction and export of raw materials, a pattern which also became apparent in agricultural production. Not only were animal or timber commodities taken, but the béche-de-mer trade along with the increase in whaling activity caused a commodification of subsistence crops, especially the easily stored yam. The ships seeking sandalwood and béche-de-mer stayed at Fiji for increasingly longer time periods in order to secure a cargo as resources became diminished. Local villages were involved with providing food for these visitors, either by trade or coercion. As noted above, food and fresh water were essential provisions for the whaling crews also. This sparked an additional industry — cash cropping — which would forever change the relationship between Fijians and their land. Even before the development of European plantations on alienated or leased land, “a spasmodic export trade in agricultural produce soon arose ... cargoes of yams and pigs went to California and Australia in the late 1840s” (Ward 1964b:486).

Perhaps the most profound effect of these extractive economic activities was the establishment of a European community in Fiji, based at Levuka on the island of Ovalau. When the shipwrecked whalers from the Logan arrived at Levuka in 1854, they found “twenty or thirty white men” living there (Coffin 1941:80). Known locally as “beachcombers”, they were a motley collection of nonconformists and refugees from more orthodox occupations in Great Britain, Germany, and the United States. They settled at Levuka to take advantage of the ease with which ships gained access to the
protected harbor within the reef. They took wives among the native women, often polygamously in accordance with Fijian tradition, and created a society hitherto unknown in the islands, but which hinted at things to come. Soon there were enough wood frame houses to outnumber thatched *bures*. By the time the British oceanographic expedition vessel *H.M.S. Challenger* anchored off Levuka in July, 1874, crew member Matkin noted that “the houses are all of wood & the place is not unlike Wellington ... the white population numbers about 500; they are from all the colonies & America & are not of the honestest description” (Rehbock 1992:182).

Politically, the presence of the Europeans at Levuka propped up the sagging influence of Bau, and ultimately ushered in the colonial era through King Cakobau’s 1874 Cession of the islands to Great Britain. During the early 1820s, “the warriors of Bau had seized Levuka from the Verata people” (Derrick 1957:58). Thus, Levuka remained under Bau’s control and protection, but this had its drawbacks as well as advantages. As a consequence of some suspected intrigue, Cakobau banished all Europeans from Levuka from 1844 to 1849, and the settlement relocated to Vanua Levu during those five years. After 1850, growing interest in the islands on the part of Europeans and Americans engendered official diplomatic ties, with consuls based at Levuka or nearby Laucala Bay on the coast of Viti Levu.

Fiji was already beginning to be considered an extension of the frontier in the antipodean colonies of Australia and New Zealand (Young 1984:2). A new kind of *kai valagi* — planters looking toward permanent settlement — began arriving by the late 1850s. Burns (1963:82) wrote that “during the year 1860 numbers of people came to the islands from Australia and New Zealand seeking land on which to cultivate cotton or raise sheep.” An investigation that same year by British representatives responding to
Cakobau's first offer of Cession spawned an influential report on the possibilities of plantation agriculture in Fiji (Seeman 1862), and more settlers poured in. This wave of immigrants to Fiji during the early 1860s was partly accelerated by unsettled conditions in New Zealand, where the Maori wars were heating up (Derrick 1957:146). Many of these would-be planters were inexperienced in tropical agriculture, and this did not bode well for the prospects of establishing successful plantations. Harvey (1946:84) noted that early plantation development in Fiji was undertaken by “settlers having little capital and no practical knowledge of tropical crops,” and that “early settlers of the Colony were traders and craftsmen rather than planters” (Harvey 1946:83). This resulted in an inordinate number of failures and bankruptcies. As Young (1970:152) commented: “Fiji was the cultural terminus of a quarter of a century of disorderly migration, chiefly by young men willing to make a quick fortune, and who had spent their lives trying to do so, and who so far had failed.”

The desire for land brought a new and different twist to the increasingly complicated relations between foreigners and Fijians. Land alienation was a process inherently problematic, owing to indefinite boundaries, fraud, and the hostility of neighboring tribes. Derrick (1957:151) noted that “at first the natives had not understood the full meaning and effect of these sales, for there was nothing in their experience that was comparable to them.” As stated earlier in this chapter, traditional land tenure was held by tribal and extended family groups. Chiefs exerted considerable powers within their respective vanua, but giving away land was certainly not one of them. Yet, the Europeans had become accustomed to dealing with chiefs when securing labor and permission to take on cargo during the sandalwood and bèche-de-mer periods, so it was only natural to
continue to work within this existing structure in their bid to obtain planting lands.

There were abuses and deceptions on both sides during the ensuing transactions. Greedy settlers coerced deeds from chiefs who did not realize they were relinquishing their rights of using and occupying ancient tribal lands. France (1969:53) commented on the cultural dynamics of such misunderstandings:

> From a Fijian point of view it would probably be nearer the truth to reverse the commonly-held view, and to say that they thought they were parting with the 'ownership' and retaining the usufruct. The nearest concept to ownership in Fijian is the 'lewa' of the land, which means the right to control its use. This was the right possessed by the chiefs and it was the lewa of the land which they transferred to Europeans.

In any event, the concept of fee simple apparently was a hard one to translate. Derrick (1957:157) reported that “not infrequently chiefs sold land without consulting the occupants ... there were cases in which land was sold to more than one buyer.” Often chiefs would sell lands over which they held no title, and subsequent colonial land tribunals attempted to sort out a number of these fraudulent deals. Brookfield (1972b:36) noted that “a land commission set up in Fiji confirmed less than half the claims presented to it.”

Many chiefs used the opportunity presented by land transfers for insulating their dominions from hostile neighboring tribes. Fison (1880:344) reported an instance where a chief purposefully sold to Europeans land that was not his to sell. This land was already occupied, of course, and when Fison questioned the chief on the troubles that were sure to occur, the chief replied that “the white men have many guns ... they are a war-fence to my back.”

Coconut oil was Fiji's first plantation export. Brookfield (1972b:26) reported the introduction during the 1850s of machinery for large scale...
extraction of oil from copra. Besides coconuts, early planters attempted to
grow a great variety of tropical produce (Harvey 1946:82). But cotton was the
commercial crop that spurred settlement. The American Civil War had closed
off Europe's main supply of cotton, and market conditions were conducive to
 experimentation in Fiji. Berthold Seeman, the British botanist, had
introduced Sea Island and New Orleans cotton in 1860 at Somosomo, on the
island of Taveuni (Harvey 1946:88), and it was not long before bales of cotton
were being exported from Fiji. Derrick (1967:5) wrote that "during 1860-61,
Dr. Seeman demonstrated beyond doubt that good cotton could be grown in
Fiji; and a beginning was made with its cultivation by new settlers." He
further noted that "by 1863 several cotton plantations were in operation ... in
the Rewa valley, on Taveuni, and elsewhere" (Derrick 1967:5). Parnaby
(1972:126) reported that "by 1867, 3,200 acres were planted with cotton and
another 1,500 cleared for planting." In 1867 there were 30 cotton gins
operating in Fiji (Brookfield 1972b:27), and Morrell (1960:147) noted that "by
1868 the banks of the Rewa River for 25 miles were lined with cotton
plantations." During 1870 the area planted to cotton approached 10,000 acres
(Derrick 1957:184).

Between 1867 and 1870 the European population in Fiji more than
doubled, and by 1870 numbered over 2,000 (Derrick 1957:184). Immigration
during this time period was stimulated by the booming cotton trade, and by
the formation in 1868 of the Polynesia Company, a group of Melbourne
businessmen who assumed Cakobau's long-standing debts to the American
government. In return, Cakobau deeded to the company 200,000 acres of land
slated for plantation development, including 80,000 acres on Viti Levu Bay in
Ra Province; 23,000 acres around Suva harbor; 10,000 acres in Cakaudrove;
and the entire island of Beqa (Derrick 1957:180). While many of these
transfers were later ruled invalid, the promise of available land lured many new settlers to Fiji. The first Europeans at Suva were associated with the Polynesia Company (Potts 1959:105). There was an immigration rush in 1870, and a flurry of supplementary economic activity. Along with the expansion in cotton acreage, "exports of coconut oil, bèche-de-mer, and tortoise shell were also increasing" (Burns 1963:83).

The settlement and occupation of lands was a process not always understood nor accepted by the Fijians. As Derrick (1946:4) remarked: "The growth of the plantation system wrought important changes in Fiji. Hitherto foreigners had bought from the Fijians produce such as bèche-de-mer, coconut oil, and tortoise shell, giving in exchange trade goods, or arms and ammunition." Now, with their own lands to plant and oversee, the settlers assumed a degree of independence from the indigenous inhabitants. Of course, labor needs were acute, with rainforest to clear, and cotton to cultivate and harvest. While some areas of Fiji were noted as ready sources of workers, mainly because of the bribery of local chiefs and their subsequent coercion of commoners, overall there was a labor shortage that was only solved with the importation of conscripted islanders from the New Hebrides and Solomon Islands, beginning in 1864. This de facto form of kidnapping was known as "blackbirding", and before the practice was stopped in 1911, probably 20,000 workers from other islands had been brought to Fijian plantations (Parnaby 1972:126).

Often local tribes deeply resented the incursions into their territory, where European settlers might mistake long cycle fallow for unused lands. Sometimes the Fijians stood up for their rights and implemented counter-insurgency measures. During 1868 there was a series of such actions on the upper Rewa. The kai Colo (mountain tribes) took over cotton plantations and
even harvested the crop and took it to market themselves. The European planters “made no attempt to return to their abandoned plantations; some settled on the Ra coast, others at Ba” (Derrick 1957:186).

In some respects, plantations were not a new concept to the Fijians, at least in the eastern parts of the group. Thompson (1938:195) reported that the Lau Islanders were forced to establish coconut plantations during the nineteenth century to supply tribute to the powerful Tongan political machine that had recently overwhelmed them. With the beginnings of the copra export industry, these plantations were already in place to provide a trade commodity for the Lauans, who in exchange “received tobacco, cloth, soap, tinned beef, rice, tea, and oil.” Once the U.S. Civil War had ended, the return of American cotton on the world market dimmed Fiji’s prospects for sustaining a healthy export. But the trade was dealt a death blow in 1871, after the Franco-Prussian war closed off French textile buyers, and the price offered for cotton in England dropped to a fourth of what it had been (Derrick 1957:197). Further calamity came in the form of a devastating cyclone in March, 1871, which wiped out many plantations. As a result of these misfortunes, many planters returned to coconuts (Harvey 1946:83). While exotic cultivars of sugar had been introduced in 1857 (Farrell 1972:52), cane did not become established as a commercial venture until after the institution of colonial administration.

The imposition of plantation agriculture was disruptive to traditional Fijian culture and cultural-ecological relationships in a number of ways. In some places, planters were able to obtain the rights to the best agricultural lands. This not only deprived the inhabitants of their garden areas, but often forced them to relocate to new lands or to become dependent on the European settlers as poorly paid plantation labor. Exotic crop introductions also created
havoc with local food preferences and hence, village cultivation practices. For a while, most Fijians tenaciously clung to their traditional crops and culture. When H.M.S. Challenger visited the islands in 1874, Matkin keenly observed that “the bread fruit, banana, plantain, arrowroot, nutmeg, capsicum & tea plant, & sugar cane will all grow here, but the first three, with the cocoa-nut are the principal productions” (Rehbock 1992:181).

Eventually, introduced crops began to replace rather than complement native foods. No cultigen had more effect on traditional Fijian root crop agriculture than cassava (*Manihot esculenta*). This American tuber was first introduced during the 1850s. At first it did not catch on, but declining soil fertility associated with shortened fallows and the displacement of subsistence cultivation to marginal lands made it more necessary to rely on cassava (Ward 1964b:488). In any event, the changes to diet wrought by new food items, along with the byproducts of commercial agriculture, combined to loosen the ties to customary agrosystems. As Farrell (1972:56) remarked, “emphasis on new cash crops and new eating patterns resulted in the neglect of traditional crops.” More poetically, Quain (1948:10) reported the effects of cash cropping opportunities on Vanua Levu: “wild hogs ravage their weed-choked gardens.”

In concluding this section on pre-colonial European contact, we must briefly look at the influence of the Christian missionaries on Fijian land and life. British Wesleyan Methodists arrived on Lakeba, in the Lau Group, in 1835. They soon sought to establish mission stations elsewhere among these islands long known for their cannibalism and “heathen” ways. Wilkes (1845:358), who was in Fiji five years later, felt the missionaries “have had little success.” While he admired the endurance and enthusiasm of the missionaries, Wilkes noted that their presence seemed to be tolerated mostly
out of curiosity, and that social relations between them and local villagers were definitely on Fijian terms: "The chiefs will not allow them to construct any dwellings for themselves, but apply the law of the land most rigorously, in not permitting any building to be constructed, without their order and consent" (1845:359).

But for many Fijians, the missionaries provided their initial introduction to European habits and material possessions. Calvert (1858:12) was well aware of the transformations taking place on account of missionary contact, and portrayed the new relationship in rich detail:

Every day, and all day long, the Missionaries and their wives were compelled to hold intercourse with the natives. The arrival of these strangers was a new era in Fiji. Many now obtained an axe or a hatchet, or plane-iron, or chisel, or knife, or razor, or iron pot, or some calico or print, or other article, for which they had often longed hopelessly before, and which was given in payment for fencing, building, gardening, or other services; as also for pigs, fowls, fish, crabs, fruits, and vegetables. Thus, too, were purchased wooden bowls, mats, curtains, etc.; for in no other way could these or other things be procured for the use of the Mission families. A new stimulus was thus given to native industry, and new comforts were introduced among the people.

Subtle but unmistakable changes to Fijian concepts of labor, and in the traditional division of labor, may also be attributed to missionary influence. Some of the missionaries attempted to instill in their flock a work ethic as a corrective for what they perceived to be sloth, and this may have goaded villagers to participate in wage opportunities. Heath (1980:19) noted that the "emphasis placed by the missionaries on the value of labor began to take effect." Eventually the Christianization of Fiji proceeded toward the pivotal event of Cakobau's 1854 *lotu* (conversion), which Wilkes (1845:359) seemed to prophesy with uncanny accuracy: "the moment will arrive when the change in this group will be more rapid than that which has heretofore attended their [the missionaries'] exertions elsewhere. Should the king of one of the
powerful districts be converted, his whole tribe will follow the royal example."

The colonial era

Great Britain officially assumed administrative control of Fiji in October, 1874. This revolution in political fortunes caused widespread changes to Fijian land and life. The alteration was immediately apparent due to the exercise of what some would consider as enlightened, others overly paternalistic, colonial authority. With Cession, Fison (1880:352) stated, "it is the management, not the ownership, of the Fijian estate which has come into our hands."

The first governor of Fiji was Arthur Gordon, who faced, from a Eurocentric perspective at least, a number of formidable troubles his very first year in office: economic collapse of the cotton boom, a devastating measles epidemic, war in the western highlands of Viti Levu, and an acute labor shortage on European plantations (Potts 1959:106). Not the least of Gordon’s problems was empty coffers, and his solution for raising the necessary revenue to run the fledgling government is one of the most pervasive impositions of the colonial era on traditional Fijian cultural-ecological relations.

Taking note of the obvious, and lamenting the lack of a commercial sector in native gardening, Gordon wrote that the Fijians “are passionately fond of agriculture, but their cultivation, though very neat and careful, is chiefly that of food plantations and articles for domestic use” (quoted in Burns 1963:117). The governor wished to instill in Fijians the work ethic that drove European enterprise, and at the same time, initiate a source of income for the colony. Gordon therefore established a program whereby each district would pay taxes through the tender of vegetable produce that could
either be sold on the domestic market or exported overseas. This program listed the allowable items that the government would accept as tax produce, and required every district to establish “tax gardens” to grow those items. The items accepted as tax produce varied among the different districts, and usually, though not always, took advantage of local conditions. Of course, the acceptable roster comprised introduced commercial crops and never the traditional food plants of Fijian village-based agrosystems. These included cotton, coffee, maize, tobacco, and sugar cane (Ward 1964b:487). Indigenous products were accepted only when they could turn a profit: copra, candlenuts, and _bêche-de-mer_ were marketed from those districts where they were suitable substitutes for plantation crops. During the colonial era there was some resurgence of the _bêche-de-mer_ trade as resources became replenished on the reefs and it was allowed as a tax item (Derrick 1957:70).

To its credit, the tax garden scheme abolished a feudal form of labor conscription that had been operating under the interim government prior to Cession. When districts could not pay an unrealistic poll tax, both men and women from the villages were forced to work off the debt on European plantations. Derrick (1957:231) remarked that this poll tax was particularly devastating in Ra Province:

> In the poorer provinces, where the natives could not pay the tax even with produce or goods, there were cases in which most or even all of the men in whole districts were dragged from their homes and sold as labourers to European planters. Leefe, the warden of the Ra province, summoned a whole town for arrears of taxes; nineteen men and twenty women were ordered to pay the amount of the tax ... in default these people were hired to planters.

As the above example illustrates, the effects of labor mobility and tax garden activity can perhaps best be assessed at the local level, within particular districts and in specific places. Thus, a more detailed discussion occurs within the case studies presented in Chapters 7 and 8.
With taxes now being paid in kind, colonial authorities were forced to deal with the need for plantation labor. They attempted to solve this problem by importing labor from the Indian subcontinent. The first Indians arrived in Fiji in May, 1879, aboard the brig *Leonidas*. This first shipment of indentured labor comprised 481 workers, and by 1916, when the program was halted, more than 60,000 Indians had emigrated to Fiji (Burns 1963:111). Their presence allowed an agricultural industry to develop and eventually dominate the Fijian economy (Mayer 1973). Sugar cane was introduced as a plantation crop in 1857, but because early cultivation attempts took place in the humid windward districts, the enterprise experienced a slow start. During the colonial period, however, once mills were constructed in 1880 and planting lands expanded in the dry leeward areas, sugar began to overtake both cotton and copra as the country's leading export (Fig. 5.4), a position it still occupies in the present economy.

**Disease and depopulation**

The spread of epidemics introduced by visiting ships was one of the more tragic consequences of European contact with the people of Fiji. There are accounts of entire villages being wiped out in some districts (MacDonald 1857). Islanders exhibited little resistance to exotic disease. As Farrell (1972:40) noted, "before the Europeans came to the Pacific the area was free of smallpox, measles, typhus, typhoid, leprosy, syphilis, and tuberculosis."

Because depopulation from disease mortality may be linked with agricultural disintensification, this section reviews references to the consequences of this most dire aspect of Fiji's introduction to the World System.

Sickness occurred right from the beginning. Tippett (1973:26) collected a number of oral traditions, among which are dirges that lament the effects of epidemics associated with the arrival of the first European
FIGURE 5.4. Fiji exports, 1875-1882.

Source: Colonial Possessions Report, National Archives of Fiji
ships. Burns (1963:43) related the historical facts: "In 1791 a tender of H.M.S. Pandora, engaged in the search for the Bounty mutineers, was in Fijian waters for five weeks and her crew met with friendly and hospitable treatment from the inhabitants of one of the smaller islands, probably Matuku. This was the first known contact between Europeans and Fijians in the islands and a strange sickness broke out among the inhabitants after the visit." The disease was called by the Fijians lila balavu ("wasting sickness"), and was possibly either dysentery or cholera (Tippett 1973:25). It seems also to have arrived by the wreck of the Argo on Lakeba in 1800, as stipulated by Burns (1963:44): "Another epidemic, worse than that which followed the visit of the Pandora's tender, was introduced by the Argo's crew and spread through the islands, killing thousands. The Fijians spoke of it as 'the wasting sickness' but it is not possible to say what it really was; cholera and dysentery have been suggested." Waterhouse (1866:22) wrote that "Asiatic cholera" was introduced in 1800 as the result of the shipwreck on Lakeba, and that "the inhabitants of Bau were decimated." Regardless of its original carrier, the ailment proved tenacious. The surgeon from H.M.S. Herald, which was charting Fijian waters in 1856, published an account of his trip up the Rewa River, and made this observation on August 18: "On that day we passed the site of a town, on the right bank of the river, whose inhabitants died off with a wasting malady called lila, which often arises in an epidemic form, and appears to be somewhat like a low typhoid fever" (MacDonald 1857:239). In one of the oral histories discussed in the Nakauvadra case study in Chapter 7, the narrator for yavusa Naisogoliku attributed the onset and subsequent spread of lila to his tribe's improper propitiation of the deities. In that account, probably as the result of an interjection by the colonial official recording the story, lila is identified as "pulmonary consumption".
Whatever the translation in English might be, for the Fijians *lila balavu* was a fearsome and most unfavorable first impression of the *kai valagi*.

The second fatal disease coming as a consequence of European arrivals was called *cokadra*, and it has been identified more specifically as dysentery. The epidemic probably began in 1808, as a result of the wreck of the *Eliza*, although Im Thurn and Wharton (1925:xxxix) implicate the earlier visit of the Spanish vessel *El Plumier*, which was “almost certainly the first European ship to reach Bua.” *Cokadra* may have caused greater death than the 1875 measles epidemic, which claimed 40,000 (Tippett 1973:25). Around 1819, there occurred an epidemic of a disease known as *vudi coro*, of which we know very little (Derrick 1957:64). And in September, 1839, the worst of several influenza epidemics affected most of the islands, causing “many deaths” (Derrick 1957:69). By the following year, Wilkes (1845:329) reported that “influenza is at times prevalent among the natives ... so prevalent, that scarcely one escaped. In some villages one-half the population died.”

Perhaps the most devastating scourge unleashed in Fiji was the 1875 measles epidemic. It was unfortunately, and ironically, introduced by King Cakobau himself, after his return from a visit to Australia following the Cession of his country to Great Britain. Measles killed fully one third of the Fijian population, and was directly responsible for the armed resistance of the inland tribes to British colonial authority. Where it failed to kill, it debilitated people, thereby causing widespread famine. Constance Gordon Cumming was an eyewitness to the effects of the disease, and wrote: “The people were too weak to go to their gardens (which are often far away on some steep hillside), and so there was none to carry food; besides, a cold wretched walk through the long wet reeds was almost certain doom. In some districts, as on the isle of Ono, the people were literally starving, digging up
wild roots, and eating old coconuts” (Cumming 1881, vol.1:58). She further noted, “details that come from every isle are alike harrowing. Whole towns are deserted, every house closed” (Cumming 1881, vol.1:60).

But even this was not the end of the ravages of European disease. Brewster (1922:189) recounted the 1918 Spanish influenza epidemic, and Farrell (1972:41) believed that “the greatest overall loss in Fiji has resulted from tuberculosis.” It should prove instructive to gauge the extent of depopulation resulting from all these afflictions.

Several researchers have provided estimates that, while not identical, are close enough to regard as somewhat accurate approximations. Frost (1979:63) estimated the precontact population of Fiji to be between 150,000 and 200,000. Wilkes (1845:323) guessed in 1840 that “the whole group contains about 130,000 inhabitants.” Farrell (1972:41) noted that “at first contact the estimated population was 250,000; in 1919, after having lost between 20,000 and 30,000 in the measles epidemic and a large number in the post World War influenza pandemic, the population had dropped to 83,000.” While his pre-contact figure is high compared to Frost’s, Farrell’s estimate of the measles toll is conservative; most authorities place the number killed at 40,000. Brookfield (1972b:24) wrote that “a series of epidemics brought population down to about 140,500 by the first reliable estimate in 1874.” The next year, measles decimated the population, and in 1879 the first official census counted between 110,000 and 112,000. According to data gathered by Brookfield (1972b:24), the lowest recorded population was 84,475 in 1921. My own research indicates that Farrell’s estimate may be closer to the population’s low point. Brookfield’s figure is based on the official tally provided by the 1921 census, while Farrell used estimates of the population total which may have occurred between the official counts of 1916 and 1921.
A graph published as part of the 1936 census shows 1919 to have had the lowest figure, at just under 82,500 (Burrows 1936:7). In 1920, although experiencing a modest increase, Fijians still numbered below 83,000. At any rate, the combined effects of the series of epidemics certainly predicated a precipitous decline in population, as the graph based on official census data shows (Fig. 5.5).

Effects of warfare

Warfare was a common and widespread occurrence in Fiji. This may not have always been the case, of course. Some sources refer to a time of peace in the days long ago, with warfare only becoming prevalent within the last few centuries. Conducting research among the Lauans of eastern Fiji, Thompson (1938:183) found that “their traditions contain no reference to warfare and there was apparently little rivalry between groups or individuals.” Some sources implicate Tongan arrivals as instigators of conflict (while others blame the Fijians for taking warfare to Tonga!). Frost (1979:74) reported archaeological evidence from Taveuni that he interpreted as a period of building hilltop fortifications between A.D. 1200 and 1400. Whatever may have been its causes and development, warfare in Fiji, by the time of European contact, had become an institution, and Waterhouse (1866:315) was compelled to remark that “Fijians, as a people, are addicted to war.”

Political evolution brought about correspondent changes in the nature of warfare in Fiji. Early observers noted there were two types of war — the “ambuscades and desultory skirmishing in the bush” which went on all the time (Allardyce 1904:71), and the larger scale conflict which missionary John Hunt termed “war of the chiefs” (Tippett 1973:76-77). Fighting between neighboring tribes, while common, did not actually cause many deaths. This
FIGURE 5.5. Fijian population, 1880-1936. (Indigenous Fijians).
Source: 1936 Census data from Burrows (1936).

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type of war was more of a social performance than a politically motivated action (Tippett 1954). Ambush was the favored tactic, and the ritual need to indulge in cannibalism may have provided an impetus for sending out raiding parties. Frequently it was enough to bring home a body or two for a symbolic feast. The chiefly confrontations, on the other hand, were associated with the rise of the greater polities, as the various *matanitu* competed with one another for power and influence. Both the frequency and ferocity of such wars seemed to have been escalated with European contact and the introduction of muskets.

What concerns us here is the effect warfare may have had upon the process of agricultural intensification. The possibility of conflict influenced subsistence activities in several ways. Location as well as type of agricultural landscape associated with a given settlement were especially susceptible to the repercussions of warfare. And location refers to both the relative geography of habitation site and gardens, and the physical situation of the village itself. These were the spatial attributes prone to respond accordingly during conditions of strife. As Lewis (1951:48-49) has written, “In Fiji some of the villages are regular fortresses, elaborately fortified with earthworks. The gardens and fields of the inhabitants are usually nearby, but may be at some distance; and the paths, both to the village and the gardens, may be concealed and difficult to find.”

Food resources were recognized as a legitimate target by Fijian warriors. There are numerous accounts of gardens being destroyed in the aftermath of combat. Uprooting plantations was often a prelude to laying siege to a village. And attacking agricultural lands was a typical and expected mode of operation in the heat of battle. Waterhouse (1866:371) commented on Bauan behavior during one of the clashes between Bau and
Verata: "Like a lawless troop of robbers and murderers, they destroyed many plantations, burned two settlements, killed two hundred and sixty of the inhabitants, and made prisoners of many women and children. During several days the victors were devouring the slain, like infuriated wolves and hyænas." On another occasion, after Bauan troops had lent assistance in the Vuna versus Somosomo war on Taveuni, they returned home via the south shore of Vanua Levu, "where they amused themselves by destroying plantations, placing traps for the destruction of the unwary, &c."

(Waterhouse 1866:138).

Chronic conflict could result in villages or even entire vanua (districts) being abandoned. MacDonald (1857:237), while journeying up several rivers in eastern Viti Levu in 1856, noted that the Waimanu passes through "a very populous district" but that the Rewa, or Wailevu, "from Navuso to Naitasiri, is very scantily populated." He recorded the absence of coconut trees, and remarked that "this is attributable to the continued warfare of former times: when a town was besieged the resources of the people, including breadfruit and coconut trees, were cut off by the enemy" (MacDonald 1857:237). A bleak homecoming awaited released prisoners from a formerly prosperous area following the disturbances in the upper Ba River, where "villages had been destroyed, the plantations ravaged, and cultivated land allowed to return to scrub" (Derrick 1957:228). For regions embroiled in internecine struggles, the cycle of ruin and repair would only end with an offer of submission by the defeated district. Burns (1963:29) described a characteristic scenario illustrative of such tactics: "The villages of the conquered people would be burnt and their crops destroyed, but many of the vanquished would escape and return after the departure of the victors to build their villages again. It might, however, be necessary for them to pay
tribute to their conquerors, in foodstuffs or in women, to escape further molestation, and this would continue until some change in the balance of power made it safe for them to evade this obligation.” Defensive postures had their own price, and avoidance of the dangers of warfare could have tragic ramifications. Derrick (1957:89) related the situation facing the inhabitants of Bua, where “for years they had been prevented by war from giving due attention to planting, and mothers were said to have destroyed their children because there was not enough food to nourish them.”

The physical location of villages responded to strategic imperatives. Many villages chose to locate in inaccessible and often lofty locations. The word ‘eyrie’ comes to mind. Lawry (1850:209) described one scene in Ra Province: “The sloping high land hereabouts is very rocky, and in some places, very abrupt. Such were the places selected to build upon; it matters not how high, or craggy, or precipitous it may be, there is their town on the crag of the rock.” The mountainous landscapes of most Fijian islands are punctuated with these old village sites (na koro makawa). Ward (1964b:485) noted the “prevalence of warfare frequently made isolation from neighbors a desirable characteristic.” As we shall see in Chapter 7, every one of the koro makawa at Nakauvadra was situated in a high sloping area of difficult access (a geographic fact to which this researcher will personally attest!). In addition to the very location offering some measure of security, surrounding their villages the Fijians constructed defensive earthworks. Much of this artificially constructed terrain foreshadows modern counterparts. Trenches, war pits resembling fox holes, and booby traps were included within this category of landscape modification.

We examined in a previous chapter the theoretical constructs of Carneiro (1970), which accounted for agricultural intensification as a direct
result of population pressure in circumscribed territory, creating a situation that eventually leads to warfare and political integration. The consequences of trying to grow subsistence crops in a landscape charged with potential conflict are manifested in many of the agricultural landforms discussed within the next chapter.
CHAPTER 6
LANDSCAPES OF INTENSIVE AGRICULTURE

Intensive agricultural landforms are consummate expressions of culture. They reflect active management of an ecosystem by humans, and ultimately derive from the interrelationships between the natural environment and the cultural milieu placed within it. This chapter charts the various landscapes that coalesced out of these interrelationships operating in the Fiji Islands.

The first section introduces the variety of agricultural landforms designed and built by Fijians. There follows a discussion of some aspects of geographic differentiation that have influenced the development of landscapes of intensive agriculture found in Fiji. The next few sections constitute an atlas of intensive agricultural landscapes. I locate these areas within the physiographic province to which they adapted: coastal plains and deltas; valley alluvial lands; and slope environments. In this discussion I am forced to use past tense much of the time because of changes in diet, crop mixes, and the increasing emphasis of commercial over subsistence agrosystems brought about by European contact.

As may be expected, particular attention is given to slopes, since this is where terracing obviously occurs. Based on field observations, these garden areas can be categorized according to their location relative to the streams that, in most cases, provided a source of irrigation water. Distance from the stream determined the complexity of the irrigation technology employed. Thus, streamside terracing needed little more than simple diversion structures placed just upstream from the garden platform. Hillside terracing required substantially greater engineering, and often a network of canals or aqueducts to distribute and regulate flows. In addition to streams, springs
and seeps were also important as sources of irrigation water. Bearing in mind the limitations of aerial photographic discovery, maps derived from aerial photographs delineate the extent of terracing in Fiji. The final section considers the general decline of intensive agriculture in Fiji.

**Agricultural landforms**

The process of agricultural intensification by which a given area of land receives increased inputs in labor and energy often modifies the environment in lasting ways. These landscape features vary in the degree of permanence they bestow to the cultural-ecological record. Some methods of intensive cultivation require the construction of new artificial landforms each season, while others leave an indelible imprint long after abandonment.

**Yam mounds**

Yam mounds are ephemeral agricultural landforms designed to optimize the microclimatic and edaphic environment favored by *Dioscorea* species. Waddell (1972a) produced the definitive explanatory work on these features, based on field research in Papua New Guinea. Wilken (1987:142-43) later listed a number of benefits from mounding, which include wind resistance, improved soil drainage and aeration, decrease in soil moisture losses from evaporation, and suppressed weed growth and facilitated weed control.

Hocart (1929:103) described yam planting activities in the Lau Islands of eastern Fiji. Land was cleared from April to June; if the entire soil cover was turned over in a yam field it was a process known as *cuki vovo*. The building of yam mounds was called *rava*; and planting usually took place between July and August, although yams could be planted through November. He also reported a rare awareness of lunar periodicity in
scheduling these activities: "Old men used to advise planting at full moon; then the yams would grow big" (Hocart 1929:103).

Reed stems known as *i vakada ni uvi* (Capell 1973:77) are placed upright in the mounds for the yam vines to climb (Fig. 6.1). In a baroque variation of this simple structure, I have also seen bamboo latticework erected over an entire yam field. Falanruw (1990:99) documented similar constructions on the Micronesian island of Yap. Yams are still cultivated in mounds in some areas of Fiji, although exotic crop introductions, particularly cassava (*Manihot esculenta*), have displaced this traditional tuber in most areas, along with the intensive method for its cultivation.

Raised fields

Raised fields may be defined as "any prepared land involving the transfer and elevation of soil above the natural surface of the earth in order to improve cultivating conditions" (Denevan and Turner 1974:24). In Fiji, the general term for such features is *vuci*. They are widespread throughout the islands, and on a small scale occur in most of the coastal plains and in the bottomlands of large river valleys. *Vuci* are commonly designed in such areas for the cultivation of taro (*Colocasia*), by raising the planting surface above a waterlogged natural base. Ditches around the perimeter of the garden aid in water circulation and drainage. Denevan and Turner (1974:24) suggested that "while drainage is usually a major objective, raised planting surfaces have other important functions." Parry (1987:85) reported that "fertility of the soil is replenished by periodically cleaning out the ditches and piling silt and vegetable mulch on the surface of the beds."

Most villages in Fiji utilized *vuci* to some extent, and field observation yields limited examples of taro cultivation in remnant raised fields (Fig. 6.2). But these features attained their greatest elaboration and concentration in
FIGURE 6.2. Vuci on coastal plain, Kadavu. These raised fields were constructed for the cultivation of *Colocasia*. Note different stages of crop growth in the separate garden beds.
the flat expanse of the Rewa delta, where they were intensively intercropped with taro and giant swamp taro, or via kana (*Cyrtosperma chamissonis*).

Taro was planted on the raised surfaces, while the giant swamp taro, tolerant of brackish and stagnant conditions, was cultivated in the ditches surrounding and deepened by the raised beds.

Fijians inhabiting most parts of the archipelago cultivated some taro in raised fields, although certain areas exhibit more prevalent use of this intensive agricultural landform than others. The nearly ubiquitous distribution of *vuci* may be detected in their variable terminology. These synonymous terms for *vuci* have been collected by Geraghty (1992): *busa* (Nadroga); *samusamu* (Natawa peninsula, on Vunua Levu); *iuvuiuvi* (Labasa and Macuata coast); *solove* (Lau); and *wanu* (Lakeba). My own fieldwork indicates the word *vuevue* in common usage on the island of Kadavu. As should be noticed, most of these areas are located in eastern Fiji, the exceptions being Nadroga (southwestern Viti Levu), and Kadavu. Parry (1987:85) noted that “this type of cultivation was not common in western Viti Levu because there are relatively few backswamp sites with impeded drainage where raised-bed methods could be used.”

**Terracing**

Agricultural terraces have been defined as “any artificially flattened surface on which crops are grown” (Spencer and Hale 1961:3). Donkin (1979:3) stated with equal clarity that “agricultural terracing represents an attempt to overcome the problems inherent in cultivating slopes.” Doolittle (1990b:95), however, suggested that terrace development could be more of an incremental than intentional process, and differentiated between “channel bottom terraces” and “hillslope terraces”. This is a valuable typological division because it is based on complexity of agrosystem operation and
requisite infrastructure. In the sections below and in subsequent chapters, I have adapted it to the particular terrace forms found in Fiji.

Unlike terraces in other regions, which may be built to retard soil erosion or simply to provide a level planting area, the irrigated taro terraces of the Pacific are designed to carefully control the flow of water. The wet, pondfield environment thus created provides the optimum medium for the growth of taro. Water must never be allowed to stagnate, but must always flow slowly through the gardens, typically at a depth of between 10 and 15 cm. This continuous run of water regulates the temperature of the garden, cooling the taro stalks and helping to prevent corm rot. The rich saturated soil layer is also constantly nourished by the nutrients delivered in the flowing water. These hydraulic requirements of irrigated taro gardens once prompted a prominent Pacific scholar to suggest a tongue-in-cheek autonymic modification to their standard nomenclature, from “pondfields” to “brookfields” (1971:115).

Irrigated terraces were constructed in many areas of Fiji, and I present a detailed atlas of their occurrence in a later section of this chapter. Like that documented for raised fields, the widespread distribution of terracing is reflected in the different names given to these features in various parts of the country. Watling (1984:125) reported the term tabaiwai from the island of Gau, and Parry (1987:80) used the same word in his study of the Sigatoka Valley. Geraghty (1992) has recorded other names for irrigated terraces in Fiji, and these include waisa (Moala; Matuku; Totoya); tukituki (Cakaudrove); somo (Nukuloa, in Ra Province); and waitaki (upper Wainibuka River). Some regions simply called them vuci. Case studies within Chapters 7 and 8 report two additional names for irrigated terraces: tuatua at Nakauvadra, and laua on Kadavu.
Irrigation systems

A nineteenth-century visitor to Fiji reported that taro “is planted systematically in beds and irrigated by means of water courses” (Anderson 1880:102). Geographer Friedrich Ratzel (1896:256) noted that “the agriculture of the Fiji Islands takes a higher rank than even that of Polynesia,” and mentioned “terraces with earth artificially banked up on steep slopes, and arrangements for irrigation, especially in the cultivation of taro” (1896:254). Infrastructure supporting irrigated terrace cultivation in Fiji included in-stream diversion dams and barrages, artificially constructed ditches and canals, and aqueducts consisting of hollowed out tree trunks or bamboo. Major terrace systems required a network of water delivery channels to maintain adequate levels in the individual gardens. The larger complexes often had several canals entering the system at different levels along the slope. Parham (1942a:21) wrote that “Fijians were, and in some parts are still, very expert in irrigation works including permanent dams, water-races, and even the piping by bamboos of water across rock faces, but though terraced areas literally cover miles of hillsides the methods used have meant immense expenditure of labour for the watering of narrow if numerous gardens.”

Canals and aqueducts sometimes stretched for long distances to deliver water to a set of terraces. Quain (1948:138) reported that in western Vanua Levu, “most taro is planted in carefully irrigated ponds, the canals of which may extend for more than a mile.” An early admiralty chart depicted a bamboo aqueduct over 3 km in length on the island of Gau. Sometimes these aqueducts would need to cross gullies or other intervening topography. Governor Arthur Gordon, on an outing in Ra Province on April 2, 1880, came upon such a construction:

We were hot and tired and our first desire was for a bathe. We were accordingly conducted to a tolerably good bathing pool in
the small river, passing on the way to it good cultivation, and a
canal and aqueduct which form really a creditable piece of
engineering, one stream being conducted across another. On this
crossing a tabu of cocoanut leaves has been placed to prevent
people using it as a bridge. (Gordon 1912:259).

Degener (1949:253) noted that "not a little labour and ingenuity has been
displayed by the Fijians in making aqueducts, often miles in length, over
ravine and hollow, to carry a supply of fresh water to these plantations."
The Nakauvadra case study includes an excavation of an earthen canal; while
the Kadavu case study reports additional data concerning the working of
irrigation channels and water delivery networks.

Geographic differentiation

Fijians everywhere cultivated the basic Oceanic agricultural complex
of tree and root crops. But all areas did not rely on the same combination of
cultigens in the same proportions. On some islands, coconuts and breadfruit
were more important than root crops. Particular parts of the group favored
yams, whereas others preferred taro. Certain regions developed irrigation;
others did not. And some villages constructed terraces for wetland taro,
while others apparently did not feel the need to intensify their production to
such an extreme degree. This variation can be attributed to both natural and
cultural factors, and may be viewed as a microcosm for agrosystem
differentiation across the entire Pacific.

Perhaps the most obvious differentiation developed from the relative
lack or abundance of rainfall. Fiji is situated in the path of the southeast
trade winds, so the south and east coasts of islands receive ample rainfall.
Mountains in the interior of larger islands orographically coax additional
amounts of moisture from the clouds. Accordingly, these larger mountainous
islands manifest rain shadows in their northern and western portions. The
precipitation pattern for Viti Levu and Vanua Levu illustrates these effects (Fig. 6.3).

Climate over Fiji generally may be categorized as tropical maritime, with a Köppen classification of “Af” (Thomas 1963:29). Precipitation patterns, however, exhibit much variability according to season, topography, altitude, and alignment relative to the prevailing winds. Other factors influencing local rainfall include “orientation of coastlines and mountain ranges, channeling effects between mountains, the relatively lower trade wind inversion with increasing height, the subsidence in the lee of mountains, and favoured areas of diurnal convection with different flow patterns” (Krishna 1980:2). Orographic influence on rainfall can have a profound effect on the geography of agricultural pursuits. As Krishna (1980:3) has commented, “dry areas found about coastal plains encroach deep into broad river valleys e.g. Dreketi River and Sigatoka River.”

Extremes of temperature and precipitation correspond in Fiji. Over the course of the year, periods of highest rainfall coincide with highest temperatures. December to March is the wet season, with temperatures averaging 24°C (Harris 1963:25). In addition to the annual variability of rainfall in general, there are many regional differences. Certain areas experience a marked dry period. Indeed, the geography of precipitation is such that any area in the islands may be classified as being in either a wet zone or dry zone (Harris 1963). Topographic relief acts to accentuate the broad seasonal differences caused by the latitudinal shifting of the Intertropical Convergence Zone. Northern Viti Levu, for example, can witness wide variation in annual precipitation (Fitzpatrick, et al.:1966). Topography has been found to exert greater influence on precipitation than earlier realized, leading to revised assessments of climatic behavior: “The
FIGURE 6.3. Annual rainfall for Viti Levu, Vanua Levu, Taveuni, and Ovalau. Adapted from Kennedy (1966).
high mountainous interior of north-central Viti Levu is among the wettest areas in the wet season. However, due to relatively low dry season rainfall the annual rainfall in this area is substantially lower than estimated in the past” (Krishna 1980:3). More detailed discussion of climate and rainfall will be included in the case studies.

Tropical storms are a climatic phenomenon that can severely affect agricultural activities. The Fiji group is situated in an area of the southwest Pacific that is prone to cyclonic storm development during the austral summer. Fitzpatrick, et al. (1966:183) stated that “the yearly occurrence of these cyclones is irregular, but their tracks are well marked in a broadly southwesterly direction ... a high percentage of the storms pass over, or nearby, Fiji, the New Hebrides, and New Caledonia.” On the average, between three and eight cyclones may be expected to form each season (November - April). Recent trends suggest, however, that this number may be on the increase, possibly due to global warming affecting ocean temperatures (Nunn 1990b).

Regional comparative advantage based on environmental conditions resulted in geographic differentiation. For example, many of the Lau Islands of eastern Fiji are coral atolls that lack the fertile volcanic soil resources of the high islands. Coconuts were often the only reliable food crop that could be grown in such a harsh environment. Some islands in the Lau group are hilly enough to support inland forests, and tree crops such as plantains and breadfruit were supplemented by wild fruits and nuts. Of course, edible marine life was in abundance, but areas suitable for root crop production were exceedingly rare. As might be expected, trade with more favored areas took place, and islands with suitable timber such as Kabara specialized in canoe building and other craft production (Banack and Cox 1987). Calvert
(1858:94) commented on the strategies undertaken by the people of Oneata, one of the Lau islands southeast of Lakeba:

These Oneata people are singularly independent in character, and have thus escaped the servitude which oppresses so many of the small islands. They are very industrious and enterprising. Besides planting abundance of food, and manufacturing articles for tribute, they have excelled their neighbors in commerce, engaging and supporting canoe carpenters, and thus enlarging their means of communication with other parts of the group, whence they obtained various commodities, such as crockery and mats, which were not made among themselves. Somehow they boldly kept their canoes from the grasp of superior Chiefs, and thus their intercourse with other islands has been considerable.

Following the traditional characteristic agricultural ecology found throughout the Pacific, root crops were generally the most important cultigens tended by Fijians. Yams, or uvi (*Dioscorea* spp.) and taro, or *dalo* (*Colocasia esculenta*) were the most common tubers cultivated. In addition, Fijians raised the prehistoric introduction from America, the sweet potato, or *kumala* (*Ipomoea batatas*), the giant swamp taro, or *via kana* (*Cyrtosperma chamissonis*), and other minor tubers. Root crops in general, along with arboreal crops such as plantains (*Musa*) and breadfruit (*Artocarpus altilis*), fall into a Fijian dietary category called *kakana dina* ("true food"): "These starches are the main component of a meal, the main elements of food that make a person feel satisfied after eating" (Pollock 1986:108). A proper meal invariably must include *kakana dina*, which may then be supplemented by various greens and perhaps fish or prawns, all of which are categorized as *i coi* (for lack of a better word, "relish").

Yams and taro were also ceremonially important. There is some disagreement in the literature and historical source material regarding which is the most important. Seeman (1862:296) noted that particular island groups in the Pacific emphasized specific cultigens: for Hawaii it was taro; in Samoa (and the Marquesas), it was breadfruit; and in Fiji, he felt, yams
reigned supreme. Likewise, Lewis (1951:72) stated that “in Fiji ... yams have first place.” On Vanua Levu, more taro than yams are grown, but yams are more important because they are perceived to be “an honorable and chiefly food” (Quain 1948:135). Lasaqa (1963:54) gave us some indication of the status of this crop when he wrote the following assessment:

The yam is traditionally the most important crop in Fiji. It was deeply involved in the social organization and in the general activities of the people. As such it had a high place in the Fijian agricultural calendar. Today, however, the yam has lost much of its significance.

Yams were also a prestige crop that comprised a necessary presentation during one of the most pivotal rituals of the year. This was the i sevu, or “first fruits” ceremony, whereby chiefs received a portion of the initial harvest (Turner 1984). Additional evidence for the crop’s importance may be seen in the fact that stealing yams from the chief’s garden was punishable by death (Waterhouse 1866:328).

Calling taro the “staff of life”, Ratzel (1896:256) noted that the importance of taro in Fiji merited placing it above the yam. Taro could also be infused with ritual and ceremonial significance. Hocart (1929:82) reported a farewell ceremony for people from Kadavu visiting Lakeba, when the host village presented food to their guests: “Next day was the ‘send off’ (italathit) ... pig, taro, puddings, and kava were collected ... the taro was set down and transferred from the usual rough basket (kato), plaited for the occasion, into big round ones.” At Namosi, in the interior of eastern Viti Levu, MacDonald (1857:256) caught sight of a religious function for this crop: “Going to the place where our canoes were hauled up, we noticed some offerings made to the spirits of the dead, consisting of boiled ndalo, laid out on pieces of masi [barkcloth], supported by four uprights rudely cut from the bush, thus forming a primitive sort of altar.” This ritualized function of taro
seems to have made the transition from heathen to Christian Fiji, as noted by Cumming (1881, vol.1:151), who wrote that a typical offering to the missionaries “generally consists of one root of yam or taro, a bunch of tobacco leaves, a sugar-cane, or a yangona root.” An extreme case of the powers of *Colocasia* comes from an account by Waterhouse (1866:286), who reported that “early in the new year [1855] a strange rumour reached Bau. A certain vegetable (dalo) had been cooked at Rewa, and served up on a wooden tray, to supply one of Ratu Qara’s wives with a repast. Suddenly it became evident that the taro was weeping.” It was an oracle, predicting the death of the king of Rewa, Ratu Qara, who tolerated the missionaries and even treated them with friendship, but never converted to Christianity himself.

Taro cultivated in the dry zones responded well to irrigation. Ward (1965:18) wrote that taro was “grown in both wet and dry zones in artificially constructed beds or in elaborate, irrigated terrace systems.” We should expect, therefore, to find irrigation to be a landscape feature in those areas where taro was an important cultigen and which did not receive enough precipitation to produce a robust crop. These irrigated gardens were not always necessarily terraced. Leeward coastal flats often needed irrigation systems to ensure reliable taro yields. These would have been monolevel pondfield areas or large “semi-terraced” platforms only slightly embanked.

Where sufficient bottom land was not available for irrigated taro production, the Fijians constructed elaborate terrace systems. Williams (1858:61-62), discussing taro cultivation practices in Fiji, provided an appreciative description of these features:

Irrigated taro beds are generally oblong, and prepared with much labour. The most approved soil is a stiff, rich clay, which is worked into the consistency of mortar, and watered carefully, and often with skill. Valleys are preferred for these beds; but sometimes they have to be cut on the mountain slopes, which, when thus terraced with mature taro patches, present as
beautiful a spectacle as any kind of agriculture can furnish. The
deep, rich green of the broad leaves, which rise three feet or
more from their watery beds in rank and file, contrasts
beautifully with the profuse but irregular vegetation of the
uncultivated ground.

This passage contains two seemingly contradictory phrases that are
revealing of the processes of agricultural intensification. The author
depicted valleys as being “preferred” for growing taro. Inherent in this
qualifying adjective is an alternative — that taro could be grown in other
than irrigated beds in alluvial bottomlands. Indeed, Fijians grow dryland
taro in regions receiving ample rainfall on relatively steep slopes with no
other preparation than the standard swidden practices of clearing and
burning. When Williams said that terraces “have to be cut on the mountain
slopes” (italics added) it would seem to imply no other choice. In
mountainous country within the dry zone, this held true. But one of the
puzzling results of the present study is that irrigated terracing seems to have
been developed in areas where it is not required by environmental and
climatic conditions. A later section within this chapter discusses the
distribution of irrigated terracing across the archipelago.

Derrick (1951:97) stated that for most areas of Fiji, “where water is
available, they irrigate their dalo-beds; in the dry areas they clear land by
firing the hillsides.” Nearly all of this dryland cultivation was accomplished
by standard swidden practices of slash and burn. But even this method,
normally considered to be an “extensive” type of cultivation, required a high
level of managerial skill. Many garden areas were in a decade-long “bush
fallow” cycle of rotation, a term proposed by Barrau (1957:53) as a more
accurate replacement for “shifting cultivation”:

The pattern of subsistence horticulture is always as follows:
clearing of the forest to lay out the garden, use of the garden
for about a year, and then leaving it to lie fallow for at least ten
years. During the first and second year of this fallow period
certain foodstuffs, mainly bananas, sometimes continue to be harvested by semi-foraging. This is a “bush-fallowing” system of cultivation.

After being harvested, gardens reverted to a secondary type of former vegetation when not continually burned. Indeed, much of the *talasiga* country may have been created because the need for greater intensity of use resulted in shortened fallow periods. Frequent burning would preclude the re-establishment of tree species, and the landscape would have degraded into anthropogenic grasslands. The irrigated taro terracing so widespread within this zone may have been developed as an environmental endpoint was reached: continuous and accumulative degradation and erosion of slopes could have rendered dryland gardens unproductive, forcing the people of interior western Viti Levu to intensify cultivation practices. By way of comparison, a somewhat parallel situation had developed earlier in the highlands of Papua New Guinea, according to research reported by Golson (1982:304): “the destruction of the forests and their progressive replacement by increasingly degraded secondary growth and finally by grassland not only make agriculture by far the dominant sector of the economy [but also cause] radical developments within the technology of agriculture itself, since the practices of shifting cultivation are not effective in the changed environment.” The developments in Papua New Guinea were rendered even more complex by the transition from hunting and gathering to horticulture.

While Fiji never displayed the cultural-ecological divergence that we witnessed earlier for some of the Melanesian islands to the west, where yams or taro came to be identified with certain cultural groups, there was at least some specialization. Couper (1968) reminded us that “a few of the volcanic islands were also known as great yam and taro producers.” Seeman (1862:59) wrote that “an immense number of yams are grown” on the island of Koro.
Turpin (1870-1894:69) noted that "Koro yams were formerly the largest yams grown in Fiji," and could weigh up to 30 pounds apiece. Ross (1909:214) provided an interesting fact that may be involved in the association between this island and yams: "Koro was the pigs' Elysium ... the spirits of all the slaughtered swine in the group were believed to assemble and spend a happy immortality there." Given the correlation between pigs and yams elsewhere in the Pacific, *Dioscorea* production on Koro may have been driven by cultural incentives. Hocart (1929) noted the predominance of yams in the Lau group, which probably had more to do with environmental reasons.

On the windward side of the larger islands, abundant precipitation obviates the need to irrigate, though taro was still a mainstay of the subsistence landscape. Nuttings (1924:150) related the agricultural scene outside of Namosi, in the eastern interior of Viti Levu:

> Approach to the village is through an avenue of orange trees well grown and loaded with fruit when we were there. Above and below where the flood plain widens are banana plantations under native cultivation. On the bases of the mountains are fields of taro, the major food product of the region.

This would have been dryland (non-irrigated) taro. Rivers (1913:265) charted a similar irrigation geography on an island in Vanuatu:

> The distribution of the two methods of growing taro in the New Hebrides is largely dependent on the presence of streams or springs, but the relation between the presence of water and irrigation is not constant, for irrigation may be absent where streams are abundant. Thus, in the island of Santo, irrigation and terraced cultivation are only found to the west of a line running from north to south through the middle of the island. To the east of this line only the dry method is practiced, while to the west of the line both methods occur.

On Viti Levu, at least, the development of irrigated taro gardening followed the same east-west division outlined earlier in the context of dialect and socio-political development. What is surprising in Fiji, in light of the assumptions operating in many past studies elsewhere, is that intensive
agricultural practices and irrigation are associated with a lower level of political organization. This notion will be discussed further in the summary within Chapter 9.

Not all intensive forms of agriculture in Fiji were linked with irrigation systems. Parry (1987:78) identified terracing for dryland taro in the Sigatoka Valley, and called this type of agricultural landform were. I also came across non-irrigated terraces on Kadavu that were planted with Colocasia, Xanthosoma, and Ipomoea. Informants identified these structures with the word sauvata. Although she did not identify a specific location, Adams (1890:90) apparently encountered dryland yam terracing on Vanua Levu:

The yam attains perfection on this island ... the sunny banks of the valleys and the slopes of the lower hills are best adapted to its growth. For planting yams, the earth is arranged in terraces, overlaid with a thick coat of rich earth and leaves. The yams intended for planting are kept until they sprout, when each sprout is removed, with a portion of the yam about an inch long and a quarter of an inch thick attached to it, the remainder of the root being reserved for eating. The detached pieces are carefully set in the terraces with the sprout upward, and tightly covered, first with leaves, then with mold.

Can dryland terracing be considered a distinctive agricultural landform in Fiji? Data presented in Chapter 8 indicate how even an intensive irrigated terrace system progresses through a cycle involving periods of both fallow and dry plantings. Moreover, even after abandonment of the water delivery infrastructure, former irrigated terraces make ideal planting surfaces, and are often still utilized for a wide variety of crops. This is represented by the mixed gardens on abandoned taro terraces behind the Kadavu village of Talaulia (see Chapter 8). There was even a place on Kadavu where I discovered a long neglected terrace system that had been subsequently developed with a number of large yam mounds, equally fallen into disuse. After seeing the steep slopes that are successfully cultivated by
swidden methods it is obvious to me that there is no reason to develop dryland terraces. Therefore, I would venture to state that all terracing in Fiji may have been originally designed to be irrigated.

The most intensive form of dryland cultivation is the yam mound. Growing yams takes up much time and labor, particularly as it requires the annual preparation of new gardens (Ward 1964b:487). Commenting on yam patches, Walker (1936:138) noted that “this cultivation peeps up in the most unexpected places, often at a considerable distance from the village.” MacDonald (1857:258) gave an account of his visit to a chief in the province of Naitasiri: “We strolled with Ratu Vaka Ruru to see his yam gardens. One of these contained about 600 mounds, and upwards of 50 natives were hard at work making an embankment around it.” At Ba, Calvert (1858:297) described “an unusually large yam-bed, a mile and a quarter long, which had a rich appearance.” His attention to details of both site and circumstance has left us a rare glimpse of Fijian cultural ecology (Calvert 1858:297-8):

The yams were of a sort peculiar to Mba, called vurai, and come in season four months before the common kind. Their cultivation also is peculiar, as several successive crops are grown on the same land. The path lay through a rich plain of great extent, intersected by several tidal rivers, which sometimes overflow and add to the fertility of the land.

The prominent position given to yams in certain areas of Fiji probably stems from a combination of cultural preference and environmental influence. Hocart (1929:102) wrote that “yams are the staple food of Lau ... the soil of Lakeba is especially suited to their cultivation.” Yet taro was grown with equal success on this island in the swamps behind Tubou. And Koro, an exceptionally fertile and well-watered volcanic island in the northern Lomaiviti group, specialized in yams when taro may well have been a better choice were the decision based strictly on environmental conditions.
To gain a better understanding of the different forms of intensive agriculture that developed in Fiji, landscapes are placed into the following types: coastal plains and deltas; alluvial margins; and slopes.

Coastal plains and deltas

Level areas just behind the coastal strand afford ideal places for cultivation. All of the traditional tree crops (coconuts, breadfruit, plantains) do well there, and root crops could also be grown provided the soil was sufficiently fertile. If a stream entered the sea nearby, these areas also benefited from irrigation. Raven-Hart (1956:112) reported that village gardens in the Yasawa Islands of western Fiji “are located a considerable distance away in the bush, especially either along a stream which provides the water-supply (since *dalo* needs much water) or between this and the sea.”

Most of the coastal plains in Fiji have been transformed by the monocultural imposition of cash cropping (coconuts and sugar cane), or by so-called economic development associated with tourism and road construction (e.g., the “Coral Coast” of southwestern Viti Levu). Furthermore, because previous land alienation targeted these areas, much of the coastal margin is now in freehold tenure (Ward 1965:119-20; Berry and Howard 1973:31). Contemporary landscapes reflect the changed conditions evident to some degree in the cultural ecology of most Fijian villages. Pressures for land-use change are more keenly felt in those coastal areas where paved roads provide easy access. Intensive forms of subsistence agriculture in such places have given way to the earning power of small scale cash crops like *yaqona* (*Piper methysticum*), or the lower labor requirements of introduced cultigens such as cassava (*Manihot esculenta*) (Fig. 6.4).
FIGURE 6.4. Planting cassava, Namada, Viti Levu. *Manihot esculenta* has displaced the more traditional tubers throughout Fiji.
Deltas at the mouths of major rivers present a unique situation, and figure prominently in any discussion of socio-political development and agricultural intensification in Fiji. As Bayliss-Smith, et al. (1988:42) wrote, "Fijian chiefs were perhaps not social engineers on the scale of Wittfogel's (1957) Oriental Despots, but the new opportunity for political control over production provided by emerging landforms such as the Rewa delta on Viti Levu or, on a smaller scale, Lakeba's swampland and coastal flats, is undeniable."

The occurrence of rivers in Fiji is limited to the two largest islands of Viti Levu and Vanua Levu. Large flat areas favorable for settlement did not develop at the outlets of all these rivers, however. Deltas were more likely to evolve on eastern coasts as a result of substantial flows emanating from windward watersheds. For example, while the Nadi and Ba Rivers on Viti Levu drain relatively large areas, their watersheds are on the dry leeward side of Viti Levu, and they do not carry enough flow and sediment to build extensive deltas. Furthermore, the location of the Ba River mouth on a low-energy coastline results in the development of a vast mangrove swamp rather than a delta of alluvial soil. Regarding Vanua Levu, its size and shape, but more particularly the perpendicular alignment of the island to the trade winds prohibits the development there of catchment areas of sufficient size to create major deltas. The Labasa River forms a small delta, but there is no evidence of prehistoric agricultural development or artificial landforms of intensive cultivation. That leaves two rivers in southeastern Viti Levu: the Rewa and the Navua.

The Rewa River is Fiji's largest; its earlier name was the Wailevu ("great water"). The tributaries of this river drain virtually the entire eastern half of Viti Levu. Parts of its delta consist of rich soils created by
successive flooding and the deposition of transported material from the uplands. Other areas, closer to the sea, constitute a swampy lowland requiring drainage for both settlement and agriculture. This area was the home of a powerful matanitu that successfully challenged Verata for supremacy and subsequently engaged Bau in its longest competitive struggle. The Rewa delta may have witnessed the most concentrated population densities in pre-contact Fiji. Still discernible in the landscape are vestiges of village fortifications and associated former agricultural zones where giant swamp taro, or via kana (Cyrtosperma chamissonis) was intercropped with taro, or dalo (Colocasia esculenta) in raised fields. Superimposed upon these features is the current cultural layer of mainly Indian small holdings comprising rice fields and pastures. Wright (1986:156) described what he saw when flying over this area several years ago: “The delta looked like an experimental garden, its neat strip fields and grid of red-earth roads broken in places by patches of brush, fallow, and meandering streams. Here and there, either intact or evident in crop patterns, you could see ring ditches and circumvallations of ancient fortified towns.”

Parry (1979:49) stated that “the swamp of the Rewa delta presented one of the most difficult agricultural environments of the South Pacific because of the high water table and the frequency of flooding.” Nevertheless, early Fijians prospered here, and peppered the region with a dense pattern of moated settlements known as ring-ditch fortifications. Palmer (1969:182) defined a ring-ditch as “a circular ditch and bank line of defence enclosing a habituation area,” and referred to MacDonald’s (1856) tally of 95 such defended villages extant in the Rewa delta during the middle of the nineteenth century. The typical ditch was nearly always circular, with bridged causeways providing access. Larger villages developed a series of
linked ring-ditches. In addition to providing a means of village defense, these water-filled trenches furnished ideal growing conditions for the giant swamp taro (*via kana*).

Beyond these domestic perimeters, wide expanses of the raised fields known as *vuci* completed the subsistence landscape. Parry (1979:49) referred to the typology outlined by Denevan and Turner (1974), and stated that “the *via* garden would be considered as a type of ‘raised field’.” But Perks (1980:83) claimed that Parry “labored under a fundamental misconception when discussing this plant [and] shows *via kana* growing on top of the garden banks. This was not where the crop was grown ... the Rewa staple was grown in the ditches.” A technical point well taken, to be sure, but this is not to say that these features should not be categorized as raised fields. The agricultural landforms of the Rewa delta were in fact designed for the production of both *Colocasia* and *Cyrtosperma*. Palmer (1969:188) is quite clear in his assertion that both *dalo* and *via kana* were grown in the delta. The artificially created agronomic environment is thus one that accommodated the intercropping of taro with giant swamp taro. Based on painstaking aerial photographic analysis, Parry (1977, 1979) estimated the area of these gardens at 5,200 ha, which “represents 21 percent of the total area of the delta and a massive investment of time and labor” (1979:49).

The delta environment favored the cultivation of giant swamp taro, which is “more tolerant of brackish conditions than *Colocasia esculenta*” (Thompson 1982:190). It took a long time to mature (three years), but the tuber left in the swampy ground remained edible for at least that long afterwards. It has been referred to as a famine food for its ability to withstand cyclones, and to provide sustenance when other food sources have been destroyed. Wilkes (1845:336) reported that “at Rewa, a root called ivia is

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found in the marshy grounds ... it is perennial, and if left to grow several years, reaches an immense size, becoming thicker than a man's body, and several yards long." _Cyrtosperma_ is not commonly grown any where else in Fiji beyond the Rewa delta, although certain other Pacific islands rely on it almost exclusively. My own limited fieldwork in the Rewa delta revealed that giant swamp taro was still being cultivated to some extent, along with taro. Villagers at Nakorovou, just north of the great river's outlet to the sea, persist in constructing _vuci_ for both _via kana_ and _dalo_ (Figs. 6.5 and 6.6).

The Navua River heads in the south-central part of Viti Levu, and because a high range of mountains blocks its direct access to the sea, it forms what Griffith Taylor (1951:149) termed a"remarkably enclosed basin." Its delta is much smaller than the Rewa, but the area experienced similar settlement patterns and related agricultural development. Palmer (1969) and Parry (1982) reported on the remains of ring-ditch fortifications and associated _vuci_ in the Navua Delta. Once covered with cotton during the 1860s, today the Navua delta is the scene of pasture mixed with minor areas of maize cropping.

Alluvial margins

The flat areas found in valley bottoms offered ideal conditions for agricultural intensification. Fertile alluvial soils responded well to increased inputs of labor, and irrigation water was immediately at hand. Lawry (1850:193) depicted one such irrigated landscape in Vuya-Dama in western Vanua Levu: "The large flats between the mountains and hills are composed of alluvial soil, perhaps twelve feet deep on the average, and being level, the rain water, and the spring water also, are seen in pools in all the low places, with here and there a rill purling its way to the neighboring river. In these flats the natives grow their taro, about nine inches deep in clear water."
FIGURE 6.5. Via kana at Nakorovou, Rewa delta. Villagers in this wetland environment still grow *Cyrtosperma chamissonis* in raised fields.
FIGURE 6.6. Building vuci for *dalo* cultivation, Nakorovou, Rewa delta.
Along the sinuous meanders of the Sigatoka River, a natural levee and backswamp topography, albeit on a small scale, allowed a number of irrigation systems to be developed on the floodplain. Parry (1987:84-85) found evidence for both raised fields and irrigated pondfield cultivation in the Sigatoka bottomlands. Likewise, Hashimoto (1990) recently documented both forms in operation at Korolevu, on the floodplain of the upper valley. Hashimoto's (1990:9) detailed drawings and map of the *dualo*vo (island beds or raised fields) and *tavi* ("flat-land pondfields") illustrate important details concerning the operation of these intensive agricultural landforms.

Smaller streams also naturally provided flat places that could be intensively cultivated in some areas. Hocart (1929:106) told of irrigated taro production in the Lau Islands, and recorded there an instance of "splash irrigation":

Only wet taro fields are cultivated in Lau, and these by irrigation along the streams. Such land is called *solove*. Swiftly running streams are most desirable, for sluggish water becomes hot and wilts the plants. The irrigation consists in dipping water from the stream with coconut shells attached to a stick, or flooding the fields by turning the course of the stream.

He also described two methods of planting taro: *lauvoro*, entailing no-till planting of taro cuttings among the vegetative debris from the cleared site; and *biti*, which involved cutting and burning the vegetation, full tillage of the soil, the creation of individual pits for every plant, and the construction of "earth walls surrounded by ditches" around each garden plot (Hocart 1929:107).

Quain (1948:138) reported a small scale intensive form of streamside taro cultivation known as *vatui*, whereby "stones in a shallow stream bed support bare taro stalks which send out feeder roots to grow loosely in the water." Interestingly, Hunter-Anderson (1991:26) has recently described the exact same method still in use for *Cyrtosperma* on Chuuk, in Micronesia.
Quain also told of a method called *laulevu*, which entailed “taro planted hastily in the swampy floor of ravines” (1948:138). My own field observation revealed an instance of streambank taro cultivation on Laro Creek, a tributary of the middle Sigatoka River, just upstream from the hot springs at Waibasaga. There, taro cuttings were simply planted in the saturated soil at the water’s edge.

**Slopes**

Landforms of intensive agriculture on slopes take the form of artificially created terraces. Based on their complexity, size, and position relative to a natural water channel, I differentiate these features by using the following two categories: streamside terraces and hillside terraces.

**Streamside terraces**

Streamside terraces are small, discrete, “pocket gardens.” They were built anywhere terrain allows along small streams, often on extremely steep slopes. Streamside terraces typically employ a stone wall in their construction, probably because of the immediate availability of small boulders in the streambed. These structures were also a response to the necessity of protecting the garden platform against wash-outs caused by rising water levels. The stone facing acts as a retaining wall, and is typically canted inward.

There are many occurrences of streamside terraces throughout Fiji. The following description by Constance Gordon Cumming (1881, vol. 1:83) accurately portrays their arrangement on the island of Ovalau:

> On this island there really is no level ground at all; and you would marvel where the people contrive to raise their crops, for the steep hills rise from the sea-beach. But if you were to follow the course of the picturesque streamlets which find their way down dark-wooded ravines, you would find that every available corner is laid out in tiny terraced fields, or rather miniature swamps.
The case study in Chapter 7 presents information gathered from the field on these features found along streams pouring off the northern flanks of the Nakauvadra mountains, in northern Vitu Levu. These data include detailed mapping and an excavation report with radiocarbon date from a streamside terrace on Rukuruku Creek.

**Hillside terraces**

Hillside terraces are more complex than the streamside gardens. They usually occur in coordinated sets, or “flights” of level bench platforms that rise like stair-steps or bleachers on the side of a hill. The arrangement of hillside terraces can assume several forms. In some cases, on broad hillsides with a singular aspect, they are simply tiers arranged in straight array. But on the toe of a spur ridge or interfluve, the terraces may follow the terrain in a sinuous curve, resembling elevation contours etched into the landscape. In other locations, such as the system on Kadavu detailed in Chapter 8, the pondfields are assembled in a lax pattern, with the configuration of the individual gardens dependent on the presence of large boulders or changes in slope and surface structure. As with all irrigated terraces, the primary design consideration is the efficient control of running water.

Most hillside terraces in Fiji are not stone-faced, but utilize a carefully shaped earthen bund. Design, however, is similar to the rock wall risers of streamside terraces, in that the bund is canted inward. As observed in operative systems, a rounded lip of earth and mud extends above the water level of the flooded garden; but these components have vanished within the eroded vestiges of abandoned systems. The width of the level planting surface depends on the angle of slope and characteristics of the immediate terrain.
The development and successful operation of irrigated hillside terraces required not only those skills involving construction and design of the earthworks, but an application of knowledge regarding cropping limitations and agronomic constraints. Eykyn (1896:185) provided an appreciative assessment of such agrosystems:

Natives are clever at making the shallow pools for growing dalo. In some places, almost all the side of a gulley is a succession of water terraces well cultivated. Sometimes the ponds have to be left fallow for a bit.

Hillside terracing represents the most dramatic and enduring of the intensive agricultural landforms found in Fiji. I have mapped their distribution in the next section of this chapter. The following brief survey introduces the geography of hillside terracing in the archipelago, moving from the smaller islands to the largest.

There are scattered instances of irrigated hillside terraces occurring on the smaller islands of Fiji. Sahlins (1962) documented a limited amount of terracing on the island of Moala. Irrigated terraces on the island of Gau are still operative at Waikama (Watling 1984). Kadavu exhibits widespread evidence of terracing and holds the distinction of being the one place in Fiji where a number of active hillside terraces may still be seen.

There are several accounts of terracing along the numerous creeks draining the northern slopes of well-watered and mountainous Taveuni. Most of these would have been streamside forms, although the *Cyclopedia of Fiji* (Allen 1907:177) included a remarkable early photograph of irrigated terraces on a hillside on Taveuni. Brookfield, et al. (1977:148) reported that "this island had a well-developed series of water diversion systems down its leeward side feeding flights of irrigated terraces on many spurs; at least one of these systems was still in operation in 1938, and the physical traces of

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several remain.” Rivers (1926:282) quotes from a letter he received from A.M. Hocart, who wrote, “I have seen terraces in Ovalau, and Taveuni.”

Hocart (1952:290) also reported the existence of hillside terraces in Vanua Levu, as well as their absence in the Lau group:

In Thakaundrove the taro fields (vuthi) are sometimes small terraces, usually long and narrow, banked with low ridges of earth. The difference of level between two terraces may reach two feet. At the lower end of the terrace, where the water runs out, there is a stone dam, so that the water does not carry away the earth. No such terraces were seen in Lau.

Ward (1965:288) found irrigated terraces in use at Sasa, along the Macuata coast. Still operative in 1960, the Sasa terraces incorporated many of the design elements and cultural-ecological strategies currently in use at Ravitaki, documented below in Chapter 8. Elsewhere in Vanua Levu, hillside terraces were once a major component of agricultural systems in the western province of Bua (Quain 1948:38).

On Viti Levu, terracing has been reported from a number of locations. At Dawasamu-bure, near the border between Tailevu and Ra Provinces on the east coast, Lasaqa (1963:51) related that wet taro was grown in two distinct environments — raised beds on swampy flats, and hillside irrigated terraces:

The most impressive of these terraces, however are those to the northeast of Naivoco. One terrace measured here is over 200 feet long, 12 feet wide and with a neatly constructed stone wall nearly 4 feet high. The parts which are presently under dalo are being worked by the oldest resident of Naivoco.

Frazer (1961:179) had also discussed the Naivoco terraces. This is one of the few examples of hillside terracing making use of stone facing. The usual lack of stone-walled terracing on hillside gardens may be a simple function of the distance from a source of building material, although this never stopped Fijians from building structures such as naga in remote, secretive locations (Fison 1884). These rectangular rock enclosures resemble Polynesian marae, and were probably used for initiation rites (Riesenfeld
1950:593). They have been found primarily in southwestern Viti Levu.

Furthermore, a circumstance recounted with greater detail in Chapter 8 illustrates how villagers at Rewa and Bau thought nothing of hauling basalt columns from Kadavu in their canoes across a treacherous strait. Thus, the earthen-walled construction technique is more likely a design element that diffused as a culture trait among certain groups of Fijians inhabiting specific places.

As noted in a previous section of this chapter, large-scale terraced irrigation systems would be expected in areas within the dry leeward side of major islands. Indeed, the distribution map presented in the next section indicates that this is certainly the case on Viti Levu. To close the present section, it should prove instructive to inspect at a closer level several key locations that manifest a remarkable concentration of terracing: the upper reaches of the Ba and the Sigatoka Rivers.

Ba watershed

The Ba River drains the northwest quarter of the island. Flowing in a northwesterly direction, its headwaters rise in the same convoluted terrain that spawns the Sigatoka’s southwesterly flow. The people inhabiting this remote region were part of the kai Colo ("mountain tribes") that responded with armed resistance to European settlement and the Christianization of their culture. They seemed to have specialized in the construction of hillside terraces to irrigate taro. The main stem of the upper Ba along with several tributaries (Talawasi and Rove Creeks) exhibit a number of abandoned terrace systems. I wish to focus here on several systems in the upper Rove Creek drainage, using a published historical document, ethnographic oral accounts, and my own field observations (Fig. 6.7).
FIGURE 6.7. Rove Creek basin, Ba Province, Viti Levu. Base map adapted from Dept. of Lands and Survey, 1989. Locations for terracing from 1978 aerial photography and field observation.
The Rove Creek valley presents a picturesque and faintly pastoral setting (Fig. 6.8). The tawny browns and deep tans of the *talasiga* vegetation contrast with the several shades of green from the gallery forests along the main stream and in tributary gullies. Old clearings on each side of the valley flank the bottom lands. Secondary vegetation comprising small trees and shrubs in these areas completes the floral mosaic, and bears witness to a long history of swidden cultivation. Horses and goats graze among the rounded hills. Here and there, black volcanic rock outcroppings protrude from the thick cover of reeds and tall grasses. Large solitary mango trees perch on the brow of hills overlooking the stream below. On the higher eastern ridge, a scattered patchwork of dark forest caps the summit. About halfway down the valley, the settlement of Tabuquito can be seen, many of its houses being the traditional Fijian *bures* of thatch and woven reed construction. Further north, one can spot where the valley floor widens at the confluence of Rove Creek with Naweidamu Creek.

Bukuya is the leading (chiefly) village of the district of Magodro, in Ba Province. Its name can be translated as "knot", referring to the twisted landscape where three major rivers find their source: the Ba, the Sigatoka and the Nadi. The *koro makawa* ("old village") sits atop a ridge overlooking the present village, which relocated to the flats below around 300 years ago. Overgrown *yavu* ("house mounds") and eroded embankments now mark the site of the old fortified settlement. Magodro is the location of important mythological terrain. It was here that the venerable Lutunasobasoba passed away during his final exodus from western Viti Levu, while leading his followers to the promised land of Nakauvadra (see discussion in Chapter 7). His grave is a protected local secret, and is steeped in *mana*.
FIGURE 6.8. Rove Creek basin, Ba Province, Viti Levu. Vestiges of Bukuya terrace system are just visible within circled area on left edge of photograph.
Beatrice Grimshaw was an peripatetic Irish novelist who toured the backcountry of Fiji around the turn of the century. During one excursion, she visited the village of Bukuya, and described the irrigated taro gardens there:

Just on my left rose, tier after tier, a strange erection of terraces, decorated with handsome, large-leaved water plants standing in an inch or so of clear water. From terrace to terrace, a tiny stream slipped downward, losing itself at last in the river below. Nasoni and Joni told me this really beautiful piece of landscape gardening was a ndalo bed, where the ndalo, one of Fiji's most important roots, was grown in the slowly running water that suited it best. (Grimshaw 1907:48-49).

Parry (1987:83), citing in turn Parke, and Roth, reported that "this same terrace system was still in active use in the 1940s." I was able to visit the site in October, 1991. Fortunately, the villagers of Bukuya had just burned the thick tropical grass and reed cover on this particular hillside to encourage the growth of young tender grasses favored by their grazing animals. This revealed the form and pattern of these gardens. A neglected canal begins near the present road crossing of Rove Creek, then traverses the slope in a 120° arc for more than 600 meters to reach the northwest-facing hillside terraces. At the top of the system, the canal bifurcates to feed two separate sets of gardens. The west-facing set consists of two sections of terraces, with nine on the upper half and ten in the lower, steeper section of the slope. The north-facing set of gardens was more eroded and washed out, and it was impossible to determine its former extent. Bukuya farmers now rely on dryland plantings, and there was no intention of reviving the irrigation works.

Farther downstream, in the hills behind the village of Tabuquto, is another, larger terrace system, which is named Mataniwai. Tabuquto is the oldest village in the Magodro region, predating even Bukuya, and is beautifully situated on Rove Creek where substantial branches enter the
main stream along both its right and left banks (see Fig. 6.7). The use of irrigated taro gardens by the people of Tabuquto probably stretches back into prehistory, but informants there told me of the expansion of this particular set of terraces for a very specific purpose. At some point in the not too distant past, the people of Magodro were involved in a war with the people from Naloto, a neighboring area to the northwest. War began when the people of Naloto tried to depose a chief who was married to a woman from Magodro. The people of Tabuquto created many of the terraces of Mataniwai to serve as a larder for the Magodro warriors. This is one very specific example of the effects of warfare on the process of agricultural intensification in Fiji.

**Sigatoka watershed**

The Sigatoka River rises near the center of the island, and flows in a generally southwestward direction. The mountainous spine of Viti Levu forms a massive eastern boundary to the watershed, blocking the humid trade winds and creating a rain shadow over much of the valley. This is the area Brookfield and Hart (1971:118) were referring to when they found that "field evidence of former taro terracing is clear and widespread in Fiji, especially along the forest-grassland ecotone in central Viti Levu, where many flights of terraces resembling those of New Caledonia are clearly visible." Turner (1983:25) referred to an account given by a nineteenth century visitor: "traveling through the upper Sigatoka Valley in the 1870s, St. Johnston saw taro being cultivated in irrigated terraces." Around the same time, colonial agricultural specialist John Horne (1881:40) also took note of the intensive taro cultivation in this area on a walk from Waibasaga to Saweni: "For about nine miles [the track] went through innumerable beds of dalo along irrigating water courses ... many dalo plantations were seen in
terrace systems in the upper Sigatoka Valley.

Hashimoto (1990) reported that a small terrace system was active in 1982 east of Draubuta, in the upper valley. He remarked on the recent history of the irrigated landscapes in this area:

Irrigated taro cultivation had been more extensively and prosperously carried out in and around Draubuta village until 1972, when most of the irrigated fields (vuci) were damaged by Hurricane Bibi. Since then, they have been abandoned and left unrepaired. In Draubuta village, one garden, built in the 1960s, is being barely maintained (Hashimoto 1990:3).

I visited a number of terracing sites in the upper Sigatoka Valley during 1992, and found all of them abandoned. Aerial photographic evidence likewise yielded no currently active irrigation of terraces. Of course, smaller operating systems may have been missed, and the possibility of extended fallowing should not be discounted.

Terrace distribution

Although many authors have mentioned irrigated terracing in Fiji, either in passing, or in specific references to the obvious areas where it is evident, no comprehensive survey of its distribution has yet been available. Perks (1980:78) attempted to display a general depiction of terrace distribution across Fiji, based on a review of the literature. His map accurately indicates the presence, though not the precise location, of terracing on the islands of Viti Levu, Vanua Levu, Taveuni, Kadavu, Koro, Gau, Ovalau, Moala, and Waya. After discussing irrigated terraces in western Melanesia, a report on root crop production in the Pacific noted that “In Fiji, similar terraces ... may be seen in Gau, Nadroga, Ra, Taveuni, Dreketi, and elsewhere” (Anon. 1976:7). In order to arrive at a more precise determination of terrace distribution in Fiji, and to locate as many of these
“elsewheres” as possible, I conducted a comprehensive aerial photographic survey of the entire archipelago. The limitations of such an exercise were discussed in Chapter 2. What the following maps indicate is primarily the location and distribution of hillside terraces; no attempt was made to photogrammetrically calculate the areas of these systems. Streamside terracing, due to the smaller size of the systems and the tree coverage along most streams, was difficult if not impossible to discern.

The concentration of terracing in the upper Sigatoka and upper Ba watersheds on Viti Levu has already been noted. These two areas show up well on the map, although several other patterns are also revealed by the cartographic data presented here for the first time (Fig. 6.9). One group of terraced garden areas is evident in the upper Nadi basin, arcing along the west face of the highlands to the north of the Nadi River Valley. To the northwest, there is another concentration of terracing about the Koroyanitu escarpment (Mt. Evans). All of these areas are depicted in larger scale maps to follow (Fig. 6.10). Another pattern is evident in the Wainibuka headwaters, and across the Nakauvadra Range to the north, an area that is the subject of the case study presented in Chapter 7.

This distribution cannot be explained by mere reference to climatic conditions. True, the broad pattern generally corresponds to the leeward, seasonally dry portion of the island, as discussed in more detail below. But there are nagging exceptions to this spatial covariation, such as the isolated occurrences of terracing on the Wainimala River; on the Waidina River; on Wainikoroiluva Creek (the northern branch of the Navua River); or along the deeply embayed coastline of Nakorotubu in Ra Province. All of these areas are located in the wet eastern half of Viti Levu. Even more troubling, however, are large areas on the leeward side where terracing is virtually
Agricultural terracing
Viti Levu

absent. Such negative evidence is a compelling argument for cultural rather than environmental controls. Even more telling is the peculiar distribution found within the broader pattern. There are a number of specific locations where terracing is a remarkably prominent feature of the landscape. These are noted here as follows.

Going up the Sigatoka valley, there are only scattered instances of terracing in the lower and middle reaches of the river and its tributaries. Upstream from Keiyasi, however, there begin to appear clusters of terraced garden areas (Fig. 6.11). One such area is in the upper branches of Lato Creek, above the village of Vunatoto, and especially in the vicinity of the village of Matokana. On the Sigatoka itself, there are aggregations of terraces across the river from Nukuilau and Korolevu, and around the village of Nubuyanitu. Behind Nubuyanitu, the upper branches of Nasa Creek display widespread terracing, especially to the east of Draubuta village. Other concentrations appear behind Namoli on Wainivau Creek; along Solikana Creek and generally in the vicinity of Sauvakarua village; and upstream from Nubutautau.

In the Ba River drainage area, terracing is particularly evident in several of the upper tributaries (Fig. 6.12). Clusters are apparent northeast of Bukuya in Rove and Tawalasi Creeks; along the main stem of the Ba River above Navala; and in the vicinity of Koro village. Two tributaries of the lower Ba also contain an abundance of terracing: Nadrou Creek around Nanuku village; and a massive group of gardens in the headwaters of Qalinabulu Creek above Balevuto that rivals the size of the Nakauvadra systems.

The highlands of northwest Viti Levu exhibit additional aggregations of terracing (Fig. 6.13). Especially apparent are the Nadi River and its
Agricultural terracing
upper Sigatoka River

- Abandoned terracing
- Contemporary village

Agricultural terracing - Koroyanitu area

Abandoned terracing
Contemporary Village
Koroyanitu, elevation 1195m


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tributaries draining the mountains east of Mala; the upper Sabeto basin; and
the area around Abaca, west of Koroyanitu, where on a recent ramble Crosby
(1993) remarked that he “saw quite a lot of dalo terracing, but it has all been
severely knocked about by cattle.” In northeast Viti Levu, the terraced areas
in the upper Wainibuka and upper Yaqara watersheds west of Nakauvadra
seem to be part of a coalesced pattern; while the irrigated gardens on the
northern slopes of the Nakauvadra mountains represent a special case,
which description and assessment warrants a separate chapter.

Locations for agricultural terracing in the remainder of the
archipelago are outlined as follows. Vestigial terracing on Vanua Levu is
nowhere near as widespread as on Viti Levu, even in the dry leeward districts
(Fig. 6.14). Coastal Macuata had the highest concentration, especially
between Niurua and Navidamu. To the east, a small system was detected near
Bulileka, inland from Labasa. In Bua, on far western Vanua Levu, where
Quain (1948) told of irrigated terraces, several areas were apparent from the
aerial photography: on the Nawailevu River above the village by that name;
in the vicinity of Kavula; and on the Druwai River above Naruwai village.

Terracing on Taveuni, while mentioned in the literature, must have
been predominantly streamside. Heavy tree cover in the many parallel
streams draining the mountainous spine of this island prevented aerial
photographic plotting. The one system visible is located behind Somosomo,
and may indeed be the same set of hillside terraces pictured in the early
photograph mentioned above. Kadavu, Fiji’s fourth largest island, was well
known for its intensive agricultural practices in general, and irrigated taro
gardens in particular. Its terrace geography is depicted within Chapter 8.

The smaller islands evince limited instances of terracing (Fig. 6.15).
Like Taveuni, streamside terracing was probably the most common form of
Vanua Levu and Taveuni

30 km

Abandoned agricultural terracing
Contemporary village


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FIGURE 6.15. Distribution of terracing on Ovalau, Koro, Gau, and Moala. Base maps adapted from Derrick (1951). Terracing located from 1978 aerial photography. Selected villages are places discussed in the text.

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taro irrigation on Ovalau. Wilkes (1845:61) mentioned that the town of Levuka "has a fine brook running through it, coming from the gorge in the mountain, the water of which is made great use of for irrigating the taro-patches, which, with their yam-grounds, claim the principal attention of the inhabitants." Of course such terrace remnants in wooded ravines could not be detected by this survey. A circa 1865 pencil and ink drawing by an anonymous artist, entitled "View on the creek, Levuka" depicts stone-faced irrigated taro terraces (Fig. 6.16). On the aerial photography for Ovalau, three separate areas of hillside terraces were detected: behind Vuma, on the east coast; inland of Taviya, on the northwest coast; and south of Rukuruku, along the west coast. Only one system was discovered on Koro, just inland from Nasau. This may seem surprising at first, given that the topographic and climatic conditions of this island might tend to encourage the development of irrigation, until we recall that Koro was a noted yam producer. On Gau, in addition to the active system at Waikama (see Watling 1984), an abandoned set of terraces was located on the opposite side of the island, inland from Lekani. Moala had one set, near Keteira (see Sahlins 1962). Terracing on Waya, in the Yasawas, was invisible, even though several sources have referred to its existence. But the irrigated pondfields on Lakeba were evident above Tubou, and while not strictly terracing, form one of the most distinctive landscapes of intensive agriculture in the Lau Group.

Again, we face the question of cultural diffusion or independent invention. Just as the distribution of terracing throughout Oceania may have a culturally derived explanation, so too the curious pattern that is evident for the Fijian archipelago. It is certainly feasible that migrating groups of people, well acquainted with the techniques of taro irrigation, and arriving at specific and definite landfalls in Fiji, ultimately may have been
responsible for the spread of this method throughout the islands. This would help to explain its discontinuous geography. Even if locally developed, terracing may be a specialized agricultural technology favored by specific groups of people. Moseley (1974:81) presented evidence from Peru pointing to "a significant degree of cultural preadaptation to canal irrigation," which allowed for the rapid development of this intensive mode of agriculture among prehistoric coastal societies formerly dependent on fishing. Thus, diffusion of irrigated terrace technology might follow the line, not of least resistance, but of most acceptance.

There are examples for such a scenario from other parts of Melanesia. On Koiombangara, in the Solomons, Yen (1976:69) found that agriculture emphasized "irrigation of taro by diverting water into pondfields defined by stone walls," and noted the cultural factor apparently operating in the development of this landscape modification: "this technique is supposed to have been invented in the hinterland and to have been brought out to the riverine areas near the coast." We know from Chapter 5 about the development of various dialect chains and the cultural differentiation that led to a western/eastern socio-political dichotomy in Fiji. It may be that western Fijian cultures embraced agricultural terracing as an adaptive strategy to a much greater degree than people inhabiting the eastern part of the group. Parry (1987:32) depicted a settlement geography that would fit these notions:

The Sigatoka Valley is remarkable for the large number of communalets that occur and their localized character. This is consistent with the idea of different groups of people using the valley as a corridor at various periods in the past. The tendency to seek security for settlement sites in side valleys and on peaks and ridges overlooking the valley floor fostered isolation.

As may be expected, Riesenfeld (1950:577) attributed the concentration of terracing in the Sigatoka Valley to the dispersal of "stone-using
immigrants” on Viti Levu: “the immigrants who had their starting point in Vunda, after having swept down the northern coast of Viti Levu and having radiated from Rakiraki across the mountain range, wandered down the two rivers Rewa and Sigatoka until they reached the southern and south-western coast; there they peopled Serua, Namosi, Nandronga, and Rewa; Kandavu and some of the other smaller islands off Viti Levu, and Vanua Levu were also touched by these migrations.” But it is not necessary to invoke migrations to explain the distribution of a culture trait that, contrary to Parry’s isolationist hypothesis, may have developed from social interaction.

Of course, environment is without a doubt a factor in irrigated terrace distribution. An overlay of abandoned terrace locations with rainfall patterns for Viti Levu clearly registers spatial covariation (Fig. 6.17). On a global scale, Spier (1951:70) noted that “rainfall in the areas in which it [taro] is grown is quite variable, ranging from forty inches [1,015 mm] annually in parts of upper Burma to over 200 inches [5,080 mm] in its Indian habitat.” Within Oceania, data presented in Chapter 3 indicated the capability of dryland taro to be successfully cropped in areas receiving at least 2,500 mm of precipitation that is “well distributed” throughout the year. We know that leeward Viti Levu experiences marked seasonality in rainfall, which would exacerbate dry conditions and raise the threshold for dryland taro cultivation. Certainly the correspondence displayed by the distribution of terracing on the shy side of the 3,000 mm isohyet represents compelling evidence for environmental control.

An additional possibility concerning climatic influence on irrigated taro terrace development in Fiji is present in the data on the Little Climatic Optimum (LCO) discussed by Nunn (1991:18), who wrote that “much of the tropical Pacific would have been drier during the LCO than at present.
Agricultural terracing and mean annual rainfall

Viti Levu

Moisture loss from soil and regolith would have rendered slopes, especially on the windward sides of islands in the tradewind belt, more susceptible to both sheet erosion and failure through landsliding during storms.” A logical inference would be that soil moisture deficits would have been even greater on the leeward slopes during this time (1200 - 650 years ago). Indeed, even now, “soil humidity decreases significantly during the dry season” (Hashimoto 1990:2). Nunn (1991:19) cites the pause in swamp deposition on Lakeba as indicative of the drier conditions in Fiji during the Little Climatic Optimum. This period of relative aridity may have engendered the expansion of large scale irrigation projects, at least in the leeward areas of the larger islands, and perhaps generally.

Sahlins (1972:142-43) reviewed evidence for agricultural intensification in environmentally marginal areas of Hawaii and the Marquesas, but indicated social and historical causation rather than ecological impetus: “competition probably accounts for a remarkable tendency to invert by culture the ecology of nature: many of the poorer regions of Polynesian high islands were the more intensively exploited” (1972:141). Elsewhere in Oceania, Waddell (1972b:20) linked agricultural intensification with marginal conditions in Papua New Guinea, but he based this assertion on the assumption that “adaptations generally have developed in response to New Guinea highland conditions rather than having been introduced from elsewhere in the Pacific or southeast Asia.” I do not think we can view the situation in Fiji under the same assumption.

Ward (1965:18) believed that the concentration of terracing in the western interior of Viti Levu arose out of a cultural-ecological equilibrium, whereby subsistence patterns took advantage of diverse environmental conditions: “It appears that the major divide between forest and grassland in
the main islands represents a zone where the forest could be less easily
burned and where settlement therefore stabilized with taro terraces, grass
and reed country, and forest providing a range of garden sites and a variety
of wild produce.” Yet this fails to consider the dynamics of anthropogenic
landscape modification. As noted in Chapter 5, there is ample evidence to
support the assertion that the extensive areas of grasslands were created and
maintained by repeated burning. But the ecotone between forest and
grassland in Viti Levu derives from differential climatic regimes and not, as
Ward seemed to imply, from a settlement frontier. With swidden agriculture
being the mainstay of subsistence strategies in the wetter parts of Viti Levu
as well as on the majority of the smaller forested islands, ease of burning
does not appear to be a limiting factor for agriculture or, for that matter,
settlement.

By way of comparison, we may regard the process of agricultural
adaptation in the western extremity of Melanesia. Bayliss-Smith (1985)
offered an “intensive taro cultivation hypothesis” to account for the
development of irrigation in highland Papua New Guinea. It was once held
that highland tribes were exclusively hunter-gatherers prior to the
relatively recent introduction of the sweet potato, an event which so
changed subsistence patterns that it has been termed the “Ipomoean
revolution”. But the premise of no prior plant husbandry was shown to be
incorrect, based on a radiocarbon date of 4,000 years B.P. for a wooden
agricultural implement found at Tambul. Bayliss-Smith reasoned that the
most likely crop grown at that time in those environments was taro: a
“Colocasian revolution would have enabled agriculture to be practiced for
the first time in the high altitude zone”(1985:289). He concluded that
“agricultural intensification and environmental modification are therefore
linked, both because of the tendency for the productivity of swiddens to
decline, and/or because of a declining yield from hunting and gathering as
the forest is replaced by more sterile grasslands” (1985:293). Further
evidence from ancient drained fields at Kuk swamp in the Wahgi Valley
indicates horticultural activity in the New Guinea highlands may have
occurred as far back as 9,000 years B.P. (Golson 1982). Regarding these
findings from Kuk, Thorne and Raymond (1989:135) wrote, “the prehistoric
drainage ditches ... may represent one of the earliest systems of food
cultivation anywhere in the world.” Although it cannot be proven by the
evidence available, Colocasia may have been the main crop involved.

Decline

In assessing Oceanic agrosystems, Cranstone (1961:75) commented that
“irrigation was practiced ... especially in Fiji,” but reminded us that “in many
places the systems are now abandoned.” Lasaqa (1963:51) noted that “the
irrigated dalo terraces of Dawasamu-bure are a relic of a past agricultural
age. They are no longer being constructed and furthermore, nearly all of
the old terraces are abandoned and consequently taken over by para grass,
sedges and reeds.” On western Vanua Levu, Quain (1948:135) noted that “even
in most dense jungle regions there are evidences of former habitation and
agriculture; ancient irrigation canals for taro ponds are now choked with
the roots of great trees.” In 1896, H. Monckton, the stipendiary magistrate
for Taveuni, reported that “prisoners have been twice sent to work on the
road to Vuna and have cleared a large portion of the road of weeds, grass &
overhanging branches and reeds ... they have also opened up a fine group of
vucis which have not been used for 60 years or more” (CSO 1896). Hocart
(1929:107) remarked upon the regression of the irrigated taro gardens on
Lakeba during the early part of this century: “In the days of the late Tui
Naiau, huge taro fields still extended from the back of Tumbou to the foot of Kendekende; now only the upper part is properly cultivated, the work being done mostly in the evening.”

There are any number of reasons that can be assigned to the decline of intensive agriculture, and to the subsequent abandonment of intensive agricultural landforms in Fiji. Ward (1982:14) has argued that “the diminishing supply of available labour was a major factor in the decline of these specialized systems.” The imposition of plantation agriculture and the later introduction of additional cash cropping systems detracted from traditional subsistence labor needs: “time and labor to devote to the cultivation, harvesting, processing and marketing of cash crops were made available not only by improved technology but also by reducing the importance of those subsistence crops which required large amounts of labor. This resulted in a decrease in the cultivation of yams and irrigated taro until today the latter is grown in very few villages” (Ward 1964b:487).

Labor allocation trends and a deflated value for agricultural work has tended to have a negative effect on the sustainability of intensive cultivation practices. Of the aforementioned taro planting method known as biti, Hocart (1929:107) reported that “the $mbiti$ method is now discontinued because it involves too much time and labor.” Even now, this was something often heard when informants were asked directly why they no longer irrigated taro. “Too much work” was a standard response.

The cessation of internecine hostilities, along with the depopulation associated with introduced diseases, likewise have exerted a negative influence on the continuation of intensive agricultural practices. Regarding the villages that depended on the raised fields of the Rewa delta, Parry (1979:47) wrote that these “ring-ditch settlements are now largely
abandoned as a result of the peaceful conditions following cession of the islands to Britain and the dramatic decline in population due to the epidemic diseases of the late nineteenth century." Frazer (1961:166) linked the end of warfare with new cultigens when explaining terrace abandonment at Nakauvadra: "the principal factor allowing the abandonment of these terraces and hillside plantations would appear to be the availability of better lands — both wet and dry — due to the peaceful conditions, and the introduction of food crops which did not require irrigation or wet situations." But the end of warfare was, of course, a gradual process, and Fijians in most areas did not feel secure enough to vacate relatively inaccessible and defensible village sites (with their adjoining garden areas) until after the Cession of the islands to Great Britain in 1874. Even when plantation agriculture had been introduced in the 1860s, Fijians sometimes adapted the new crops to their customary gardening methods:

Jealousy that made every village distrustful of its neighbors compelled the inhabitants to fortify themselves on the most inaccessible heights, and prevented them from cultivating any land beyond the few feet around each man’s dwelling, if more were required, the cultivator afraid to descend into the plain discovered some spot in the recesses of the mountains where he might plant his yams secure from molestation. This system of scanty cultivation has been followed by them that it is still very difficult to persuade a native to plant on an extensive scale. He still endeavours to produce all that he may require in the small patch of soil around his habitation and in the manner they have hitherto planted the cotton, so close that the trees have no room for development and the produce is proportionally checked. (COC1864).

Once Pax Brittanica was formally instituted, however, most Fijians abandoned na koro ni valu ("fortified villages") and migrated onto the rich alluvial bottomlands in the valleys or along the coast. This village relocation played no small part in the abandonment of intensive agricultural landforms.
In depicting the process of agricultural disintensification as reflected in the demise of terraced cultivation on the northeast coast of Viti Levu, Lasaqa (1963:106) offered the following account:

The construction of elaborate stone terraces on the steeper slopes is no longer undertaken and few of the old terraces are cultivated. This remarkable feat of primitive Fijian engineering obviously required much more labour and effort than is frequently seen in Dawasamu-Bure today, or in any other Fijian village for that matter. Today there is a feeling among the elders that the youths of Dawasamu-Bure are no longer capable of undertaking major constructional work such as digging twenty-feet deep trenches or erecting terraces. Some elders, like ninety-year old Akini of Nataleira go as far as to declare that the present generation of kai Dawasamu-Bure is lazy and indulges more than they themselves did in their time on yaqona drinking, which keeps the villagers away from their gardens.

Ravuvu (1988:140) echoed this concern, expressed most poignantly by native Fijian scholars, over gunu yaqona sivia (excessive drinking of yaqona), but also pointed to increasing dependence on public works assistance programs: “the effort formerly exerted by the villagers on subsistence gardening at Nakorosule has reduced dramatically since rural development projects were introduced by the government.”

General pronouncements aside, perhaps we can only understand the decline and eventual demise of most of these intensive agrosystems by examining particular conditions surrounding individual sets of terraces at specific locations. Detailed case studies of an abandoned terraced area and an active set of gardens are presented in the next two chapters.
AGRICULTURAL TERRACING IN THE FIJI ISLANDS
VOLUME II

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CHAPTER 7
CASE STUDY: NAKAUVDRA

The largest complex of agricultural terraces in Fiji is situated on the northern flanks of the Nakauvadra Mountains, in Ra Province, near the northernmost point of Viti Levu (Figs. 7.1 and 7.2). No longer utilized, this extensive set of gardens and canals is still discernible as an artificially shaped and contoured landscape now covered by reeds and tall grasses (Figs. 7.3 and 7.4). Known locally as *tuatua*, these skillfully constructed pondfields were once irrigated by diverting mountain streams and by utilizing the runoff from springs and seeps.

The larger, contoured hillside terraces remain a prominent feature on open mid-elevation slopes, from 150 - 250 meters above sea level. Smaller terraced streamside garden areas were constructed adjacent to the creekbeds and at higher elevations, where secondary forest has now reclaimed the land. Both types of gardens are found in several tributary drainages of the Nakauvadra River, but are remarkably concentrated in the watershed formed by Matanivanua, Rukuruku, and Naikoro Creeks (see Fig. 7.2). Geographer Roger Frazer estimated this group of terraces covered an area of 325 hectares (Frazer 1961:164). Much of what follows is a report on investigations conducted in this one specific area, although discussions relating to the cultural and political ecology of the gardens and settlement sites necessarily encompass a larger spatial context.

This chapter presents findings of research regarding: 1) the location, design, and functioning of the *tuatua*, derived from archaeological excavation, aerial photo interpretation, and planimetric mapping; 2) oral historical accounts of *mataqali* claims to land, and the associated village relocations and placements in the area; 3) ethnohistorical and archival data
FIGURE 7.1 Ra province, northeast Viti Levu. Selected places as discussed in the text. Adapted from Dept. of Lands and Survey, 1989.

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FIGURE 7.3. Abandoned terraces at Nakauvadra.

FIGURE 7.4. Abandoned terraces at Nakauvadra.
relating to population, early settlement patterns, land and resource use, and the changes wrought by the colonial encounter; and 4) review of scholarship in several disciplines (archaeology, geography, anthropology, and history) focusing on the spatial circumstances of Ra Province in general, and the Nakauvadra area in particular. The intent is to bring all possible lines of inquiry to bear on the problem of agricultural intensification as exemplified and embodied in the tuatua, and to explain, again using all available evidence, the subsequent abandonment of these agrosystems.

Nakauvadra valley as locale

Even when gauged against the outstanding scenery that abounds in Fiji, the Nakauvadra mountains and river valley constitute an extremely picturesque setting (Figs. 7.5 and 7.6). Rising to over 750 meters from nearly sea level, the north-facing escarpment descends steeply to the valley floor in a series of alternating grass and scrub covered spurs and wooded ravines. These ravines act as drainages for a number of parallel tributaries to the Nakauvadra River, which rises on the slopes of Uluda — highest point in the range — and flows to its confluence with the Penang River just 2 km upstream from the sea.

The climatic regime for this area exhibits a moderate dry season, lasting at least three months, with one month often very dry. Rainfall ranges between 2,030 mm and 2,540 mm per year, and the mean annual temperature is 25°C (Frazer 1961:4-6). Crop-threatening dry spells are not at all unusual, as indicated by the following entry in the Ra Provincial Council Records for November 16, 1897: “The prolonged drought has been felt more severely in Rakiraki and Raviravi than in the other districts. These two districts frequently suffer in this way” (RPC Second Book, 1892-1905).
FIGURE 7.5. Nakauvadra mountain range, looking east.

FIGURE 7.6. Nakauvadra valley, looking east.
The Nakauvadra Mountains are high enough to create a rainshadow effect, although orographic precipitation tends to spill over the crest, supplying streams with steady flow most of the year, and allowing a number of springs to issue forth at lower elevations.

Soils are derived from parent materials of basalt and andesite. They are typically slope soils or lithosols composed of shallow, rocky clays, with relatively high nutrient content (Twyford and Wright 1965:320). Soils on the lower slopes of the Matanivanua/Naikoro watershed include Nanukuloa bouldery clay and Rewasa bouldery clay, both of which are “nigrescent soils from basalt and calcereous agglomerate”; while the upper basin is underlain by Vaidoko steepland bouldery clay and Vatukoula bouldery clay (Twyford and Wright 1965: map 1, sheet 5). One of the features characterizing these soil associations is “the occurrence of bold outcrops of rock bluffs and volcanic plugs” (Twyford and Wright 1965:320). Regular burning of the vegetative cover of reeds and grasses results in “severe sheet erosion” of these soils, which may lead to siltation of waterways and creation of a flood hazard in the Penang River valley (Twyford and Wright 1965:321).

Vegetation on the open slopes consists of an association of native reed or gasau (*Miscanthus floridulus*) and introduced exotics: mission grass (*Pennisetum polystachyon*), wire grass (*Sporobolus* spp.), and thickets of guava scrub (*Psidium guajava*). Remnant specimens of native ironwood or nokonoko (*Casuarina equisetifolia*) and the screw pine or vadra (*Pandanus tectorius*), for which the mountain range is named, occur as well. Despite exotic introductions, the scenery does not seem to have changed much since Horne’s (1881:50) description more than a century ago: “The northern parts of Viti Levu are very mountainous ... covered with grass and here and there with screw pine trees, standing singly or in small clumps.” The wooded
ravines harbor an assortment of tree species, with greater diversity tending toward the higher elevations due to increased precipitation and less human disturbance, both past and present. Typical trees in the mid-elevation range (150-365 meters) include baka (Ficus obliqua), vau (Hibiscus tiliaceus), and vaivai (Serianthes vitiensis).

Current land use comprises maize and sugar cane farming on the valley floor, with cane acreage increasingly being extended up slope on to more marginal lands. Many Indian smallholders have taken up residence in the valley, either on leased mataqali lands or on available Crown lands. Besides the obligatory cash cropping of sugar cane, these farms produce peanuts, beans, and assorted vegetables such as spinach, tomatoes, and baigani (eggplant), which is favored for curry dishes. Draft animals are still more common than tractors, and a pair of bullocks may be found on most farmsteads. There are also usually a few horses about, with chickens and ducks underfoot. Goats are ubiquitous.

Grazing of cattle and horses is the predominant land use in the immediate area of the terraces. Pastoral pressure and frequent firing of the vegetative cover have, over time, resulted in erosion and severe gullying of some stream channels. Many of the terraces are scarred by animal trails or have assumed a more rounded profile from accelerated soil creep (Fig. 7.7). Some of the terracing on the lower elevation slopes has been destroyed recently by new cane cultivation.

The village of Vatukacevaceva is located at the head of the Nakauvadra Valley, some 10 km up a dirt and gravel road from Vaileka and Rakiraki, the administrative and economic center of Ra Province. Vatukacevaceva is situated at the foot of Uluda, a high promontory providing panoramic views, both literal and metaphorical, in many directions. As we shall learn in more
FIGURE 7.7. Cattle on abandoned terraces. Many of the *ruatua* at Nakauvadra have suffered erosional damage caused by grazing livestock.
detail in the sections to follow, this village had its origins sometime during the latter part of the nineteenth century, when some of the mataqali inhabiting sites along the side of the mountain migrated down to the valley bottom. At that time we can assume traditional root crops such as yams and taros still dominated the agricultural landscape of the new settlement. Some abandoned terraces are evident immediately adjacent to Vatukacevaceva, but most of the taro was probably grown in raised beds constructed in wetland bottoms. Several remnants of these intensive gardens are just beyond the village confines (Fig. 7.8). Yam gardens have been replaced by cassava, although the search for wild yams is yet very much a part of the seasonal work cycle. During October and November many of the surrounding hillsides are burned to facilitate the search for tikau, kawai, and other wild tubers.

I spent numerous evenings in this village, getting to know the people whose ancestors helped construct and maintain the tuatua, and arriving at some understanding of the contrasts and conditions of modernity faced by rural Fijians today. Most of the men in the village are employed in some aspect of the sugar industry, either as farmers growing cane or on any number of cane cutting crews that travel the countryside during harvest season. Women tend to the food gardens in the surrounding hills or take frequent truck rides over to the coast for an evening of fishing when the tide runs right. Younger children attend elementary school by walking to the school grounds only a kilometer away, but those going on to the high school at Rakiraki must catch the one bus that leaves at 7:30 each morning, and returns at 4 o'clock in the afternoon. The men work clearing new land, plowing in preparation for planting cane, or tilling a ratoon crop in the field.
FIGURE 7.8. Remnant vuci planted to taro at Vatukacevaceva.
Mythological terrain

In addition to the physical site characteristics and contemporary cultural landscape, an equally important aspect of place is the prominence given to this area in Fijian culture history. Consequently, an understanding of social and environmental relationships in the spatial context of Nakauvadra requires consideration of the mythical elements of this particular location. As Basil Thomson (1892:143) put it, “the Nakauvadra Range ... is the home of Fijian mythology.”

John Fraser (1954:170) noted that Nakauvadra is “the heart of the region richest in Fijian story and legend. This was the neighborhood where, according to tradition, the ancient fathers of the race first made their homes after their long ocean migration from the west; and it was from here that pioneering tribes departed to found new settlements in the mountainous interior of the island.” There are, indeed, numerous traditions associated with early migrations to and from Nakauvadra. Many of these, depending on where the tale is collected, can be slightly divergent variations on a theme or even contradictory. To fully appreciate the functioning of the *tuatua* within this landscape, it will be helpful to examine some of these stories and legends. And, to keep this matter in proper perspective, we would do well to recall the insightful words of ethnographer A.M. Hocart (1913:108): “Undoubtedly it often happens that every native tells you a different story, but that may simply be that there are many different stories, all of which are true.”

Certain oral historical accounts relate the first arrival of the Fijian people to this area. One popular legend, known throughout the islands, tells of a canoe, the Kaunitoni, commanded by a chief named Lutunasobasoba, which fetched up near the northernmost point of Viti Levu. From there the people on board moved inland to establish a village at Nakauvadra. Some
versions of this story hold that Lutunasobasoba and his people came from Africa, in some cases, specifically either Tanganyika or Ethiopia. The African connection probably owes its origin to doctrines circulating among the mission schools during the late nineteenth century (France 1966). Nevertheless, the story has regenerative explanatory power, and, in one form or other, is widely believed throughout Fiji. Quain (1948:31) suspected the genesis of these tales, even while acknowledging their universal appeal: “Stemming from European academic beliefs of the nineteenth century, a belief in direct migration from Africa to Viti Levu has spread through even the most remote villages.” One version from the island of Moala was reported by Sahliins (1962:229) with characteristic wit: “It begins with the sailing of ancestral canoes from Tanganyika ... three boatloads (of intrepid Bantu?) are reputed to have made the journey from ‘Afirika’, and every stock in every island can be linked with some precision to the ancestral pantheon.”

Peter France (1969:4) understatedly dismisses the Kaunitoni legend as being “of questionable antiquity.” There is, after all, no mention of this tradition in the early ethnographies and missionary accounts by Williams (1858), Seeman (1862), Pritchard (1865), or Waterhouse (1866). Detailed research by France (1966;1969) into this matter indicates that the Kaunitoni most likely had its origins in an 1892 story-telling competition sponsored by the Fijian language newspaper Na Mata, and that colonial administrator and ethnographer Basil Thomson may have had more than a recording role in the presentation of its written version. Henige (1982:86) has described the subsequent flowering of belief in Kaunitoni:

Europeans and Fijians began to embellish and then to codify this migration story. Times were ripe for this new version of Fijian origins and the story of Kaunitoni’s settlement fits in well with the more outlandish ethnography of the time, which tried on philological grounds to argue that the Fijians derived ultimately from ancient Egypt. After about 1900 the Kaunitoni legend

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became the orthodox version. It appeared in general histories of the island, in schoolboy writing contests, in the press and on the radio, and in anthropological accounts of Fijian culture. It is now virtually impossible to collect accounts of Fijian origins that do not attribute the settlement of the island to Kaunitoni.

Geraghty (1977) offered further evidence, based on linguistic investigation, that this mythology is not a local product. Ra dialect incorporates a glottal stop in place of the consonant t, but when pronouncing the name of the infamous canoe, kai Ra do not say “Kauni'oni,” as might be expected, but “Kaunitoni” (Geraghty 1977:25).

France (1969:4) concluded that “the myth seems to be a product of acculturation and the growing Fijian national consciousness rather than an indigenous tradition, and is significant of the needs, rather than the history, of the society which accepted it.” And Finnegan (1982:27) accurately commented that because Kaunitoni is now so ingrained in the Fijian psyche, it serves a useful purpose, and thus “is no imposture, but has a genuine reality for many thousands of Fijians ... giving a sense of unity to a people otherwise widely scattered over scores of islands and speaking different dialects.”

For our purposes here, we must ask why the Kaunitoni was associated with Nakauvadra in the first place. It is clear that these mountains possess a powerful mana, an evocative force that elevates this landscape to a lead role as the setting for Fiji’s most sacred traditions. Even when another popular version of the Kaunitoni story has the canoe first coming ashore at Vuda, on the west coast of Viti Levu, the people on board still manage to end up building a settlement at Nakauvadra. Actually, a landfall at Vuda makes perfect navigational sense, since canoes carrying the first colonists of Fiji more than likely originated from either Vanuatu or New Caledonia (Irwin 1992). After landing at Vuda, and dwelling for some time near the present
village of Viseisei, these pioneers ventured overland, following the crest of the ridge lines, again led by their aging chief Lutunasobasoba. The route they took has been sanctified as the Tualeita — “Pathway of the Shades”. This is one of three such legendary trails collectively known as sala ni yalo (“spirit path”) that converge upon the locus of Nakauvadra (Gifford 1951b).

A second sala ni yalo connected these sacred mountains to the east coast of Viti Levu, while a third led across the sea to Vanua Levu — to Naicobocobo, the traditional “jumping-off place” for souls on their leap into the afterworld. Some people say that Lutunasobasoba died along the Tualeita, and, as mentioned in the previous chapter, villagers at Bukuya believe that he is buried on the mountain named Magodro, in the western highlands.

While details of the Kaunitoni migration may not have survived careful scrutiny, Nakauvadra was indeed thought to be the mountainous home of Degei, the closest approximation to a primal force in early Fijian belief (Williams 1858). “The supreme being in Fiji is Degei ... his sway is universally acknowledged in Fiji, and no attempts are ever made to elevate any local gods above him” (Seeman 1862:389). Degei has been characterized as “the personification of eternal existence” (Seeman 1862:390), and a “symbol of everlasting duration” (Tregear 1903:182). To early Fijians, he was an omniscient deity who “dwelt in a cave in the sacred valley of Na Kauvadra” (Tregear 1903:182). While some stories regard Degei as having been an actual person, in some cases the son of Lutunasobasoba, but in any event usually a chief, he often appears to humans as a serpent, with a lower half of stone. His home was never ascribed to any other place but Nakauvadra. “The Fijian deity Degei also had a serpent form, though some said his body was stone. He lay coiled in a cavern on Kauvadra mountain and when he turned over the earth quaked” (Poignant 1967:94). Curiously,
Erskine (1853:245) mentioned a supreme being named “Ove”, (“maker of all men”), and then related that “Ndengei is, next to Ove, the most generally acknowledged deity, and is said to be enshrined, in the form of a serpent, in a cave in the district of Nakauvadra, in Viti Levu.” There are no other accounts that mention Ove, and most likely he was a local deity that had somehow displaced Degei in that one region. MacDonald (1857:250) stated that “The inland tribes of Na Viti Levu do not worship, though they accredit, the deity Ndengei; and they affirm that the knowledge of him has been derived from Ra or Raggi-raggi, situated to the westward.”

There are a number of legends and myths involving this snake god. Pritchard (1865) related a tale about the time Degei found the nest of a snipe, or kitu (*Porphyrio vitiensis*) with two eggs in it. He cared for the eggs and they hatched into the first people, male and female. Degei put them under the shade of a vesi tree, and ordered yams, taro, and bananas to come from the ground for their food. He also taught these first people how to make fire to cook the yams and taro. “Thus the first pair lived, sheltered by the shade of the vesi, protected by the great Dengei, nurtured on bananas, yams, and dalos, until their forms were fully developed and their passions matured. Then they became man and wife, and their progeny peopled the land” (Pritchard 1865:204). A tantalizing clue concerning the possible antiquity of this legend is found in two creation myths from Tonga and Samoa, both of which differ in content, and yet feature the same animal — the snipe (Pritchard 1865:265). It is significant, too, that the sheltering tree chosen by Degei was the vesi (*Intsia bijuga*). Seeman (1862:88) reported that of all tree species, the vesi and baka (*Ficus obliqua*) were most typically chosen as sacred trees; while Waterhouse (1866:358) related that the vesi was “considered sacred throughout the entire group.” Hocart (1952:64) said the
vesi was a “tree used only by the nobles”; and Quain (1942:178) told of the Vanua Levu practice of using vesi in the construction of the chief’s house.

By far the most prevalent legend associated with Degei is the story of Turukawa and the twins. It seems that Degei had a pet bird named Turukawa — some say it was a rooster and some say a pigeon — that would wake him up in the morning, a sort of avian alarm clock. We know that the fowl (Gallus gallus) was among the few domesticated animals brought to these islands by the earliest inhabitants, so Turukawa certainly could have been a rooster. But it could just as easily have been either of two native birds: the gilu (Gallicolumba stairi), a ground pigeon, or the ruve (Columba vitiensis), the large white-throated wood pigeon whose characteristic barking call still echoes hauntingly through the upland forests of this region. In any case, as the story goes, one morning Degei failed to hear his beloved Turukawa. After investigating why he was not awakened in the usual manner, Degei discovered that his bird had been shot with an arrow, and that the culprits responsible were the twin sons of his sister Adi Sovanatabua. This angered Degei, and to escape his wrath his twin nephews ran away to the other side of the mountain, to seek refuge at their father’s village of Narauyaba. There followed a long siege of Narauyaba by Degei and the people of Nakauvadra. When he found that he could not take the village by force, Degei caused a great flood to wash away Narauyaba, and the people from that village eventually settled at Nukutubu, in the Rewa Delta.

There are a number of variations of these stories featuring Degei and Lutunasobasoba (Gifford 1951b), and it is always difficult to differentiate between what might be construed as authentic oral history and the embellished legends that may serve to bolster some social or hierarchical claim to prominence. Many societies have “invented” traditions when there
was a need to validate or support the status quo (Hobsbawm and Ranger 1983). Here at Nakauvadra, however, the numerous specifically named characters in the stories, and the extant designated places in the landscape tend to substantiate the otherwise amorphous nature of such records. While the chronicle of Turukawa is widely told throughout the islands, I was able to hear the tale as told by the people of Vatukacevaceva, who pointed out to me on my maps and in the hills surrounding the village those sites where the action occurred. For a person outside the culture, there can be no more compelling experience of traditional belief than to walk beside the hallowed ground where legends are said to have happened. It may prove beneficial at this point to chart the geography of this mythological terrain.

Although Degei is now supposed to reside within the dark recesses of a cave on the summit of Uluda, in earlier times he lived in the village of Nakauvadra, located on the mid-elevation northern slopes. The place where the twins lived is called Nukuitabua, just about a kilometer to the south and uphill of the present site of Vatukacevaceva. The place where the twins shot Turukawa is known as Conua, and it is located on the next spur ridge to the west of Nukuitabua. I was able to visit these sites easily from the directions given to me by the villagers. Some pottery was evident on the surface at Nukuitabua. Much of it was yellow or orange plainware, thinner, and possibly older than the shards found in the rockshelters and habitation areas further upslope.

Informants assured me that the stone foundation, or yavu, belonging to the house of the twins was still visible at Nukuitabua, but I was not able to locate any yavu. Perhaps it is just as well, for the people of Vatukacevaceva feel strongly that this is a place that is thoroughly steeped with mana. I was told about a church group — the Methodist Youth Fellowship (MYF) — who
came here in 1986. It seemed that many people, foreign tourists and Fijians alike, were making what amounted to a pilgrimage to the mountainous home of Degei, and the church authorities wished to provide a counter symbol to remind everyone that the old religion had been replaced by Christianity. The MYF group climbed Uluda and placed upon its summit a tubular metal cross some six meters tall, painted silver, and set in concrete (Fig. 7.9). On their way back down the mountain, just as they passed by the twins' yavu at Nukuitabua, a radio that was being carried by one of the group suddenly stopped playing, then functioned normally again once the group was beyond the site.

The old village of Narauyaba was situated just the other side of the Nakauvadra Range, on a ridge overlooking the headwaters of the Wainibuka River. At this point the Wainibuka is a small stream, but it eventually joins with other streams to form the largest river in Fiji, once known as Wailevu ("big water"), and now commonly called the Rewa. The village site is said to be located along the Tualeita — the Spirit Path — leading from Vuda, and is well within walking (and warring) distance from Vatukacevaceva and the old site of Nakauvadra. It is clearly marked on certain maps of the Native Lands Commission, concerned with ensuring that proprietary claims to land by mataqali are properly documented. But even with these clues, when I set out to find the site one blustery morning during the onset of the cyclone season, I ended up lost in a densely overgrown network of wild pig trails.

According to the standard version of the story, Narauyaba was the village of the Rokola clan, known for being skilled woodworkers. While most of the recorded versions tell how Degei's grandson Vueti chopped down a water-filled vine that grew near the village walls and caused a great flood which washed the people of Narauyaba downstream, the story told to me by
FIGURE 7.9. Cross atop Uluda. This tubular metal structure was placed on the summit of Fiji’s most sacred mountain by the Methodist Youth Fellowship.
the people of Vatukacevaceva contains a greater measure of verisimilitude. During the siege by Degei and his allies, the father of the twins, a man named Waicala, was living at Narayaba, and it seems he was something of a prophet, or perhaps was simply imbued with common sense. At some point he reads to the besieged villagers from a scroll, telling them that blood must not be spilled. He tells his two sons that they ought to leave. So the twins asked the carpenters of the Rokola clan to build some boats, so that they may escape. And the Rokola people, apparently fearing recriminations from Degei for their role in helping the twins to escape, went with them. Their canoe route naturally followed the Wainibuka downstream. They eventually settled at the village of Nukutubu, near the mouth of the great Rewa River, where they have maintained over the years a respected tradition of boat building and fine carpentry. Now, obviously the business about the scroll is a later embellishment, but the structural elements of this myth are probably close to the truth. As a further testament to the veracity of this tale, as recently as the early 1980s some of the Nukutubu people were allowed to return to the Narayaba area to claim their ancestral lands.

Thomson (1892:143) gave another reason for lending credence to the Turukawa myth, and clearly stated his belief in this tradition: "Seeing how trivial are the causes that lead to war ... and how any incident causing dissension would stand out against the background of monotony, there is little doubt that the god Ndengei was once a man — deified because he was the embodiment of the ancestral spirit — and that his favorite pigeon was really shot, and his people divided in consequence." Thomson’s point about seemingly trivial causes for war is a valid one, and is discussed at some length by Sahlins (1991) in regards to the Bau—Rewa conflict of the early 1840s. Wilkes (1845:78), who was able to observe intertribal friction first
hand, commented that "the wars of the Feejeeans usually arise from some accidental affront or misunderstanding, of which the most powerful party takes advantage to extend his dominions or increase his wealth."

One aspect of Nakauvadra mythology that makes this area so significant for the Fijian people is that not only are these mountains the destination for any number of first arrival stories, but they are replete with tales of exodus as well — the migrations from Nakauvadra. Whether or not the Turukawa story can be held credible, there are several narratives of a great flood, originating from a feud at Nakauvadra, which led to the settlement of other places in the Fijian archipelago (Seeman 1862:395). But perhaps even more important are the stories of an earlier migration, one that followed another of the spirit pathways, this time to its terminal point on the east coast of Viti Levu, to the place called Verata.

Spencer (1941:1) recounted the inconsistencies that surround this tradition:

A vague belief exists in the minds of some individuals that at one time in the distant past all the vu of the various clans dwelled together on Nakauvadra, a range of mountains in the northeastern part of Viti Levu, and then later dispersed, each vu to the territory he now occupies. One informant expressed the opinion that the dispersal was the result of the great war waged by Ndegei, the serpent-god, whose name is familiar to every reader of Fijian mythology, but whose cult was actually restricted to a small part of the island of Viti Levu. Another informant was equally positive, however, that the clan vu left the scene long before the war.

That these Nakauvadra people had left the mountains before the trouble between Degei and the twins may be shown by examining the elements of the story itself. When Nakauvadra laid siege to Narauyaba and found it to be a formidable fortress, Degei called upon his sons to help. One of his sons was named Rokomautu, the founder of Verata, and father to a man named Vueti. It was Vueti who, answering his grandfather's call for assistance, chopped
down the yaka vine at the entrance to Narauyaba and caused the flood waters to rise and wash away the town.

Verata is located on the central east coast of Viti Levu, on a point of land that looks directly northeast across to the island of Ovalau. Hocart (1915:76) commented on the physical appearance of the Verata people, “whose Dholo [interior highlands] origin is marked on their faces.” The Veratan landscape is infused with many traditions regarding the migration from Nakauvadra and the subsequent peopling of other places in Fiji. I had the privilege of spending several days at Ucunivanua, the modern village of Verata, and learned of these traditions from the people who uphold and cherish them.

Rokomautu was Degei’s eldest son, and when he set forth from Nakauvadra, some say he followed the crest of the ranges trending eastward along what has become the second sala ni yalo (“spirit path”) emanating from Nakauvadra. Others tell of him sailing a canoe — in some versions the reliable Kaunitoni, and in others a different canoe called Rogovoka — and making landfall at the protected cape. There is a curious cross-hatched pattern of lines in the tidal mud flats below Ucunivanua, said to represent the sail of this canoe, which would have been made of joined sections of masi (Fig. 7.10).

After settling at Verata, Rokomautu sired a number of sons and daughters, who went out to establish their own settlements in other parts of Fiji. His eldest son, Ulumatua, went to Bua after being chased away from Verata by his father. Many of the sagas of Ulumatua were recorded by Quain (1942). Besides Bua, there are additional areas of Vanua Levu that traditionally consider Verata to be their ancestral home (Hocart 1952). These linkages appear within oral histories from Vanua Levu documented by
FIGURE 7.10. Sail seams from Rokomautu's canoe, Verata.
Sayes (1984), who remarked that rather than being a literal account of original settlement, "these origin traditions can be interpreted as records of an extension of Veratan power" (1984:10).

Rokomautu’s son Vueti settled on the island of Motoriki, near Ovalau. Other children went to Batiki and to Kabara, in the Lau Group. Thompson (1938:185) recorded the following tradition from Lau: “About ten generations ago, according to the genealogies of high ranking sibs [mataqali], a group of warrior immigrants arrived in Lau. The folklore says that these people came from Nakauvadra ... the immigrants worshipped Degei as their first forefather.” Led by Daunisai, these people landed on Kabara, then spread to the rest of Lau. Thompson (1938:189) noted that Kabara was once the head of its own chiefdom, which held other islands “in tributary relationship”, but was later “absorbed by Lakeba.” This is also reflected in oral histories from the homeland, as Hocart (1929:25) pointed out: “In Viti Levu, too, is a tradition that Kambara was once chief in Lau.” Kabara now serves as bati (warriors on call) to Lakeba. Rewa was first settled after a division in one of Verara’s chiefly families. And the people who eventually became the powerful chiefs of Bau also derived from Verata. Barker (1926b:24) recounted that the present-day Bauans are “descendants of a chief called Romautu or Roko Mautu; he belonged to the Degei clan, and was born at Nakauvadra.”

Along the littoral strand below the headland at Verata are several partially submerged roots of a large vuga tree (Metrosideros collina). Gifford (1951b:172) also reported seeing them on the beach at low tide. But because there is no specimen of Metrosideros in the vicinity, these roots are called wakanivugayali (“roots of the lost vuga”). The belief exists that the tree is growing at Nakauvadra, and that the roots visible here represent the different mataqalis who came from Nakauvadra, settled at Verata, and then...
dispersed to other areas of Fiji. The vuga is indeed a mountain tree, not a coastal tree, typically “flourishing in dry, poor soil” (Capell 1973:270). In Hawaii the species is called ohia lehua, and is sacred to the goddess Pele (Thaman 1992b). The reddish-colored roots on the tidal flats at Verata have been used for traditional medicines, and it is said that when one of them dies it is a sure sign of the imminent death of a chief.

Verata was the first of the powerful political entities that evolved in Fiji. Many early sources hold that its rise to prominence was roughly contemporaneous with that of equally ascendant Rewa. Waterhouse (1866:13) wrote that “in the middle of the eighteenth century the two principal powers of central Fiji were Verata and Rewa. These kingdoms originally sprang from the same source, and are still called tauvu (‘same root’).” Ever the literalist, Tippett (1973:101) believed that, according to tradition, both Rewa and Verata were established as kingdoms in the year 1750. But most Fijians tend to grant primacy to Verata, and this would make sense, given that Rewans derived from a split in one of the chiefly families of Verata.

The legend about Rewa and Verata springing from the same source bears further investigation, however, because a segment of one version of the story is said to have taken place at Nakauvadra. Thomson (1892:144) related that following the trouble with Degei and the twins, and the siege of Narauyaba, people living in the area “scattered; and some went down and settled on a streamlet, and two of them built houses there together — the ancestor of Rewa and the ancestor of Verata; and to this day they use this interjection, when a Rewan meets a Veratan he cries ‘Kai vuni yavu’ (citizen of the foundation) and the Veratan answers ‘Kai vuni yavu’ because they had but one house foundation in the mountains.” But Thomson’s source for this story was a man from Beqa, an island very much under the control of
Rewa. This informant’s insistence that an ancestor of Rewa was living at Nakauvadra is probably symptomatic of Rewa’s desire for a direct connection to Nakauvadra. The Rewa-Verata connection, however, was actual. Perhaps more reliably, Waterhouse (1866:13) reported that the standard greeting between people from these places was “Nogu vuniyavu” (“my foundation”). But here yavu is meant not as the actual house mound but as a metaphor for a shared ancestor spirit — hence “vu of the house mound”. Whatever truth can be assigned to these tales may be evident from the original name for Rewa. It is Burebasaga — meaning “the temple with branches”, harking back to political division within the Verata hegemony, and the fact that there were temples at both Rewa and Verata dedicated to the same god (Waterhouse 1866:13). The ancient name still lives on as one of the three modern confederacies.

There are also traditions that tell of people from Nakauvadra moving to other locations in Fiji. Nadalo (1958:51) wrote, “in the early days some seven hundred years ago tribes began to part from the sacred mountains of Nakauvadra and settled in distant places all over Viti Levu.” He further stipulated that “there were in fact two streams of migration, believed to be of the same origin, which moved out westward from Nakauvadra ... the first stream consisting of some six tribes who took the mountain ranges. The second stream consisted of some ten tribes who took the watercourse of the Sigatoka” (Nadalo 1958:55). In closing this section on mythological terrain, we may note that even today many Fijians still trace their ancestors to Nakauvadra, and codified social relationships such as tauvu likewise indicate linkages. Thus, kinship and social bonds tend to support myth, and, in Basil Thomson’s words, “confirm the sagas of Nakauvadra” as the “cradle-land” of the Fijian people (Thomson 1908:6). At this point it becomes necessary to
shift from mythos to choros. and report the findings of research into the location and form of the tuatua at Nakauvadra. From that we can arrive at an idea of the design and functioning of these sophisticated agrosystems. In the sections that follow, I will continue to embed these garden terraces within the geographic and historical context necessary for comprehending both their development and demise.

Terrace location and morphology

There are a number of parallel tributaries to the Nakauvadra River tumbling off the crest of the range and cutting notched and steeply graded drainages into the slopes. Many of these streams were tapped to irrigate systems of terraces varying in size and complexity. These particular agricultural landforms were conspicuous enough to garner mention in at least one popular account. Australian mining engineer John Fraser spent some time prospecting for gold around the Nakauvadra country during the early part of this century. His attentive description of a typical set of Nakauvadra terraces conveys the sense of awe which these feats of traditional engineering are capable of invoking. The following passage is from the book *Gold Dish and Kava Bowl* (Fraser 1954:173):

> Lower down the slopes, near the fast-flowing water, we sometimes found the remains of terraces dug long ago for the cultivation of the water-loving taro plants. A ditch was dug from the gully out to the point of the spur, where a long narrow terrace was built up on the sloping ground, below this another, and so on till there was a series of perhaps ten. Water once flowed from terrace to terrace in an admirable irrigation scheme, and we were astonished at the immense amount of work and ingenuity represented by these systems of garden plots and water races. The terraces were often forty or fifty yards in length and ten yards wide; and we knew that, at the time when these irrigation systems were installed, no picks or shovels existed in Fiji. All the digging out and levelling of terraces and water channels, as well as the construction of the trench fortifications, must have been done with pointed sticks, wooden spades, and bare hands.
To focus on one particular group of *tuatua*, the watershed of Matanivanua-Naikoro Creeks was chosen for detailed field study (Fig. 7.11). This basin contains the greatest concentration of terraces at Nakauvadra, perhaps even in the entire archipelago. The dissection of the systems here may contribute to a more comprehensive understanding of the remnants of irrigated terraces elsewhere in Fiji, or, for that matter, Oceania.

Naikoro Creek is the primary drainage channel of the watershed. The stream heads at an elevation of 800 meters, near the summit of the range, and flows northwest for 3.5 km to its confluence with the Nakauvadra River at an elevation of 42 meters above sea level. Such a pronounced gradient, situated on the underlying volcanic structure of the range, results in a typical pool-and-fall type stream, at times deeply incised, especially in its upper, more steeply pitched reaches. There are numerous tributary streams to Naikoro, particularly along its left (western) bank.

Rukuruku Creek is simply a named branch of Naikoro, and is itself split into two forks that I have named West Rukuruku and East Rukuruku, and which join at the somewhat surprising angle here of 30°, indicating an intervening spur of land. Both branches of Rukuruku also head high on the mountain — about 670 meters — and both possess an additional feeder in their upper reaches. Rukuruku enters Naikoro along its right bank at an elevation of 150 meters, and thus drains the entire eastern portion of the upper Naikoro basin.

Matanivanua Creek is the main tributary of Naikoro, and its basin is separated from the rest of the watershed to the west by a prominent dividing ridge or interfluve (Fig. 7.12). Matanivanua heads near the crest of the range, at an elevation of 770 meters, and flows northwest for almost 3 km to its confluence with Naikoro Creek, at an elevation of 60 meters. From that

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FIGURE 7.12. Dividing ridge between Matanivanua and Naikoro basins.
point to its junction with the Nakauvadra River, the augmented Naikoro Creek only receives further input along its right bank from the outflow of a spring, but gains another major tributary from the west, along its left bank. Matanivanua Creek has one large branch that drains the western portion of its basin, but it also accumulates flows from an array of smaller tributaries draining the long ridge on its right flank to the northeast which culminates in Naibonabona hill. Even more importantly, its headwaters are situated in a steep pocket of forest land which forms a semi-circular upper basin.

Most of the watershed, up to about 365 meters elevation — and this is significant for its correspondence with old habitation areas (see discussion below) — was cleared of its original dry zone forest, and still appears quite bare in the 1951 aerial photography (Fig. 7.13). By 1978, trees and shrubs had become re-established in the Naikoro/Rukuruku drainage down to about 200 meters, though the drier spurs and ridges retained their cover of grass and reeds (Fig. 7.14). Matanivanua basin also witnessed a partial resurgence of tree cover, particularly within and adjacent to the swales and pockets — protected areas of greater moisture availability. Large areas of Matanivanua, however, have maintained a cover of grass and reeds. These changes in land cover over time, and the noted differences in revegetation between basins, are important clues to the processes of desettlement, agricultural disintensification, and continued resource use that have shaped the landscape of this watershed, and which will be discussed in the summary section at the end of this chapter.

Streamflows within the watershed exhibit great variation. Some of the streams are unable to maintain their flow all year. The main stem of Naikoro Creek has the largest bed, and drains the most area. But during the 1992 dry season (July - September) this stream stopped flowing altogether, and only
FIGURE 7.13. 1951 aerial photo of lower basin, Naikoro/Matanivanua.
FIGURE 7.14. 1978 aerial photo of lower basin, Naikoro/Matanivanua.
the larger pools held water. Underground flow could be detected in some stretches of the stream bed. West Rukuruku was more reliable, even though it drains a smaller area, probably on account of numerous springs which issue forth along its route. It flowed steadily all year. East Rukuruku, however, also went dry during the 1992 austral winter. The main stem of Matanivanua was the most stable stream of them all, not only within this watershed, but in comparison to all other streams draining the northern side of the Nakauvadra mountains. It flowed steadily all year, providing cool drinking water and an idyllic bathing pool at my field camp location. These hydrologic conditions were recognized not only by the early inhabitants of the highlands who constructed the irrigation works here, but by the more recent folk who live in villages on the valley floor and who have installed a concrete check dam on upper Matanivanua Creek, and several kilometers of pipe for domestic water supply.

Agricultural terracing in the Naikoro/Matanivanua watershed is, in a word, widespread. Its design includes the two basic types of terrace forms: hillside terraces — long, linear, level planting areas with earthen walls built along contours on the open spurs and ridges; and streamside terraces — small, pocket gardens with rock walls built adjacent to creeks or below springs in the forest. Detailed mapping and excavations of selected samples of both these forms yield the following data.

Hillside terraces cover a vast expanse of the open, grass and reed covered slopes, and are evident in nearly every one of the lower elevation drainages within the watershed (see Figs. 7.13 and 7.14). Because of the predominance of this talasiga land cover within the Matanivanua basin, definitive investigation of these contoured landscapes takes place there. Although both main branches of Matanivanua Creek hold remains of the
smaller streamside, stone-faced terraces, it is West Rukuruku Creek where these features are not only more numerous, but are more refined, and are also better preserved. It is in that area, therefore, that the excavation of a particularly well designed and constructed garden plot was conducted.

Canals are essential infrastructural components of the hillside terrace systems. They were identifiable in the landscape as long, linear, nearly perfectly level earthen constructions which led from a creek out to a point on the side of a hill or spur of a ridge. I was able to locate several of these features among the irrigation systems in the basin. In order to document with complete certainty the function of these canals, I conducted an excavation across a section of one of the best preserved exemplars of the form, located in the lower Matanivanua terrace system. The data derived from that exercise are reported below. There is one place along West Rukuruku Creek where the remains of a rock faced retaining wall indicate the headworks of a canal which once delivered water to a set of hillside terraces around the slope to the west. Such stonework in aqueducts was not common, although I did encounter it also in the Mataniwai system in the Rove Creek Valley of the western highlands (see preceding chapter). But perhaps the most remarkable hydraulic landscape modification within the watershed is a ditch some 8-10 meters deep constructed just below and to the east of the interfluve between Matanivanua and Naikoro/Rukuruku drainages. This ditch is situated at the base of the hill where the trail to the old village site of Burelevu commences, at an elevation of 800 meters, and evidently once served a dual purpose as a defensive earthwork and as an aqueduct. It was shocking to first come upon this structure, since its scale and depth are not apparent until one very nearly literally stumbles into it.
It was also not immediately apparent that the ditch was an artificial construction, until I noted the overgrown mound of spoil material along the brink of the ravine, and the numerous *kau moli* (shaddock trees, *Citrus* spp.) likewise lining the banks. The thick thorns protruding from the branches of this tree made it a favorite choice for designing defensive hedgerows.

**Matanivanua**

Two separate terrace systems within Matanivanua basin were chosen to document the form and function of this type of garden. The higher elevation set of terraces was designated upper Matanivanua, while the lower set was labeled lower Matanivanua. Under the direction of archaeologist Andrew Crosby, I excavated two trenches, one in each system. Trench 1 cuts across a set of three terraced garden platforms in upper Matanivanua, while Trench 2 dissects an earthen canal at lower Matanivanua (see Fig. 7.11). Planimetric maps were also drafted, using a laborious tape and compass survey.

Upper Matanivanua is a remarkably even set of tiered planting surfaces (Fig. 7.15). This system is representative of the classic *tuatua* form found throughout the Nakauvadra Valley. There are 25 individual garden platforms in the system. The average width of each terrace is 2.7 meters, while mean garden size is 132 m². Overall slope of the gradient is 12°. These terraces are situated facing north and northeast on a spur overlooking the east branch of Matanivanua Creek. The grass-covered hillsides to the east on the opposite side of the creek also show evidence of terracing. Upslope, on the toe above the confluence of the two forks of east branch, there are additional *tuatua*.

While there is a small streamlet running into East Matanivanua Creek adjacent to the main set of terraces here, it appears more likely that water...
FIGURE 7.15 Upper Matanivanua terrace system. Based on field survey.
was delivered by conduit or canal from the main east branch. As noted above, this stream maintains a reliable flow of water throughout the year. Pipes made of *bitu* (bamboo — *Bambusa* or *Schizostachyum* spp.) or the hollowed out trunks of *balabala* (tree fern — *Cyathea* spp.) and other soft woods were commonly used as aqueducts in traditional Fijian irrigation technology. Canals were also constructed, especially when a greater volume of water was required (see discussion on lower Matanivanua excavation, below).

Trench 1 was located about halfway down the system, at an elevation of 245 meters. It was 13 meters in length, and sliced through a set of three terraces. The trench was placed perpendicular to the slope, and its alignment, facing downhill, was 14° magnetic (Fig. 7.16). Vertical stratigraphy consists of three layers of soil above the natural regolith (Fig. 7.17). The pattern exhibits a typical cut-and-fill construction method, whereby soil was scraped from upslope and graded outwards to form a level planting surface. Stratigraphic details at the outer edges of the terraces reveal the remnants of the lip or bund, formed by not removing the underlying clay base at those points, and piling the excavated fill from the adjacent (upslope) planting surface on top. The interface between Layers 1 and 2, and between Layers 2 and 3 is not definite across the section. The interface between Layers 2 and 3 is mixed, probably due to gardening activities and root penetration. Layer 4 has clearly been cut into in places, and several dimple marks at the interface between Layers 2 and 4 are probably indicative of digging stick action. The soil horizons can be defined as follows:
FIGURE 7.16. Trench 1, upper Matanivua.
Upper Matanivanua terrace system
Trench 1, east profile

FIGURE 7.17. Stratigraphic section of east face, Trench 1. Upper Matanivanua terrace system.
Trench 1. East face stratigraphy.

1  Black, loamy topsoil. Dries to crumbly loam. Contains fine particles of charcoal and roots. Interpretation: recent turf build-up following terrace abandonment; subsequent burning practices indicated.

2  Very dark greyish brown (10YR 3/2) loam. Moist and humic, does not dry so quickly. No charcoal present. Interpretation: garden soil.

3  Yellowish brown (10YR 5/6) loamy clay. Contains lumps of yellow clay and intrusions of black loam; smears to yellow. The compacted matrix is dry and very firm. Interpretation: fill caused by cutting at back of terrace and moving material toward front.

4  Olive yellow (2.5Y 6/6) clay. Dry and crumbly in parts, moist in others. Very firm and difficult to dig. Quite pure in color. The interface with Layers 2 and 3 is unclear in places. Interpretation: natural sloping base that has been excavated and leveled to form foundation for planting surfaces.

The tuatua of Lower Matanivanua are similar in form, but somewhat more complex. This system consists of a coordinated set of thirty tiers, in some places staggered along the central axis (Fig. 7.18). The average terrace width is 4.2 meters, and mean garden area is 153 m². It should be noted that these calculations cannot account for the system in its entirety because segments of many of the terraces have been destroyed by erosional slumps or were rendered inaccessible by dense guava thickets and other brush. Due to the size and extent of this system, slope is variable, but overall it averages 14°. The longitudinal dimension is 340 meters. The lower Matanivanua system is situated on a long interfluvial spur between the two main forks of West Matanivanua Creek, at an elevation of between 140 and 190 meters.

Water was delivered to the top portions of the system in all probability by conduits or small canals from the west fork (of West Matanivanua Creek). There is, however, what is clearly recognizable as a major canal running from the east fork, and entering the system about halfway down the slope,
FIGURE 7.18. Lower Matanivanua terrace system. Based on field survey.
where it would have supplied additional water to the remainder of the *tuatua*.

Trench 2 is an excavation of a cross section of this canal (Figs. 7.19 and 7.20). Stratigraphy for the south profile of this excavation is complex, and indicates several distinct periods of canal utilization (Fig. 7.21). The soil horizons are defined as follows:

**Trench 2. South face stratigraphy.**

2. Brown soft loam. Interpretation: bank slump following abandonment of canal and terrace system.
3. Dark brown soft loam. Stained black in places. Interpretation: bank slump which occurred between two separate periods of canal use.
5. Olive brown (2.5Y 4/3) loam. Drier than Layer 4. Interpretation: deposits from first period of canal use.
7. Dark brown loam. Stained or marbled with darker soil in places. Interpretation: successive bands of exotic fill material that has become mixed with Layer 8.

**Rukuruku**

The abandoned gardens on Rukuruku Creek are representative of the number of small, discrete sets of terraces found along the streams flowing off the north face of the Nakauvadra Range. These streamside gardens were
FIGURES 7.19 (top) and 7.20 (bottom). South face of Trench 2. Canal, lower Matanivanua.
Lower Matanivanua canal
Trench 2, south profile

FIGURE 7.21. Stratigraphic section of south face, Trench 2.
constructed directly adjacent to the creek beds, and were located at elevations anywhere from 150 to 465 meters above sea level. All of these plots are stone-faced terraces. Lengths of the walls range between 2 and 10 meters; in some places they curve to take advantage of naturally situated boulders in their design. Their height seldom extends over a meter, though in some steeper areas the walls may reach 2 meters. They are often canted inward for greater stability.

A nineteenth-century visitor to Fiji rendered an accurate account of this type of garden (Lucas n.d.:48):

In the cultivation of ndalo ... the Fijians note that it requires for growth, good alluvial soil, continuous wet, and plenty of air and room. And so a native, where he cannot utilize natural swamps, will search the mountain stream until he finds a portion of the bank where he can, by means of small boulders and stones from the brook, build a series of terraces, over which a portion of the waters may slowly trickle. With great care and neatness he builds a series of terraces, finishing with small stones, and capable of retaining a necessary proportion of rich soil. And, at a proper distance apart, he plants his ndalo roots, from which, in due course, he obtains an abundant harvest. And furthermore, he learns the wisdom of giving the ground a rest, and so shifts the scene of his operations, and periodically chooses new gardens.

It is interesting to note here that shifting cultivation is a term that may be aptly applied to irrigated as well as to less intensive slash and burn dryland agriculture. The awareness of fallowing requirements and rotation of irrigated gardens is still operative, and will be discussed in the Kadavu case study in the next chapter. This realization has important implications for drawing conclusions about the relationship of population to intensive agriculture. The presumed demographic pressure on land resources based on evidence of irrigation, at least here in Fiji, may be more apparent than real. This point will be discussed further in the final chapter.

The representative streamside garden chosen for detailed study lies approximately 30 meters downstream from the trail crossing of West
Rukuruku Creek. The terrace is a stone-faced platform 90 m$^2$ in size, situated
along the left bank of the stream (Fig. 7.22). The terrace wall ranges in
height from 2 meters at its right angle corner above the stream bed, to less
than a meter along its front face. It should be noted that this wall formed the
upper garden in a set of three adjoining terraces. Construction techniques
made use of rock materials immediately available. Round stream boulders,
along with other, more angular rocks, were arranged without mortar
(Fig. 7.23). Much of the wall that is presumed to have existed facing the
creek has been washed away.

I excavated, again with the direction and assistance of Andrew Crosby,
a pair of trenches through the wall of this terrace. Trench 3 was placed
adjacent to West Rukuruku Creek, near the right angle of the terrace wall
where it then faces downstream (Fig. 7.24). Stratigraphic detail of the east
face of Trench 3 shows that the terrace wall in this location has suffered
erosional and tree root damage (Fig. 7.25). Soil horizons are as follows:

Trench 3. East face stratigraphy.

1. Very dark brown loam with turf. Moist, with some gravel and
roots present. Some pottery also present.
Interpretation: garden soil.

2. Dark brown loamy clay with some gravel. Drier, more compacted,
and with more pottery than Layer 1. Some charcoal present.
Interpretation: fill.

3. Grey/brown gritty clay. Wet, with abundant densely packed
gravel and larger rocks.
Interpretation: natural alluvium.

Trench 4, excavated through the front face of the terrace wall and
perpendicular to it, revealed a buried foundation of larger rocks (Fig. 7.26).
Stratigraphy in the west profile of Trench 4 consisted of four layers in the
upper garden, and four layers in the lower garden, interrupted by the
discontinuity of the wall (Fig. 7.27).
FIGURE 7.22 Rukuruku streamside terrace. Based on field survey.
FIGURE 7.23. Stone facing of Rukuruku terrace wall.
FIGURE 7.24. Trench 3, Rukuruku streamside terrace.
FIGURE 7.25. Stratigraphic section of east face, Trench 3. Rukuruku terrace.
FIGURE 7.27. Stratigraphic section of west face, Trench 4. Rukuruku terrace.
The soil layers are as follows:

Trench 4. West face stratigraphy.

1. Black, loamy topsoil, 10 cm thick. Interpretation: post-abandonment turf formation.

2. Very dark brown (10 YR 2/3) loam, containing some gravel and pottery, 24 cm thick. Interpretation: garden soil.

3. Dark brown (10 YR 3/3) loamy clay with abundant gravel inclusions; pottery and charcoal present, 40-60 cm thick. Interpretation: fill material.

4. Grey-brown gritty clay with abundant densely packed gravel; no pottery or charcoal present. Interpretation: natural colluvial deposit.

5. (Same as Layer 1).

6. (Same as Layer 2).

7. Light brown, crumbly loam, lighter in shade than Layers 2 or 3, with gravel and pebbles; no pottery or charcoal present. Interpretation: appears to be unconsolidated fill material that was dragged to the rear of the lower terrace during its construction.

8. (Same as Layer 4).

A 5.5 gram sample of wood charcoal from a depth of 60 cm in the fill material of Layer 3 was assayed for 14C activity (Beta 64461). The age reported by Beta Analytic laboratory was 160 ± 70 years B.P. Spriggs (1991:8) has issued important caveats on interpreting such data:

Radiocarbon dates from within irrigated or other garden soils may be misleading for a number of reasons. In discussing charcoal found within pondfield soils, Kirch (1975:306) notes three possible sources. These are: initial clearing and burning of the site prior to pondfield construction, burning of fallow growth during the period the field was in use, and an upstream source with charcoal carried in by the irrigation water. Thus dating material from a pondfield soil does not necessarily date first use of the pondfield ... charcoal present within them may only relate to the latest phases of use when the soil was last turned over. This must always be borne in mind when interpreting dates on charcoal within garden soils.
Because of the relatively small size of this particular pondfield, and the depth at which the sample was obtained from within the fill material, it is reasoned that this charcoal fragment represents clearance and burning of vegetation at the time of terrace construction.

In close proximity — from 10 to 20 meters — to the Rukuruku streamside terraces are several small rockshelters and overhangs of large boulders evincing signs of former human use. These are within the area of Burelevu village, and, while they may not have served as habitation sites, they were probably used to cook meals or store food or water. Although no excavation was conducted, a number of potsherds and molluscan shells were collected from the surface. Most of the shells comprise specimens of the genus *Gafrarium* (fam. Veneridae), an edible Venus-shell. Other specimens include shells from the Cardiidae family; several ark-shells, probably *Anadara* spp. (fam. Arcidae); a tropical clam, possibly *Codakia tigerina* (fam. Lucinidae); a small conch (*Strombus* spp.); a cowrie (fam. Cypræidae); and a Murex (fam. Muricidae). One larger shell fragment was easily identifiable as a *Lambis* specimen, probably *Lambis lambis*, the common spider conch, a delicious shellfish known to the Fijians as *yaga*. A sample of these shells submitted for radiocarbon dating (Beta 64460) yielded a 14C age of 210 ± 60 years B.P. Based on the date for the charcoal sample noted above, it could be inferred that reef and marine foods may have contributed a greater percentage of subsistence resources prior to the development or intensification of horticulture at this site. But given the margins of error, the radiocarbon dates place the period for gathering these shellfish as roughly contemporaneous with the postulated time of construction of the Rukuruku terrace.
Na koro makawa

There are three koro makawa (abandoned village sites) within the watershed: Burelevu, Bua, and Naikoro. I did not attempt detailed archaeological mapping of these sites. Oral histories of the three yavusa that formed these settlements were acquired from the Tukutuku raraba archives at the Native Lands Commission headquarters in Suva. They chronicle the origins and subsequent movements of the mataqalis comprising the social order in these villages. These traditions specify a migration from the Matanivanua-Naikoro basin to the coast sometime prior to the 1874 Deed of Cession. It is illuminating to note the locations of these former habitation areas in relation to the agricultural infrastructure still extant in the landscape (Fig. 7.28).

Naikoro is a beautifully arranged site, comprising at least a dozen discernible yavu on a forested slope along the western branch of upper Naikoro Creek. There appear to be several distinct sections in the village layout, with the stream forming a series of plunge pools in its midst. Large (roughly 6-12 meters in diameter) black volcanic boulders help define the placement of some yavu, and lend a feeling of intricate design. A surface collection of pottery sherds from Naikoro, and from other former habitation areas of Nakauvadra, was deposited with the Fiji Museum. They are mostly relatively thick, incised ware, with a probable date of manufacture no earlier than 200 years B.P. (Crosby 1993). It is probable they are within the Ra phase of ceramics, a period which basically encompassed the entire nineteenth century (Green 1963). Roth (1933:68) remarked that “one of the districts where pottery making is still practised is on the Ra coast ... where the reputation for making good pots still holds today.”
Oral historical accounts from the Tukutuku raraba stipulate the people of this village “left Naikoro and went to Naisogoliku and stayed with the people there for a long time” (NLC:yavusa Naikoro). They subsequently divided, with some mataqali moving to other places, including the island of Malake, and some remaining at Naisogoliku, becoming integrated with the mataqalis of yavusa Naisogoliku. These combined tribal units eventually formed the social order in the village of Vitawa, situated at the base of Navatu, an imposing physical and metaphorical landmark on the northern Ra coast.

Bua (not to be confused with the Vanua Levu matanitu of the same name) was a smaller village, possibly functioning more as a place of refuge during times of danger or impending attack. The site is located high up on the ridge between the two main branches that form upper Naikoro Creek, at an elevation of 400 meters. Because of the steep slopes and narrow confines of the ridge, there are no well defined yavu; but remnants of several rock retaining walls, with level house sites behind them, were found. The most striking features of the Bua site are two defensive structures — one a long (60 meters) rock wall facing west, and at its northern terminus curving around the point of the cliff; and, just above this point, another rock wall, 10 meters long, positioned as a parallel upper tier to the curved end of the lower wall, and commanding a view of the terrain below. These walls had been constructed with great care, with well fitted stones that have not become dislodged over time. The long wall is one meter in height and nearly a meter in width, while the stronger, more substantial upper parapet is almost 2 meters in height, and over a meter in width. The oral history for Bua is extremely brief. It was recorded on January 22, 1917, from the narration of Timoci Lewaivuki. According to this account, the people of Bua “left there
and stayed at Wailama ... they left Wailama and joined the people of Naisogoliku until the Deed of Cession" (NLC:yavusa Bua).

Burelevu appears to have been the largest settlement of the three. The site sprawls across several levels of slope along the right bank of West Rukuruku Creek, at an elevation of 335 meters. Centrally located within the site is a massive baka or banyan tree (Ficus obliqua). In addition to yavu there are a number of overhangs from the scattered boulders which seem to have afforded shelter. Many pottery sherds were evident beneath these overhangs and scattered among the yavu, and a surface collection of predominantly incised ware was made. The probable date of manufacture of these ceramics is the same as noted above for the pottery from Naikoro. Although a thorough archaeological mapping of the habitation area was not attempted, several features should be noted.

Among the dozen or so visible yavu that comprise the Burelevu village site, there is one that clearly is larger than the others. It is of a more regular rectangular shape, and also exhibits a higher stone foundation. This would indicate either a chiefly dwelling, or possibly the bure kalou (temple). Codrington (1891:48), using Fison's (1880) data, defined a yavu as the ancestral town lot upon which the house is built, with the height of its foundation reflecting the social rank of the dwelling's inhabitants. Thus the metaphorical adage aimed at families of privileged status: sa cere na nodra yavu, meaning “the house mound is high”.

Along the perimeter of the habitation area are the remains of a fairly substantial rock wall. It was constructed from the blocky and angular talus from a nearby exposed cliff face, and some of the stones appear to have been crudely cut and dressed. They averaged from 40 to 45 cm in diameter. This wall extends from the exposed rock face of the cliff downslope for 180 meters,
and terminates on the other side of a large boulder several meters in height, where the slope dramatically steepens. The main trail passes between this boulder and another, slightly smaller boulder just upslope. The width of the wall is between 1 and 2 meters, while the height was measured generally to be just over a meter. There was evidence in the form of rock rubble on either side that it had at one time been somewhat higher. Regarding its function, we may compare its position in the site to that depicted in accounts of similar structures found elsewhere in Fiji and the Pacific.

Among the people living in the interior of northern Viti Levu, just southwest of Nakauvadra and not very far away, Brewster (1922:265) encountered “stone walls which surround their villages.” Britton (1870:54) wrote about finding rock walls on the island of Ovalau: “there is a stone fence of several miles, which encloses 300 or 400 head of cattle, the increase of a few introduced 10 or 12 years ago.” Campbell (1881:155) also reported livestock enclosures on Kadavu: “pigs were inside the fence which surrounded about a dozen huts, these fences appearing to be built to keep the pigs within bounds, which are employed, I imagine, as scavengers.” In Hawaii, rock walls were built as livestock exclosures on the island of O'ahu, where Kirch and Sahlins (1992, vol.1:148) reported on the pilikia (trouble) that European livestock caused among the maka'ainana (commoners): “in the 1840s there were cattle in their gardens: mainly foreigners' cattle, destroying the subsistence of the Hawaiians ... the people reacted by building walls of all kinds.” In the Kohala district on the island of Hawai'i, Clark (1986:16-17) documented “an increase in wall building” for the same purpose during the 1840s and 1850s, associated with the adoption of Irish potato cultivation: “these walls frequently crossed over and thus blocked earlier irrigation ditches.”
In some cases, the various precincts of a village constructed walls within the village to define the living space of the social group whose yavu were thus enclosed (Fison 1880:336). But the wall at Burelevu is on the very edge of the settlement site, not within it, and therefore may have served as the village boundary wall, built to demarcate the entire habitation area and to provide some measure of defense. Thus, its function would have been similar to the wall already described at neighboring na koro makawa Bua.

Quain (1948:35) described nearly identical features on Vanua Levu: “At suitable intervals piled stone, uncut and not cemented, is heaped between large boulders to form ramparts; the path is effectively blocked so that but one man can pass at a time. Forest debris has accumulated so that the stonework today is rarely more than 4 or 5 feet in height.”

The oral history of yavusa Burelevu as set forth in the Tukutuku raraba was recorded January 22, 1917, from the narration of Solomoni Nasora. It recounts the establishment of the village at Burelevu, a subsequent movement to Rukuruku (most likely just down the hill from na koro makawa Burelevu), and eventual relocation to the coastal village of Naisogoliku, and then, following Cession, to Vitawa. One installment of the oral history of yavusa Naisogoliku, recorded on July 18, 1918, from the narration of Kini Tuitobu, at that time the Tui Navatu, confirms these data:

All the yavusa Burelevu came, and left their land forever. They were given a piece of land called Samukinakoro, and it still goes by that name today. Then some of the yavusa from Naikoro came, including all of the mataqali Narukuni. They were also given a piece of land, called Uluilagi, where they have stayed through the Deed of Cession until today.

The land where many of the Matanivanua terraces are situated was once the inhabited territory of the people of yavusa Burelevu. As noted above, the people of this yavusa migrated to Naisogoliku, and after Cession, to Vitawa, on the coast. It still “belongs” to the mataqali of yavusa Burelevu as
a class of land known as *vanua vakaitaukei* (see France 1969:76). One Vitawa villager has returned to these ancestral lands and raises sugar cane as an independent farmer or *galala*. Timoci Nabogi was a key informant during this investigation, and we became fast friends. I was able to locate the massive hillside systems at Nakauvadra easily enough through the use of aerial photography, but it was Timoci who showed me the streamside gardens along Rukuruku Creek. Thereafter I scouted out other streamside terracing on most of the other creeks. He also led me on horseback one hot day straight through *na koro makawa* Burelevu, but slyly admitted no knowledge of the site, even as I dismounted and clambered over the rock wall snapping photographs. He often would wait until he saw how much I could discover on my own or through research back in Suva before he divulged what he knew. Then there would always be surprise and much laughter when our data matched up. Timoci’s claim to these lands points to the previous location and subsequent universal mobility of Nakauvadra villages that occurred around the time of the Cession of Fiji to Great Britain and the cessation of hostilities instituted by Pax Brittanica. The next section discusses the settlement pattern at Nakauvadra during the early historic and protohistoric periods.

**Early population and settlement**

Oral historical and archival evidence regarding this area points to a formerly larger population engaged in subsistence gardening prior to European contact. On a map that also delineates the general location for the Nakauvadra agricultural terracing, Frazer (1973:82) has charted the relocation of villages in Ra Province since Cession. He located a number of “fortified villages” situated on the upper slopes of the Nakauvadra Range. As indicated cartographically, most of these populations shifted to the village of Vatukacevaceva during the early colonial period, prior to the 1911 census.
I had a copy of Frazer's map in my possession during several evenings around the grog bowl in Vatukacevaceva, and it was an object of intense interest. The cartographic data consist of symbolic denotation of village location, but without toponymic labels. Arrows link abandoned village sites to presently inhabited places, indicating migration of the population. The villagers at Vatukacevaceva were able to supply names to village symbols on the map, and pronounced Frazer's data to be amazingly accurate, with a few minor exceptions. For example, Frazer indicated that the people once residing at na koro makawa Navanani migrated to both Vatukacevaceva and Togowere, on the coast. But the people at Vatukacevaceva were adamant that the kai Navanani went only to Togowere, and never formed any part of the aggregated population of their village. Most surprising, however, in light of the otherwise comprehensive accuracy of Frazer's data, is that the map completely missed the three koro makawa within the Matanivanua-Naikoro basin. This may be attributed to the eventual migration of those villagers, not to Vatukacevaceva like most other Nakauvadra settlements, but across the ridge to the north, to the coastal village of Vitawa.

Each of these old village sites was visited and its location charted during the course of fieldwork, resulting in a map of the pre-Cession settlement pattern at Nakauvadra (Fig. 7.29). From the chronicles contained in the Tukutuku raraba, supplemented by Frazer's data as corroborated during interviews with local informants, it is possible to determine many of the subsequent movements of population. While precise dating of these migrations is at times difficult, it can be ascertained that many of the old villages were abandoned just prior to Cession in 1874. This chronology generally would match that obtained from the pottery collections made from each village site, as well as the radiocarbon dates from Rukuruku.
FIGURE 7.29. *Na koro makawa* in the Nakauvadra area. Base map adapted from Dept. of Lands and Survey, 1989. Location of village sites based on fieldwork and Native Lands Commission maps.
Warfare was undoubtedly a determinant in the siting of these old villages, and by association, the gardens and terraces of Nakauvadra. Discussions within Chapter 5 have already outlined the ubiquitous nature of Fijian warfare. Fear of enemies permeated all aspects of pre-Cession life and livelihood in Fiji. This fear was transmitted to the landscape through the construction of fortified villages in some cases, and, more typically, in hilltop and ridge forts which served as temporary places of refuge during those times when danger of attack was imminent. Informants in the village of Vatukacevaceva stressed that because of the potential for enemy attack or ambush, nobody lived in the valley prior to Christianity, even though it was the site of much better soils. There are several aspects of both site and situation of the Nakauvadra terraces and associated habitation areas which bear testament to the need for wariness by the villagers of na koro makawa Burelevu, Bua, and Naikoro.

First of all, the actual location of the massive Matanivanua terrace systems, along with the Naikoro and Rukuruku systems to the west, tells of implementing the preliminary line of defense: that of concealment. The position of these terraces several kilometers up a small river valley, virtually hidden from coastal view by an intervening ridge, clearly implies a strategic imperative. Given the volatile nature of intertribal relations during the period of occupation, it would have been essential to maintain productive garden areas contiguous with defensible settlement sites.

The village sites themselves were likewise situated in rocky areas on steep slopes. Large natural boulders were used to define the boundaries of habitation areas, and rock walls were constructed along the site perimeters. The elevation of every koro makawa exceeded 300 meters. This was true not only for the three villages within the Matanivanua - Naikoro basin, but for
all the settlements along the northern flank of the Nakauvadra Range. Some of the smaller hamlets, such as Nasanimai and Bua, were located even higher up the slopes, indicating more of a refuge function.

Remnants of surrounding defensive earthworks provide still another clue to the milieu within which these people went about their lives in precarious balance with their neighbors. Several sets of ramparts and berms were discovered during reconnaissance surveys of this area. One extensive set of defensive features is situated on the interfluvial ridge between Matanivanua and Naikoro drainages. Another cleverly hidden berm — what one informant termed a "war ditch" (*keli ni valu*) — is aligned parallel to the main trail between Burelevu, on Rukuruku Creek, and the Naikoro drainage basin. It is upslope from the trail, at a distance of 15 meters, which would have been a perfect ambush range for combatants brandishing spears or the dreaded *ula*, which Wilkes (1845:343) described as "a short club, used as a missile." The design and construction of this particular *keli ni valu* took advantage of a naturally occurring variation in slope angle, and thus its appearance is that of a natural topographical feature. It appears from the trail below as a slight undulation in the terrain, without a hint of the excavated ditch just behind, within which warriors could be utterly concealed from view. I had passed by it several times before finally giving in to curiosity and a nagging feeling that something wasn't quite right about it, and walked behind it to find the ditch.

John Fraser (1954:173) gave an account of climbing the steep trails of Nakauvadra and coming across what may have been these same landscape modifications: "The native paths we followed took no heed of grade, but ran straight up the rises and down the depressions of the mountain ranges, often leading to a hilltop which was the long-abandoned home of some ancient
Fijian community. We frequently found evidences that such places had once been provided with rather elaborate defence works, a deep trench or series of trenches having been dug completely round the hilltop.” Tippett (1968:58) also reported on these features: “When I climbed the narrow way to the top of Nakauvadra in Ra, I crossed several war pits, and was shown where the bowmen would have stood shooting at me as I crossed under fire.” He has elsewhere described defensive earthworks for a fortified location on Kadavu, giving an account of one such fort — Naborua — of the yavusa Naikasovesi, at Daviqele: “Approach is by single file only. Even if an enemy did reach the top he had to pass four keli-ni-valu (war-pits), and a sava (spirit-land) perhaps feared as much” (Tippett 1973:61).

**Politics and alliances**

Social relationships among tribal clans (mataqali or matanibure) and larger groups (yavusa and vanua) during the several centuries leading up to the historic period were marked by mutual hostility and warfare. Chapter 5 reviewed the archaeological evidence for the build-up of fortifications elsewhere in Fiji beginning around A.D. 1400. Rechtman (1992) noted a “pattern of increasing warfare and cannibalism.” Because this seemed to have been a widespread and universal development, we may assume that similar conditions prevailed in Ra. We have no indication that a powerful chiefdom existed in this region, although oral traditions tell of culture heroes such as Udre Udre, a cannibal chief widely renowned for devouring upwards of a thousand bodies. His tomb is enclosed in a shrine along the main coastal highway west of Rakiraki (Fig. 7.30). There were, however, cohesive political entities in adjacent areas. Wilkinson (1908:14) related the tradition of the Tavua tribe who migrated to Viti Levu from Vanua Levu, and settled along the coast “between Ba and Rakiraki, where they remained an
FIGURE 7.30. Tomb of Udre Udre, Ra Province.
important and independent chiefdom up to the time of the cession.” But when Barker (1926b:24) wrote about Rokomautu having “left Nakauvadra before the decay of that confederacy,” he was using the term loosely. Certainly nothing approaching the scale of a matanitu ever existed in Ra.

During the seventeenth and eighteenth centuries, when the Verata hegemony exerted influence over most areas in Fiji, it might be expected that Nakauvadra was included, given the traditions of connection between the two places. Scarr (1984:7) noted that “Verata in history was a wide-ranging, tribute-exacting chiefdom.” As one example of the geographic extent of Veratan dominance, Sayes (1984:13) reported that on Vanua Levu, a network of tribute-conveying pathways known as sala volivoli converged on Wailevu, a place “used as a clearing house for property and food presentations which were to be taken to Verata.” Local informants at Nakauvadra, however, deny the likelihood that Verata ever exacted tribute from Ra, while the people of Verata likewise seem to regard Nakauvadra with a certain reverence, and not at all in a subordinate position.

Besides, Verata did not hold on easily to its consolidation of political power. Warfare was a constant threat and preoccupation, and not only required frequent expeditions to the periphery, but created the need for centripetal defensive structures as well. Gordon (1897, Vol.1:216) described Verata as “a little town which has three deep concentric fighting ditches.” It was situated in a mangrove swamp, behind the prominent headland where the modern village of Ucunivanua is now located. While at Ucunivanua, I asked to see the site of na koro makawa Verata. My informant, reluctant at first due to the powerful mana emanating from that place, agreed to show me the boundary so long as we didn’t go in. This, after all, was indeed serious business. Australian geographer Oskar Spate once made a similar request to
the villagers of Ucunivanua, accompanied by a large tabua, which was accepted. He was then able to tour the site and took several photographs, including one of the yavu of the bure kalou ("spirit house"), which, when developed, presented the image of a Fijian warrior brandishing a club. As he was telling me this story, my informant brought us to the edge of the outer moat, where I pointed my camera toward the dense secondary and tertiary rainforest that had enveloped this sacred site. Just as I was obtaining focus, something — an insect or piece of windblown bark? — flew into my eye, preventing me from getting a clear image of even the perimeter of old Verata.

Prior to the decline of Verata, and the rise to power of Rewa and Bau, the forces of conflict operating within Ra were largely provincial. Frazer (1901:22) has identified two types of warfare that occurred in Ra during the prehistoric period: "continued outward pressure of the Colo tribes of the mountainous interior on the dwellers in the lowlands [and] internal feuds among the 21 vanua, with continuously changing factions." Wilkinson (1908:10) also spoke of the "jealousies between the Colo and the coast tribes." These hostile relations prevailed well into the nineteenth century. Forbes (1875:79) painted a stark and vivid portrait of the people of coastal Ra during the late 1860s:

The inhabitants are hemmed in on one side by the ocean, on the other by the mountains and the warlike tribes they contain. This state of things, continued through centuries, has left its mark on the race. Compared with Fijians from other parts of the group these lowlanders are a degraded and miserable set of men. With them the struggle for existence degenerates into a mere struggle for food. I have often seen them stalking along the seashore like gaunt spectres, searching with wolfish eyes for something to eat. But besides food these people stand in need to defend themselves against their cannibal neighbors who occupy mountain fastnesses in a chain of lofty mountains.
On September 20, 1850, the Reverend Walter Lawry sailed along the coast of northern Ra and uttered this lament: “We passed along the coast of Ragigidi, and in sight of the Kauvadra mountains; but the Gospel makes little way among so many ‘little wars’” (Lawry 1851:209). When Britton (1884:53) recounted a ramble he took in these “screw-pine hills”, he wrote, “I had a dread of momentarily rushing into the arms of some anthropophagistical mountaineer.” Violent skirmishing was simply a way of life for the Nakauvadra settlements, as shown by the defensive earthworks previously discussed, and the difficult and inaccessible position of the habitation areas themselves. Allegiance to a greater polity was not required for participation in this free-for-all.

With the evolution of more complex chiefdoms during the nineteenth century, a series of conflicts arose when these eastern coastal powers mounted expeditions seeking tribute or demanding submission to their authority. As presented in the previous section, oral histories from the Tukutuku raraba told of migrations from the Nakauvadra mountains to the coast by the Burelevu, Bua and Naikoro yavusa. Additional data derived from fieldwork revealed the reason for this relocation. These mountain tribes were summoned to assist the Tui Navatu in his battles against the allied forces of Tui Navitilevu and Cakobau. This organized offense by Bau, not to mention the advantage of muskets, proved relentless. Wilkes (1845:83) reported that in 1840, Nakauvadra was “a district under the authority of Ambau.” And Derrick (1957:142) wrote that, at least as of 1859, Rakiraki was “part of the Bau dominions.” But villagers from Vitawa, the present settlement at Navatu, assert that their vanua was never subject to anybody.

Indeed, during the austral winter of 1860, when British envoy Colonel Smythe was investigating the attitude of other Fijian chiefs regarding
Cakobau’s first offer of Cession, he met with representatives of all the states considered at that time to be independent; these included “Rewa, Kadavu, Nadroga, Navatu, Macuata, Bua, Nakorotubu, Lakeba, and Cakaudrove” (Derrick 1957:146). This lends credence to the claim of Navatu as an autonomous principality, along with the more powerful matanitu such as Rewa, Lakeba, and Bau. Grey (1973) related that during the 1860s, Navatu “was the main centre on the N.E. coast.” And although Navatu — the physical site — is a natural fortress, to maintain such a sovereign stance undoubtedly required a strong force of warriors. When the three villages from the area of terracing — Bua, Burelevu, and Naikoro — migrated to the coast, it was to form a guard around Navatu. They were summoned as bati (warriors on call) by Tui Navatu. Wilkes (1845:60) reported that “the term mbati signifies allies, or being under protection, though not actually subject.”

Not all linkages were political, of course. Relationships between various social groups were also structured along lines of common ancestry and kinship, as well as the more economic functions of trade and exchange. It will prove valuable at this point to probe a bit deeper into the these types of connections which gave order and meaning to Fijian society, particularly those that have had some bearing on the evolution of land and life in the Nakauvadra Valley.

The relationship of tauvu was mentioned in earlier chapters. Functional operation of this bond may be responsible for reinforcing the importance of irrigated taro production as a component of local horticulture. The people of Ra are tauvu to the people from Nadroga, in southwestern Viti Levu, and also to the people from the island of Kadavu. This would have entailed visits and social liaisons between these areas, an ongoing process of cohesion that may be just as potent today as in the past, because of improved
transportation opportunities. Food preferences influence the type of fare offered at traditional feasts, and irrigated taro has a taste that many people favor (cf. Chapter 8, below). In the previous chapter I presented evidence regarding the scattered distribution of terraced agriculture throughout the group, and the concentration in the Sigatoka basin (Nadroga) and on Kadavu. This is perhaps no accident of geography. Villages situated in separate sections of the country but linked by tauvu relations, may have shared not only a common ancestor but a tradition of expending the time and energy required for pondfield agriculture.

Quain (1948:288) was careful to differentiate the relationship of tauvu from a strictly kin-based alliance, and also associated it with agriculture: “In contrast with the bonds of kinship, it is inherited claim to land that determines the regions to which one is tauvu. Tauvu concerns lands and their earth. Bonds between these lands affect all those who till the soil.” Furthermore, as Spencer (1941:2) noted, the function of the vu shared by tauvu relatives was directly tied to agriculture: “The ancestral spirit of a certain clan watches over the gardens of his people and if taro is planted carelessly he will come at night and admonish the planter. He is accustomed to inspect the gardens after dark and at such times a light like a lantern may be seen moving about the yam mounds, but no tracks are to be found in the morning.”

Trade relationships existed between groups of people at both a formal and informal level. The most formal trade system in Fiji was known as solevu, which Couper (1968) has described as “the prior arrangement by one related group to visit another, the preparation of goods to be exchanged over a period of months or even years, the visit, the ceremonial exchange of gifts (status being accorded to the most generous), and the accompanying feast
and dances.” It was typically a connection which favored both parties, and served to establish links between “sea and land peoples” (Couper 1968). But it was a connection based less on the acquisition of desirable commodities than on social needs, for these exchanges were driven by kinship ties and ceremony as well: “Local specializations for indigenous trade were not, however, simply direct responses to the distribution of resources” (Couper 1968). This is a point that Thomas (1991:190) has recently made clear:

The old solevu were grounded in the diversification of specialized craft production: that is certain villages or groups manufactured things such as pottery, mats, salt, wooden ornaments, and barkcloth. With certain exceptions, many of these articles could have been produced anywhere, or at least in more places than they were produced, but the pattern of specialization and consequent mutual dependence fitted well with the tremendous importance of alliance in Fijian society: the reproduction of persons was (and in rural groups still is) seen to depend upon paths, maternal links, and exchange.

Less formal exchange arrangements have also been reported. Unlike the ceremonial impetus of solevu, many of these would have exhibited a dimension of regional comparative advantage. Thompson (1938:188), for example, remarked on Lauan inter-island trade: “the fertile volcanic islands exchanged food for manufactured articles such as canoes, woodwork, tapa, and mats from the infertile islands.” Wilkes (1845:185) noted that “Nairai is famous for its manufactures of mats, baskets, &c., a large trade in which is carried on throughout the group by exchanges.” Quain (1948:5) found that coastal-interior trade linkages were common in Vanua Levu: “yams, taro, bananas, and kava root for turtles, fish, and other products of the sea.” Burns (1963:40) elaborated on this network: “The mountain tribes of Viti Levu exchanged yaqona, grown in the interior, for salt, mats, and other articles produced on the coast. Certain areas produced the best mats, or masi, or canoes, and these were eagerly sought after by people from other areas who offered their own produce in exchange.”

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For Nakauvadra, we know that such trade was indeed carried on. To the west of Togowere, on the coast, there are a number of salt-drying basins that are still in use today, and which furnished a trade commodity for the coastal dwellers to offer in exchange for food or kava from the interior. Hocart (1915:76) reported that salt-making was a specialty of the northern Ra coast. Informants at Vatukacevaceva still remember crossing the ridge on horseback with yams and taros to trade for salt and fish. That taro was a major item in this exchange between Nakauvadra and the coast should not be surprising. Thomas (1991:90) reminds us that “in day-to-day exchange, as well as on more important occasions (in tribute and in sacrifices) food was — and in general still is — the primary medium for the expression of social and ritual obligations and affiliations throughout the Pacific.”

**Colonial encounter**

Radical changes were wrought in the landscape and society of Nakauvadra by the coming of the Europeans. While this section is entitled “colonial encounter,” it should be understood that these changes began prior to the actual Cession of the islands to Great Britain, and the beginning of formal colonial rule in 1874. Many of these changes had direct impact on the functioning of village agrosystems, including, and perhaps especially, the irrigated terraces. This section discusses the ramifications of initial European contact in the first decade of the nineteenth century, the subsequent patterns of trade and provisioning that were established, and the relationships of exchange and subsidy that were a direct consequence of the polities and alliances discussed in the previous section.

By the 1860s, the establishment of permanent European settlement in Ra Province began to erode traditional subsistence patterns, not only through spatial intrusion and land alienation, but also by the export of local
manpower to serve as plantation labor, often in other areas of Fiji. With
colonial administration came colonial rules and regulations, and none had a
more profound impact on traditional Fijian agriculture than the imposition
of taxes, to be paid in kind by the sale of approved crops. These “tax gardens”
were a ubiquitous feature of early colonial landscapes throughout the
country, and it is necessary to examine their development at Nakauvadra to
gauge the conflict they might have caused with subsistence requirements.
Again, both land and labor issues are involved. Finally, this section
considers the impact of new or introduced food crops for domestic
consumption in the Nakauvadra area during the late nineteenth and early
twentieth centuries.

The first recorded contact between Europeans and Fijians from this
part of the archipelago occurred in 1789, and, judging from the outcome, it is
a moot point as to who may have gained the privileged position. William
Bligh, aboard a small boat loaded with eighteen loyal crew members off the
H.M.S. Bounty, was making for the far-off Dutch outpost of Timor when he
sailed through the strait between Viti Levu and Vanua Levu. On the morning
of May 6, Bligh spotted the Nakauvadra Range: “Saw another large Mount.$
18d SWbS 10 leag$.” (Bach 1987:57). Later that day a number of Fijian canoes
made sail from one of the Yasawa islands, and their manner seemed to
indicate an unfriendly pursuit. In the wake of the mutiny, Bligh was in no
mood for further trouble, and managed to outdistance the native canoes. In a
masterful feat of seamanship and navigation, the small boat eventually made
it to Timor, and the much-maligned officer may have had the upper hand
after all regarding his experiences in Fiji, for the sea off the north coast of
Viti Levu is known today as Bligh Water.
As discussed in Chapter 5, the initial thrust of Europeans into Fiji was a consequence of the sandalwood industry. While most of this activity took place on Vanua Levu where concentrated stands of sandalwood trees permitted commercial exploitation, the beginnings of trade between European ships and Fijians touched the shores of all the surrounding land areas. The coast of Ra is directly across the strait from the areas on western Vanua Levu where the sandalwood was being extracted, and it is entirely feasible that ships would have called in to shore on Viti Levu for provisions that may not have been available to them on Vanua Levu. Moreover, because of interaction with the sandalwood ships, Bua was the most powerful chiefdom in Fiji during the first decade of the nineteenth century. Ward (1972:94) has shown that the height of the period of sandalwood export from Fiji was from 1804 to 1809, and that “by this time the political structure had been influenced by trade, with Bua temporarily occupying an exalted position.”

While there is no evidence pointing to political expansion of Bua or enlargement of its tributary network, there may have been such a shift in the balance of relations between Bua and Ra. I have already noted the existence of certain ties between these two localities due to their close proximity and the spiritual and mythological communion created by Nakauvadra, Naicobocobo, and the sala ni yalo linking them. We know that Bua's influence extended to Waya, in the Yasawa Islands to the west (Wilkinson 1908:14). Finally, we cannot discount the possibility that laborers from Ra may have traveled to Vanua Levu to work in the sandalwood industry. As discussed below, there is a long tradition of Ra villagers being wanderers and readily available itinerant laborers, a tradition which may have started during this period. This migration of labor from the
Nakauvadra area certainly would have had a negative impact on the ability to maintain the intensive agriculture of the irrigated terraces. Curiously, a parallel situation happened in Hawaii, on the island of O'ahu, where food production suffered during the 1820s due to labor displacement caused by the sandalwood industry (Kirch and Sahlins 1992, vol.1:57). The labor taken up by sandalwood in Hawaii at this time was one of the reasons for the abandonment of the Anahulu Valley taro irrigation systems (Kirch and Sahlins 1992, vol.2:87).

The sandalwood boom collapsed with the exhaustion of the resource and the drop in prices on the oriental market. But it was not long before another export commodity was sought after in Fiji, and the beginnings of the bêche-de-mer industry brought profound changes to the Ra area. Ward (1972:95) wrote of the dovetailing of these two activities in the Pacific: “the rise of the bêche-de-mer trade in Polynesia and Melanesia was closely linked with that of sandalwood, often providing an alternative income to traders faced with the depletion of the sandalwood resource.” Again, it was Vanua Levu — this time Macuata, along the north coast — involved initially in the actual procurement of the resource, but vessels cruised other coasts seeking foodstuffs in trade. Later, several areas along the northeast coast of Viti Levu were also exploited for drij, augmenting the supply being obtained from Macuata. The Ra coast was ideally situated to provision the ships visiting these two source areas. Pigs, and especially yams, were provided by the coastal areas of Ra in the vicinity of Nakauvadra (Ward 1972). While taro, we can assume, was still being grown in relatively large quantities, yams were more suitable as ships’ provisions due to their superior storage capabilities. Yam cultivation, though not irrigated, was still a labor intensive activity. Mounds had to be prepared and the vines trained to climb a trellis made of
reeds or bamboo. Weeding was very important also. The additional work that was necessary to increase the yam crop for trading to the bêche-de-mer ships would have been redirected from the labor required for irrigated taro production.

Logistics of the bêche-de-mer procurement process were outlined in Chapter 5: the massive amounts of firewood necessary for drying, the labor of entire villages being summoned by chiefs who desired European muskets and trade items, and, most relevant to the situation of food production in Ra, the length of time that the ships were required to be in Fijian waters. Typically a bêche-de-mer vessel would need to stay for three months while a cargo was procured and processed. The food required to feed its crew during that time effectively created the first cash cropping in Fiji, and started a trend of dependence on foreign trade and away from subsistence production that continues unabated today. As Ward (1972:115) stated, "from this time onwards the supplying of foodstuffs to visiting vessels and to European residents increased steadily and a commercial element was firmly established in the agriculture of some coastal villages."

Certain scholars feel that the impacts of European contact and the onset of trade should not be viewed as entirely disruptive, at least in the beginning. Thomas (1991:120) has warned of putting too much emphasis on this conjuncture, particularly in the provisioning of sandalwood and bêche-de-mer vessels:

Their relatively limited demands were met by different groups over quite a wide area ... and could easily be accommodated. This was so because the ceremonial economy in Fiji was already developed to an enormous extent: there were many forms of intensive irrigated horticulture, and food was routinely produced to be offered up for ceremonial exchange — in some areas specifically for barter through specialized production networks. When accounts are read of feasts at which many thousands of yams or taros and dozens or occasionally hundreds of pigs and
turtles were presented, it is not difficult to imagine the smaller needs of ships being relatively easily dealt with. While this seems a logical argument on the surface, several flaws emerge with closer reading. First, it ignores the fact that ceremonial exchange may not have been so easily converted to a commercial transaction. Those great piles of pigs and root crops were (and still are) a point of local pride in presentations at regional ceremonies. The overwhelming quantities so painstakingly prepared for ritual offerings were not transferable as fodder for barter, especially to the *kai valagi*. Even Thomas (1991:112) has admitted that “the conduct and organization of trade was essentially upon Fijian terms to which foreigners were obliged to adapt.” In any case, and even more so if this last assertion by Thomas is true, as trading partners Fijians would have offered as little as they could in return for as much as they could obtain. Furthermore, turtles at this time were only for the chiefs, strictly taboo to common folk. Waterhouse (1866:316) listed “the unlawful eating of the turtle” as one of many *causi belli* in Fiji. Later, of course, turtle shell became another export trade commodity. Finally, while the irrigated horticulture of *taro* may have been available to ships’ crews at the immediate *bêche-de-mer* station area, it could not provide the flexibility afforded by the storable *yam*.

The overriding effect of providing food for the sandalwood and *bêche-de-mer* vessels was the commodification of food animals and crops that were up to this point part of the subsistence system. Once Fijians learned the commercial value of their produce, it became a marketing matter. And this continued to affect the inhabitants of Ra Province once the *yasi* was all cut and the *dri* gathered and dried. As Ward (1964b:486) has revealed, after the sandalwood and *bêche-de-mer* periods came to a close, “a spasmodic export trade in agricultural produce soon arose ... cargoes of yams and pigs went to California and Australia in the late 1840s.” Thus, the dislocations in Fijian
customary relations with land, and the shift in Fiji's place within the World System enabled by the activities of this period fully justifies Ward's claim (1972:92) that traders were the "agents of cultural and ecological change."

Translations of the *Tukutuku raraba*, along with the cartographic work by Frazer (1961, 1964, 1973), provide evidence for the amazing movement and relocation of entire villages across the Nakauvadra landscape. Most of the oral histories utilize the date of Cession as a chronological benchmark, and this is significant for several reasons. As Roth (1953:3) pointed out, "the knowledge that a stable government had been set up in 1874 gave the first impetus to the removal of villages from their mountain fastnesses and this step was officially encouraged as a means of bringing them under administrative control and of facilitating the sale of their produce." The development of these produce sales as administered by the government's tax garden scheme will be examined in more detail in the sections to follow. Regarding village movements, however, Ravuvu (1988:50) implied a forced relocation: "Following establishment of the colonial government in 1874, the people were removed from their various fortified scattered hamlets perched on hilltops and ridges, where they used to defend themselves and observe one another." Also suggesting coercion was a finding by Thompson (1938:194) that, consequent to the Christianization of Fiji, "people were forbidden to live in hamlets in the interior of the islands and they moved to new villages along the coast."

Whether it was a policy of official encouragement or forced removal on the part of the new colonial administration, the end of hostilities was probably the primary factor influencing these relocations. As Farrell (1972:59) has written, "cessation of local warfare ... has been of major consequence in modifying the Pacific genre de vie, the look of the land, and
relations with it.” Even before Cession, village transition was common, as Ward (1964b:492) has specified, but it was the Pax Brittanica that allowed many settlements to finally shift to more convenient and accessible sites: “Prior to 1874, villages often moved because of war, internal disputes, sickness, population changes, and perhaps soil depletion. The establishment of peace during the 19th century led to the abandonment of many hilltop villages and the building of new settlements beside the rivers or on the coasts.”

This was true not only for the Nakauvadra area. From another part of Ra Province, near the Tailevu border on the east coast of the island, Lasaqa (1963:23) recounted how, in the days following Cession, “villages shifted their sites from the inaccessible interior to the coast.” Indeed, this interior to the coast migration seems to have been common for all of Fiji, and was perhaps even more pronounced on the smaller islands. Toren (1990:22), in a recent monograph based on her research on the island of Gau, reported that “the centre of Gau is mountainous and heavily forested; all villages are situated on the coast. Remains of earlier villages are to be seen in the lower hills, near what is now gardening land, and I was told that more ancient village sites may be found on hilltops further inland.” And, in a masterful study blending archaeology with oral history, Crosby (1988) described a similar situation on Beqa.

While some of the old villages coalesced into centrally located positions in the interior valleys, forming new villages such as Vatukacevaceva, most of the relocations were to the coast. And it was not only for “administrative control” that villages were “encouraged” to change location. Brookfield (1972b:44) emphasized the commercial and evangelistic aspects of these changes when he wrote that “many villages were relocated to the seaboard,
where they were accessible to traders and missionaries.” Although missionary activity seems not to have been a major factor in Ra Province, the development of trade and the commercialization of local produce clearly influenced the settlement geography of the region.

The most far-reaching changes to the Nakauvadra Valley stemmed from the alienation of native lands and the establishment of European settlement in the area. This process began in Ra Province in the early 1860s, and from all indications the first plantation crop to be grown was cotton. Ward (1969) reported that in 1860 the coast of Ra, along with Serua, witnessed the first sales of land for plantation agriculture in Fiji. The villagers of Vatukacevaceva remember stories of their ancestors walking across the hills to work on the coastal cotton plantation owned by the Thomas brothers. When British consular official J.B. Thurston visited Navatu, on the Ra coast, on August 12, 1865, he wrote: “Picturesque rock. Enormous quantities of cotton covering the country side” (Thurston 1924:402). Encountering cotton at Rakiraki, Britton (1870:57) related that “the cotton plant does not grow so luxuriantly here as in the wet districts, but the dry heat of these localities enables it to mature on the trees with little liability to injury from rain, which in some portions of the group stains a large percentage of the yield.” But this was a particularly volatile area within the archipelago, and attempting to establish a plantation here during this time proved to be risky business.

The frequent inter-tribal conflict that characterized the pre-contact cultural landscapes of Ra Province only escalated and intensified with the introduction of muskets. The Reverend Lawry, sailing along here in November 1847 aboard the mission brig John Wesley, told of Fijians asking for powder and flints (Lawry 1850:208). When he visited the islands a second
time in 1850, he reported bloodshed along the Ba coast and at Nakauvadra (Lawry 1851:197). During May, 1862, there was more war on the Ra coast (Morrell 1960:141), and further disturbances less than a decade later. Frazer (1961:24) wrote of an incident at Nakorowaiwai, just west of Vatukacevacea, “where an attacking force headed by Cakobau’s Christian troops was reported to have killed or wounded 157 people.”

The political intrigues of the larger matanitu also had a direct effect upon Ra. Many areas of Ra, including the island of Malake off Rakiraki, were by this time under Bau’s domain. Derrick (1957:107) related an unfortunate incident there which provoked strong reactions from the Bauan alliance: “In August 1853, the Levuka cutter Wave was becalmed near the small island of Malake, off the north coast of Ra. The Malake natives seized the ship and its crew, and plundered the cargo.” A punitive expedition was mounted, and because “Tui Levuka had an old grudge against the Malake people,” he led the massacre (1957:108). Burns (1963:78) detailed a power play by the Tongan chief whose ambition was to challenge the position of Cakobau: “Ma’afu was engaged in hostilities against the allies of Bau in Vanua Levu and had seized the island of Beqa and the district of Rakiraki on Viti Levu, both of which were under Bau suzerainty.” This Tongan occupation of Rakiraki occurred early in 1859, but by December, a peace agreement between the warring high chiefs had been signed at Levuka, leaving Ra Province to revert to its former internal turmoil.

While these conflicts involved only Fijian combatants, the European planters in the area were not immune from their provocations. An Australian newspaper correspondent traveled through Rakiraki in 1870, and was struck by the stark evidence of the tensions apparent at that particularly unsettled time. After he “visited the plantations of Mr. St. John, Captain
Fuller, and Colonel Jennings.” Britton (1870:57) reported that “there is quite a little colony of Americans on this portion of the coast, and the stars and stripes were gaily floating over the Colonel’s house from a tall flagstaff ... much more ominous was a target 200 yards off for rifle practice.” Young (1970:167) depicted the hostilities of 1870-71, during which Fijians often demanded muskets, by quoting from a letter by R.B. Leefe, who also owned a cotton plantation at Rakiraki: “Messrs. St. John, Jennings, and Fuller, as well as Mr. Andrews and myself, abstained during the whole of 1869 from giving any Viti Levu men either arms or ammunition ... I know well that in my own case I should have much more cotton if I had acted differently.” So here we see an instance not only of the impact of plantations being viewed by the local people as a potential arsenal in their inter-tribal fights, but a classic example of subversion by passive resistance on the part of the hired labor, in this case because their desire for weapons was not fulfilled. In this particular action, it hardly seemed to matter, for, as outlined in Chapter 5, the cotton boom went bust in 1871. But cotton was viewed by the Fijians as a harbinger of things to come. Fison (1881:409) recounted this Fijian riddle which is pregnant with double entendre, and points to the feeling of oppression inflicted upon the people by the emerging political economy of plantation agriculture:

A stranger comes to Fiji to eat. His feast is made ready; he eats it all, and is satisfied, eating no more for several months. Then he goes back to his own land, and his belly is emptied?
[Answer]: a cotton bag.

Another plantation experiment was peanuts, and Harvey (1946:92) cited a nineteenth century author named Stonehewer Cooper, who reported that at Rakiraki there were “several flourishing plantations of peanuts much appreciated by the youth of America.” Maize was another plantation crop tried at Rakiraki, and by 1876, it was the only profitable crop in the province.
(Frazer 1961:27). Grey (1973:3) reported that “most of the maize and peanut export to Australia, New Zealand and California was grown on the black colluvial soils near Rakiraki.” Both of these crops can still be seen in small amounts in the Nakauvadra Valley today. But it was sugar cane that finally allowed plantation agriculture to thrive in Ra. A sugar mill was built at Rakiraki in 1880, and the phenomenal increases in land devoted to this commodity thereafter will be discussed in the next section.

Livestock made an early appearance in the areas around Nakauvadra. Pastoralist Robert Swanston enlarged his Fijian land holdings with the purchase in 1863 of several small islands off the Ra coast: Nananu-i-Ra, Nananu-i-Cake, and Malake, where he introduced sheep. After chronic problems with an unknown disease resulting in stillborn lambs, however, he sold all his sheep three years later (Harvey 1946:84, 86). R.B. Leefe, who eventually went bankrupt, unsuccessfully tried angora goats and silkworms on Nananu-i-Ra (Frazer 1961:27). Wilkes (1845:205) reported that cattle were introduced to Fiji around the late 1830s, but it is not certain when they first grazed the countryside of Ra Province. As outlined in the next section, however, their presence greatly increased during the first half of the twentieth century. I previously remarked on the possibility that the stone walls at the old village site of Burelevu may have been to keep livestock out of the village, based on comparative evidence from Hawaii and Ovalau, but this seems unlikely, for the mountain villages were probably abandoned by the time livestock began roaming the Nakauvadra valley and adjacent slopes. Moreover, Seeman (1862:382) observed that the Fijians were “not fencing in their plantations, they have rather a dislike to cattle, and in some instances they have killed them, as their crops have frequently suffered.”
The aspect of colonial encounter that had the most impact on traditional Fijian agriculture was the imposition of "tax gardens". Prior to Cession and the appointment of Sir Arthur Gordon as governor of the Colony, the Cakobau government, under pressure by European planters, had instituted a devious system of per capita taxation whereby villages that were unable to pay the mandatory impost could furnish labor to European plantations in order to work off the assessment. This was nothing more than a transparent ploy on the part of the planters to obtain labor. Gordon could not condone such a practice, and faced with the problem of administering a Colony with empty coffers, he devised a new system, which he presented in no uncertain terms in a speech to the assembled chiefs at Bau, on September 10, 1875 (Gordon 1897, vol.1:211): "A piece of land shall be set apart in each district and shall be called the 'district plantation', and I alone shall then decide what shall be planted, and what shall be suitable to the district; and when the produce is gathered it shall all be taken in to the government for sale by the owners, and I alone shall fix upon the price to be paid."

The new tax regulations were indeed tailored for the conditions within each district, and tried to match allowable commodities with available resources. For the Rakiraki district, the items acceptable as tax produce initially were cotton, bèche-de-mer, and lauci (candlenut — Aleurites moluccana), a tree of many uses: "the sap is used for dyeing masi, the fruit for making torches, the leaves for ripening bananas" (Capell 1973:114). But things did not go smoothly at first. The Roko Tui Ra (provincial administrative chief) complained of poor cotton seed and the difficulty of planting due to "the hardness of the ground"; that the lauci were "too far away in the bush"; and that "the distance of the reefs from the shore" made collecting bèche-de-mer too dangerous: "One day one of our canoes went out
to fish *bèche-de-mer*, and some of our people were drowned" (Gordon 1897, vol.2:650).

There were other problems with this scheme, not the least being transport and marketing of the produce. Upon collection at the local district level, all commodities were shipped to Levuka, the small port on Ovalau that served as the Colonial capital prior to its move to Suva. The Colonial Report for 1881 (CPR 1883:12) stated that tax garden harvests were often unable to be shipped because of "non-arrival of vessels ... at the end of 1879 every store, hulk, and available place in Levuka was full of produce awaiting shipment." Another factor inserting uncertainty into this program was, naturally, the weather. A severe hurricane in December, 1879 cut into the amount of tax garden produce available for export (CPR 1883:56). Despite these and other setbacks, the institution and administrative sponsorship of commercial agriculture was a deeply unsettling development in the cultural ecology of Fijian villages. Tax gardens not only instilled an incentive and further precedent for cash cropping, but also influenced settlement patterns: "In the latter part of the 19th century some villages moved in order to be able more easily to grow tax crops" (Ward 1964b:492).

Finally, this discussion of the colonial encounter will close by looking at the peculiar phenomenon of labor export from Ra Province. While these migrations shared certain characteristics common to other districts, and indeed, other island groups, the people of Ra specifically became known as laborers willing to work elsewhere. This labor drain surely had an effect on the capacity to maintain labor-intensive subsistence agriculture at the local level. The 1878 Council of Chiefs expressed their official opposition to labor recruitment, pointing out that "it interferes seriously with the supply of food" (Morrell 1960:381).

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New European planting enterprises were faced with the problem of local villagers neither needing nor wanting to work: “Fijians saw no need to work long hours, day after day, at the tedious task of clearing forest, planting, weeding, and picking cotton” (Stokes 1968:171). The Colonial Report for 1881 (CPR 1881:68) complained that “the supply of Fijian labor is however by no means certain, as the natives of the Colony are generally fully employed upon their own affairs, and devote a large portion of their time to agriculture.” The agriculture in question, of course, was the cultivation of root crops and other traditional foods for subsistence and ceremonial needs. Brookfield (1972b:50) observed that as a consequence of the overall condition of “primitive affluence” [or “subsistence affluence” (Fisk 1972)] in Fiji, whereby basic needs were met with minimal labor requirements, “it was hard to secure a stable labor force unless the recruits could be removed from their home areas.”

The most extreme measure taken to alleviate this labor shortage was a form of slavery known as “blackbirding”, whereby Melanesian islanders from the archipelagos to the west were coerced into boarding ships that brought them to work on Fijian plantations. Vanuatu was the most common source area for these workers: “in 1864 the first laborers were brought from the New Hebrides” (Parnaby 1972:126). Eventually, of course, even islanders from elsewhere were not sufficient, and, beginning in 1879, the colonial administration sanctioned the import of conscripted workers from India.

From the beginning of plantation development in Fiji, Ra Province was a target for labor recruitment. Morrell (1960:380) wrote of the movement of laborers “from the more backward districts like Ra, Ba, and the Yasawas to islands favored by planters, such as Taveuni.” In 1864, when the Ryder Brothers bought Mago from Ma’afu, the Tongan chief removed that
island's native inhabitants and placed them on neighboring Vanua Balavu, and the new owners "obtained laborers from the Ra coast" (Young 1970:166). There was also an arms-for-labor scheme undertaken by chiefs hungry for weaponry: "The chiefs of Ra were willing enough for their young men to go to the plantations in order to secure muskets and ammunition" (Derrick 1946:5). In commenting on these labor movements in his March 12, 1877 report to the Earl of Carnarvon, Gordon (1897, vol.2:345) wrote that "various causes led to the districts of Ra and Ba in Viti Levu and the Yasawa Islands being selected as the field for these operations, and the supply of native labor has been drawn almost exclusively from those provinces."

The above-mentioned poll tax was, of course, one cause for labor movement not only from Ra, but also from the adjacent province to the west. In Governor Gordon's report of February 16, 1876, to the Earl of Carnarvon, he lamented that "whole districts have been well nigh depopulated, and the reckless deportation of the male inhabitants has left the formerly fine provinces of the Ba and Ra almost deprived of cultivators" (Gordon 1897, vol.1:452). Such a migration would have had a double impact on local subsistence production, as Fison pointed out with great insight in a letter to Gordon on September 16, 1875: "It should be borne in mind that the men who work for the planters are the most efficient food-producers for their tribes, and that in most cases they leave behind them nonproducers who were dependent upon them. Hence their departure not only lessens the tribal efficiency; it adds to the tribal burden" (Gordon 1897, vol.1:509).

Special permission from colonial authorities was necessary to leave one's district to seek employment. Nevertheless, working for wages was perceived as less arduous than working in home gardens, and continued to lure men away from their local responsibilities for growing both tax produce
and the staple crops comprising the subsistence economy. Although it was against regulations for a Fijian to be absent from his home village for more than 60 days, there were ways around this (Bain 1988:127). During the December 5, 1877 meeting of the Great Council of Chiefs at Rewa, the Roko Tui Ra complained that people from his province were neglecting domestic duty:

[The men] consult together about the district gardens, and say, 'let us go and engage ourselves as labourers, that we may get our taxes more easily.' Our district work is made difficult in these days, as vessels crowd each other on the shores looking for labourers. The men are not even regularly engaged before a magistrate. Nor do we know the lands to which they are taken (Gordon 1897, vol.2:650).

Another possible explanation for the tendency of Ra men to serve as itinerant laborers, according to Allen (1907), involved Ra women. During the early period of European contact, prior to the establishment of plantation agriculture, the women of Ra were often purchased by European men in need of a wife, a tradition that probably began because European trading vessels were able to gain easy access into Viti Levu Bay, a large and sheltered embayment just to the east of the Nakauvadra region. As Allen (1907:247) explained it:

The consequence of the trade in Ra women was that after a while their male relatives began to follow them, and to work in the compounds of their European husbands. The Ra youths thus soon began to appreciate the delights of travel, and of escape from the deadly dull monotony of life in small, shut-in communities. When, therefore, planters began to come to the group, the Ra men were the first to pluck up courage and go on and work for them, and now it is strictly the fashion for all the young fellows of this province to graduate on plantations.

Disregarding the distorted Eurocentric images of monotonous village life, this, after all, seems a plausible explication. But the tradition of the Ra journeymen may be even older than that. There are reports that kai Ra were pressed into service to go on expeditions to Vanua Levu to collect tribute for Verata (Sayes 1984:11).
Transformations

This section looks at the further transformations of landscape in Ra Province beyond the colonial encounter, by examining the ongoing interaction of Fijian political ecology with the world at large. This interaction has had a continuing effect on village life, labor, and livelihood. Ultimately, these transformations are made manifest in land-use and resource utilization patterns.

It was only six years after the establishment of Colonial government that a sugar mill was erected at Rakiraki. The first attempts at growing commercial cane on a large scale in Fiji were in southeastern Viti Levu, and by 1874, there were “already 20 sugar plantations on the Rewa River” (Morrell 1960:383). With the realization that the relatively dry leeward areas of the main islands were more favorable for cane production, mills were soon operating at Lautoka, Ba, Rakiraki, and at Labasa, on Vanua Levu. The opportunity to grow and market a reliable cash crop completely changed the way Fijians in Ra Province related to their lands. As Grey (1973:3) remarked, “over the next years the alluvial plains at Rakiraki were given over to cane.” Even people in the mountainous hinterlands experienced the lure of this different kind of agriculture. Burns (1963:158) gave an account of one villager from an inaccessible part of Ra who grew yaqona until he saved money to lease cane land in the lower valleys.

To comprehend the scope of land-use changes that have occurred since the colonial encounter, we have only to look at the operation of the Penang sugar mill at Rakiraki. The area devoted to cane cropping has steadily increased since sugar was first refined at Penang in 1881, and one hundred years later, there were over 5,000 hectares of sugar cane supported by this mill (Fig. 7.31). From initial attempts at commercial agriculture by
FIGURE 7.31. Area planted to sugar cane for Penang Mill, Ra Province.

European settlers planting cotton, there was already a significant amount of alienated freehold land in the Rakiraki area. After the cotton boom bottomed out, and the sugar mill was constructed, these lands were planted to cane. In addition, Fijians who did not grow cane themselves leased their mataqali lands to the owners and operators of the mill, who in turn, placed on that land the influx of indentured labor from India. Importation of labor from India continued until 1911.

During the 1920s, after the sugar industry in Fiji was consolidated under the Australian corporate umbrella of Colonial Sugar Refining Company (CSR), the Indian cane workers were guaranteed entitlement to smallholdings. From the beginning, some would argue by design, these proved too small to be self-sufficient enterprises. Such farms experienced further fractional division from the growth of Indian families, and there never developed a true peasant economy. With only one place to sell their crop, the Indian smallholders were in fact still proletarian workers under the control of the sugar company (Ward 1980). Since the prospect for obtaining even a small piece of freehold land is now practically non-existent, Indian farmers avidly seek opportunities for leasing available mataqali lands or Crown lands. Ward (1985:59) reported that "by late 1982 expansion of the cane perimeter in Ra Province had reached the stage where very steep slopes were being cultivated with little hope of sustained production." Recently, several Indian cane farmers took up residence on Crown land on lower Naikoro Creek. Several sets of abandoned tuatua have been demolished by the new cane crop.

Unlike some areas of Viti Levu, and on Vanua Levu, where sugar cane farming is primarily the affair of Indian smallholders, local Fijian villagers are very much involved in the sugar cane industry around Rakiraki. But
Fijian participation in the sugar industry in Ra is not just a recent phenomenon. This is not so surprising, in light of the fact, as Morrell (1960:383) has reminded us, “sugar was also one of the crops Fijians were encouraged to grow under the Native Taxes Ordinance.” In 1898 the two crops allowed as tax produce in the district of Naroko, where Vatukacevaceva is located, were maize and sugar cane (RPC First Book, 1898-1899).

A dramatic increase in land planted to cane has occurred in the village lands surrounding Vatukacevaceva (Fig.7.32). This represents a major land-use change from the situation that prevailed 90 years ago, when most of the Nakauvadra Valley was as yet untouched by plantation cropping. The following entry from the minutes of the Ra Provincial Council meeting for December 2, 1903, illustrates the circumstances then in place:

Buli Naroko [the district administrative officer] reported that the people of the village of Vatukacevaceva wished to pay their tax in coin. The taxpayers number 34 and the village is about 7 miles from cane fields. The Roko was not in favor and the council did not approve (RPC Second Book, 1892-1905).

The journey to and from the cane fields at Rakiraki was thus deemed an acceptable routine for the villagers at Vatukacevaceva. An editorial comment in the margin, obviously scribbled by some sympathetic colonial official, noted that “the taxes of this village will amount to about £8/year ... 7 miles is a longish way to go constantly to pay this small assessment” (RPC Second Book, 1892-1905). Time spent traveling, in addition to the that spent working the cane, was time away from traditional subsistence gardening.

There are other cases where lack of suitable land nearby was not an insurmountable impediment to village participation in the burgeoning cane industry. A colonial tax inspector recommended that “owing to the very low price obtained for maize, he would advise those districts that were not going to fish for pearl shell etc. to endeavour to acquire some land at Rakiraki for
FIGURE 7.32. Newly plowed cane field, Nakauvadra Valley. Note abandoned terraces on lower slopes of foothills.
cane cultivation" (RPC First Book, 1898-1899). Burns (1963:158) offered the following account of an enterprise during the 1930s undertaken by villagers from Malake, one of the islands off the Ra coast where sheep were introduced in 1865:

Fijians have also taken to cane farming — and not just yesterday. It is a measure of their adaptability and willingness to work that about thirty years ago the people of the island of Malake, traditional fishermen, took up cane farming areas in Tavua on the mainland and worked them for nearly twenty years.

That the inhabitants of the island of Malake should go to such trouble to grow sugar might seem a particularly poignant illustration of the negative effects of this plantation economy on the continuations of customary cultivation practices. But Wilkes (1845:210) noted in 1840 that “Malaki has the appearance of having once been well cultivated, and there are a number of terraced taro-patches of great extent, which had been erected with great care, but are now entirely deserted.” Clearly, at least in this instance, agricultural disintensification derives from other factors operating prior to the development of the sugar industry. Even so, the amount of land devoted to cane cultivation along with wage opportunities provided by the sugar industry have acted to seal the fate of most intensive forms of traditional Fijian agriculture. Cane cutting crews now provide an additional source of income for many Fijians. Even where they choose not to cultivate land themselves, often groups of villagers will form roving crews during the long six-month harvest season.

As sugar became the dominant agricultural commodity, other crops went into decline. In 1884, the crops produced in Ra, in decreasing order of value, were tobacco, maize, sugar, and cotton (Frazer 1961:37). The Colonial Report for 1888 (CPR 1889:14) stated that “cotton and coffee are in a languishing condition and do not any longer rank as principal exports.”
Cotton never recovered from the bust of 1871, and only continued to be planted at the bidding of the government. During the Ra Provincial Council meeting of November 16, 1894, the district administrative officer for Rakiraki stated that “he and his people desired permission to discontinue cotton planting. They had a cane field, they also produced maize and fished for bêche-de-mer and pearl shell as taxes. They really had no time to plant cotton” (RPC Second Book, 1892-1905).

Although encouraged initially as a tax garden item, coffee was prevented from becoming a cash crop due to “the catastrophic introduction of leaf disease (Hemeileia vastatrix) from Ceylon” (Harvey 1946:83,91). There had been unsuccessful attempts at growing coffee on the northern slopes of the Nakauvadra Range, just above the village of Narara. Other areas of Ra likewise witnessed the failure of coffee introductions. Grey (1973:3) reported that “these plantations, now overgrown, can be found at Narara, Rewasa, Navalau, Naiserelagi, old village site, at Nacokoraki (above Naocobau), Vunisea and others.” Near the Tailevu border, in southern coastal Ra, Lasaqa (1963:31) portrayed a relict agricultural landscape that included remnant coffee trees from old tax gardens. In the interior of Ra, south of the Nakauvadra mountains in the district of Saivou, a number of villages continued to experiment with coffee as a tax crop (RPC First Book, 1898-1899). Indeed, many of these areas in Saivou were being asked to juggle the production of several crops. On November 16, 1897, the Ra Provincial Council passed Resolution 28, which decreed “that the Tokaimalo, Drekeniawai, Yaulevu, Waibasaga, Nasolo, Vuniyanuyanu villages at the extreme head of the Wainibuka, being very inconveniently placed for growing tax maize, discontinue to grow that product and plant coffee instead. That in the
meantime, before the coffee comes into bearing, they plant tobacco” (RPC Second Book, 1892-1905).

Certain crops continued to be planted for tax produce. In Ra, maize and tobacco were most commonly cultivated, and these were supplemented by marine resources in the coastal districts: “the maritime villages fish for bêche-de-mer and pearl shell, and the inland villages plant maize” (RPC First Book, 1898-1899). According to the minutes for the Ra Provincial Council meeting of October 18, 1898, the allowable tax crops included maize, yaqona, tobacco, copra, and bêche-de-mer (RPC First Book, 1898-1899). As noted above, in Naroko district, where Vatukacevaceva is located, the permitted crops were maize and sugar cane, which was rapidly becoming the tax crop of choice for the entire area. As for the other commodities, when the tax garden scheme was retired in 1913, “so too it would appear were the crops that had been fostered” (Frazer 1961:37).

Livestock, on the other hand, were an increasing presence in Ra Province. Large ranches were set up by European settlers along the northern coast. At Yaqara, just over the hills to the west of Vatukacevaceva, the Thomas Brothers ran “a mixed herd of cattle of Shorthorn and Zebu breeds” (Grey 1973:4). The government-operated Yaqara cattle scheme is now the largest ranch in Fiji. Bullocks had been given to several villages to assist in the plowing and tilling of tax gardens, but Fijians were not quite making the adjustment to animal husbandry. In 1898, the district officer for Nalawa issued the following complaint:

Our cattle have behaved themselves badly. They make frequent visits to our gardens, and cause us a great deal of annoyance. These people have made little use of their animals (RPC First Book, 1898-1899).

But animals frequently strayed off the European-owned ranches too, and these occurrences were a point of discontent on the part of native
Fijians. The Ra Provincial Council passed a resolution directing that “steps be taken to keep the Ellington cattle from trespassing” (RPC Second Book, 1892-1905). The CSR brought in Brahmin cattle from Texas in 1938 to improve the breeding of draft animals for the sugar cane farmers (Grey 1973:4). Cattle, and horses, are now a common sight in the hills around the Nakauvadra Valley. There are no fences to hold these free-ranging stock, and they come and go as they please, even through the village. This is one reason for the lack of kitchen gardens; one of the few I found at Vatukacevaceva was heavily protected with a bamboo palisade (Fig. 7.33).

Discussion

In this section I summarize the findings presented above, and discuss the results and implications of this case study of the intensive agricultural landscapes at Nakauvadra. Since this chapter is but a “case study”, I would caution against drawing any general conclusions. The particular “structures of the conjuncture” that enabled the development of the tuatua, then subsequently brought about their decline, are decidedly place-specific. While we may have learned something of the processes that influence cultural-ecological relations and contribute to landscape formation, there should be no mistaking the distinctive nature of the historical and geographical forces operating here.

Nakauvadra was, and probably still is, considered the most sacred place in Fiji. The cross atop Uluda represents the Christianization of an ancient shrine, and indicates the powerful mana that yet permeates these mountains. This power was further acknowledged during my time there, when the championship rugby side “Fiji Sevens” made what was, in effect, a pilgrimage to Vatukacevaceva to propitiate the traditional deity Degei. Of course, this visit was carried out with a certain amount of discretion. Once
FIGURE 7.33. Kitchen garden, Vatukacevaceva.
the media reported it, however, the rugby organization was forced to admit their presence there, but claimed they were only playing an exhibition match with the local Ra side. That this match should take place on the eve of the Sevens' departure for the world tournament at Hong Kong, where Fiji successfully captured the title for the third year in a row, seemed an event beyond coincidence.

Oral histories contained in the *Tukutuku raraba*, along with the more immediate and accessible traditions of local informants, indicate that the series of villages along the northern flank of the Nakauvadra mountains were occupied by people who had migrated north over the top of the range from the interior district of Saivou. The people of *yavusas* Burelevu and Bua, for example, originated near Vunisea, while the residents of some of the other villages on the mountain had come from the vicinity of Nayaulevu (see Fig. 7.1). The original inhabitants — or at least the folk of the Degei and Lutunasobasoba legends — who lived at Narauyaba, Nukuitabua, and Nakauvadra had long since left the area. Interestingly, some of these people settled at Drauniivi, on the Ra coast to the west of Vitawa. One informant claimed that the people of Drauniivi still hold the *mana* from Nakauvadra. And it was here that a self-styled prophet arose, who agitated his followers into such anti-colonial ferment that he was taken seriously enough to warrant exile to the remote and isolated island of Rotuma (Kaplan 1990).

This rendition of Nakauvadra settlement history is supported by the apparently older pottery sherds on the surface of the Nukuitabua site. Of course, to fully test such a hypothesis, it would be necessary to undertake comparative archaeological investigations. We do know, from the ceramic collections, that the other villages were roughly contemporaneous. And
based on the oral histories, corroborated by the radiocarbon dates from Rukuruku, these sites were still occupied just prior to the colonial period.

Bellicose conditions throughout Fiji resulted in the necessity of building fortified settlements not only in mountainous terrain, but also in low-lying areas such as the Rewa and Navua deltas. In Ra Province, various accounts of constantly warring tribes and vanua in martial competition are manifest in the locations chosen by the kai Nakauvadra for their hamlets. All of the koro makawa at Nakauvadra were situated between 300 and 400 meters elevation. From these lofty perches on the spurs and interfluvial ridges, local inhabitants commanded a panoramic view of the entire valley. On clear days they could gaze out across Bligh Water all the way to the Yasawas and Vanua Levu. Any threatening canoes that entered the coastal lagoons would have been spotted in plenty of time to prepare defensive postures.

For these Fijians of a century or more ago, the Nakauvadra Range was a cultural landscape charged with fear, but also one that was empowered by the close proximity of traditional deities. My own admittedly modern and variant sense of wilderness values perhaps skews my appreciative perceptions, but I confess to having become quite enamored of the place. I absolutely relished the opportunities for conducting fieldwork at this location, and found many reasons to ultimately disagree with Geraghty (1977:26), who wrote that “anyone who’s familiar with the barren and comfortless Nakauvadra region would wonder what could possibly prompt anyone in their right mind to choose to settle there.”

Prior to Pax Brittanica, the threat of attack or ambush precluded people from utilizing the rich soil resources of the valley bottom. Consequently, gardens were located close at hand to settlement locations.
Informants at Vatukacevaceva related that all of the villages along the mountain cooperated in the construction and maintenance of the terraces at Matanivanua-Naikoro, probably because the streamflow there was the most reliable. This startling revelation was reinforced one afternoon when I saw a number of men I did not recognize scouring the hillsides near my field camp in search of wild yams. When I asked Timoci the next morning who these men might have been, he replied they were from the coast, and that their mataqali had traditional rights to these lands, based on a long history of use.

Were the gardens also abandoned when the villages were vacated? Probably. We know that John Fraser (1954:173) in the 1930s found only the “remains of terraces” on the slopes of Nakauvadra. Roger Frazer (1961:166) regarded the relocation of villages around the time of Cession as the catalyst for terrace abandonment:

In Ra it appears that the terraces, if not actually abandoned immediately, were soon used only in a dilatory manner, and no further extensions were made. One informant aged over 80 claimed to have used them as a young man but abandoned them due to wild pig damage; other informants cited a number of reasons for their forefathers abandoning the terraces. These include the drying up of the streams supplying the water — which seems to have been true for only one small area and in any case may have post-dated the move — and lack of time due to the demands of the tax gardens and district work.

Beyond consideration of their place in Fijian culture history and the historical geography of Ra Province, we can also appreciate the tuatua on an aesthetic level. Jane Allen (1991:122), in describing terrace systems on O’ahu, offered similar insight: “the large, abandoned agricultural complexes of Kailua and Kane’ohe are impressive in their own right as hydraulic and architectural — perhaps even monumental — features.” But it is not only our own retrospective perceptions of the beauty of terrace morphology that is operative here. As we shall see in the next chapter, building and forming
terraces is landscape art of the first order. It is a creative act that serves to quite literally put people in touch with the earth that is their home.

Finally, we should foremost keep in focus the skill and ingenuity of the early Fijians evinced by the construction of the Nakauvadra terraces. These vast landscape modifications combined with their associated hydraulic engineering elements offer an outstanding example of what Spriggs (1984b) has typified as “true irrigation” — the highest level of agricultural intensity found in the Pacific. This kind of environmental knowledge should never be lost through disuse or neglect (Klee 1980, Siwatibau 1984, Spriggs 1988, McCorkle 1989, Moles 1989, and Clarke 1990). Indeed, such knowledge may need to be revived to serve future needs of Fiji and other small island nations. Careful study of traditional systems of agricultural resource management may help to avoid failures or disappointments in this process. Successful application of customary practices may hinge on blending them into the dominant capitalist mode of production. As Young (1990) pointed out recently, regarding traditional versus modern knowledge systems, these “two types of knowledge cannot coexist, each in its separate sphere where it is most applicable ... one reason is that the knowledge itself may be directly contradictory in such areas as how to manage work, how to plant crops, or how to handle money and resources.” What may be necessary, therefore, is that traditional customs and the modern political economy be “merged into a uniform biocultural framework” (Young 1990).
CHAPTER 8

CASE STUDY: RAVITAKI

In this chapter I present the findings of field research regarding one of the few still functioning terraced irrigation systems remaining in the Fiji Islands. This case study looks in detail at one of four areas of active terracing located along the south coast of the island of Kadavu. It is perhaps appropriate that operative terracing should be found on this island, for it has always been one of the least known and visited in the group. Even the 1840 United States Exploring Expedition, which somehow managed to chart most of the reefs and shoals in Fiji, and to survey nearly every coastline, admitted to a gap in its data here, as noted by Wilkes (1845:319): “with the exception of the south side of Kantavu, every portion of the group has been as thoroughly examined as is necessary for any nautical purpose, or for those of general geography.”

The peripheral position of this island relative to the rest of Fiji, and its isolation from marketing and employment opportunities presented by the capital city of Suva, have much to do with the persistence of these traditional agricultural landforms. Therefore, in several preliminary sections, I locate and characterize Kadavu in time and space, and examine the transformation of former areas of intensive agriculture into lands devoted to cash cropping or extensive dryland cultivation. Because irrigated terracing now represents only a minor part of the subsistence landscape, I outline the wider pattern of agriculture in which it takes place. I also illustrate how this agronomic activity is embedded in the cultural matrix that serves to maintain and perpetuate its vitality. As Waddell (1972a:183) wrote, “an agricultural system cannot be considered meaningfully apart from its social context.”
Kadavu as locale

Kadavu is a long, linear, wasp-waisted island located 80 km south of Viti Levu, and is centered upon latitude 19°S, longitude 178°15'E. The island is roughly 50 km long, with an axis trending ENE to WSW (Fig. 8.1). It is the fourth largest Fijian island, ranking in size behind Viti Levu, Vanua Levu, and Taveuni, and has an area of just over 400 km². The twisting shape of the island creates a convoluted shoreline, with many deeply indented embayments and jutting headlands. Two narrow isthmuses geographically divide the island into western, central, and eastern portions. The south coast of Kadavu is named naceva, after the south wind, and the north coast is known as natokelau. Because all villages on the island are now located along the coast, this north-south coastal dichotomy makes perfect sense. Kadavu's 1986 population amounted to 9,805, living in 72 villages (Ratuvalacereivalu 1992:82).

The mountainous backbone of the island is defined by the eroded vestiges of twelve volcanoes. Several smaller islands off the eastern end of Kadavu, arcing northward, are also volcanic remnants. Vulcanism probably dates from the Pliocene (Woodrow 1980). Surface geology reveals a predominance of andesitic lava flows, with minor areas of basalt in the far eastern region and offshore islands. Some sandstone is present on Galoa Island. The western third of Kadavu is “underlain by hornblende andesite containing a greater number of flows from the late Tertiary” (Berry and Howard 1973, vol.1:27). Elevations of the highlands typically range from 150 to 400 meters, with the prominent volcanic dome of Nabukelevu (“giant yam mound”) on the far western end of the island being the high point, at 808m (Fig. 8.2). There are in some places relatively flat plateaus situated between the old volcanoes, where eroded material has conjoined them and smoothed
FIGURE 8.1 Kadavu. Selected villages are places discussed in text. Adapted from Dept. of Lands and Survey, 1989.
FIGURE 8.2. Nabukelevu ("giant yam mound"), western Kadavu.
out the topography. Other areas have jagged hills. Wilkes (1845:288) reported that “the whole length of Kantavu is high and mountainous, with the exception of a small part of its centre, near Malatta Bay.” Moseley (1879:261), viewing the island from the deck of H.M.S. Challenger, described the profile of Kadavu as “a series of obtuse-angled triangles, rising one above the other.” The island is well watered, with numerous streams running from the hills to the coast. It receives ample precipitation delivered by the humid southeast trade winds, although, as elsewhere in Fiji, periods of drought are not uncommon. Mean annual rainfall amounts to 2,163 mm (Sofer 1985a:129).

The forests along the mountainous spine of the island have been the scene of limited timber operations in the past, and several small cooperative forestry projects have been undertaken, using the introduced Caribbean pine (Pinus caribaea var. hondurensis) in closely spaced plantations. Native tree species in the higher elevations include kaudama (Myristica spp.), yasiyasi (Myrtaceae), kauvuila (Endospermum macrophyllum), and dakua (Agathis vitiensis) (Berry and Howard 1973, vol.2). Although these are important timber species, the steep topography and isolation of the island combine to preclude large-scale commercial exploitation. Other trees interspersed within this forest type include koka (Bischofia javanica), sasauwira (Disoxyzylum richii), and the dreaded salato (Laportea harveyi), the leaves of which contain tiny needles that are highly irritating upon contact with skin. Angas (1866:42) discussed the consequences of such an unfortunate encounter: “Mr. Milne [botanist aboard H.M.S. Herald]... says that he met with a nettle tree, forty to fifty feet high, which, when touched, causes a burning sensation so severe that the effect is felt for many weeks.” Assorted climbing vines and lianas such as yaka (Pachyrhizus tuberosus),
along with the parasitic baka (*Ficus obliqua*), complete the floral mosaic. Curiously, because of the closed nature of the canopy, shrubs are conspicuously absent from the forest floor; Berry and Howard (1973, vol.2:54) remarked that “the forest often has no understorey but the ground is covered with ferns 50 cm high giving the forest the appearance of a temperate beech woodland.” At lower elevations the species composition has largely been altered by the recurrent cycles of swidden agriculture. Patches of woodlands represent fallow areas that are part of a ten to twenty year planting cycle. Trees in such secondary forests typically include many of the species mentioned above, along with doi (*Alphitonia zizyphoides*), lutulutu (*Macaranga seemanii*), and molau (*Glochidion seemanii*), (Berry and Howard 1973, vol.2).

There is an extensive barrier reef off Kadavu, providing an expanse of protected lagoon, sometimes over 2 km in width, especially along the south coast. This coral strand holds closer to the island in western Kadavu, and at some locations there forms a fringing reef. Off the eastern end of the island, the reef curves northward for more than 50 km, enclosing Ono and the nearby group of islets. Here the coral formation is known as the Great Astrolabe Reef, named by the French explorer Dumont D'Urville after his flagship by that name nearly ran aground on it during the evening of June 5, 1827 (Dunmore 1969:205).

Kadavu has long been considered a bastion of traditional Fijian culture. This is probably due to its isolation and independent social and political development. Similar to the situation obtaining in western Viti Levu, there was never a paramount chief of Kadavu. The island is divided into a number of independent vanua or districts, each ruled by a local chief of more or less equivalent rank. Although the island was held in suzerainty
for over half a century by Bau and Rewa (see next section), these indigenous political divisions have continued to the present. During the colonial period, the chief of Tavuki was chosen to represent the island's interests in the Great Council of Chiefs, but following Fijian independence in 1970, and with the recently established republic, the political arrangement among Kadavu's districts has reverted to its traditional mutual independence and diversity.

Despite the unconfederated condition of local politics, people from Kadavu display a keen sense of social solidarity and cohesion. A certain pride at being from the island goes beyond mere provincialism. The people of Kadavu are tauvu to people from Nadroga — the nearby southwest coast of Viti Levu, but also to Ra Province, and oral traditions tell of direct connections with Nakauvadra. In one recorded example, the chief Qarikau came to Kadavu from Nakauvadra. His children founded the villages of Dravuwalu, Namara, Mataso, Nukunuku, Yakita, Yale, and Nakasaleka. In addition, “ancestors of Namalata, Namuana, Navuatu, and Drue came with Qarikau in his canoe” (Tippett 1968:105).

In the time immediately following the lotu — the conversion to Christianity — of Cakobau in 1854, many districts and villages in Fiji were switching en masse to the new religion. Derrick (1957:115) reported that out of more than one hundred villages on Kadavu, twenty-one were asking for Christian teachers, as if to imply that this indicated a desire on the part of Kadavuans to embrace the kai valagi’s mode of worship. More significantly, this means that fully four-fifths of the island did not wish to receive instruction, thus indicating a desire to retain traditional religious beliefs and practices. This traditionalism has continued into the present, and in the sections to follow I will present illustrations that reveal the persistence of
older sacred traditions, and cite cases where other scholars have commented on the mythico-religious elements of Kadavuan landscapes.

Transportation around the island has always been difficult, with the situation today not much different than that reported by Moseley (1879:261): “There are no roads in the island of Kadavu, merely narrow tracks through the woods and along the shores, which are excessively tiring to traverse.” These walking tracks link most of the villages, and in some places cross the central hills to connect the coasts. Although well-maintained in the past, they have now fallen into disuse. Some villages, such as Daviqele, which rely on these tracks to access garden lands, still take pride in keeping them cared for, calling periodic work parties to attend to cleaning and weeding the right of way. But to travel long distances around the island, or to visit the administrative center at Vunisea where the ferry landing, post office, government agencies, and hospital are located, is something of a chore. There is a road linking Tavuki with Vunisea, and elsewhere transport facilities are gradually being improved; for example the coastal road to Vunisea was recently extended along naceva westward from Nasegai to Levuka.

Canoes were the obvious mode of transport in earlier times, and even “nowadays nearly all travel is by boat” (Woodrow 1980:1). But it is expensive for a village to own and maintain a “fiber” — the local term for a runabout of fiberglass construction powered by an outboard motor — and the few operators who charter their services charge unreasonably high fares. This situation is ironic since Kadavu was once recognized throughout Fiji for the quality of its canoes (Hocart 1929:127; Tippett 1968). Wilkes (1845:289) reported that “the island is well covered with pine timber, resembling the Kaurie pine of New Zealand, and most of the large canoes used in the Feejee
Islands are built here.” By pine, Wilkes was of course referring to the coniferous *dakua* (*Agathis vitiensis*). He also noted Kadavu’s method of meeting tributary requirements: “Most frequently the annual tribute is paid in canoes, except when the king of Rewa designates otherwise” (Wilkes 1845:289). When the whaling ship *Charles W. Morgan* was off Kadavu in 1852, one of the crew depicted a rather grisly scene: “a large double war canoe hove in sight, headed for the opening in the reef ... on a platform amidships of her could be plainly seen the big part of a man’s leg that had been partly roasted, from which pieces had been hacked or torn ... the canoe, like others of its kind, would no doubt hold at least two or three hundred warriors” (Haley 1948:251). During the 1874 visit of H.M.S. *Challenger*, Matkin wrote “we had some enormous canoes alongside the other day with fruit &c, some of them were regular family canoes, & had the whole family thereon” (Rehbock 1992:184). And Spry (1878:151), apparently borrowing most liberally from Wilkes, noted that “most of the large canoes used amongst the islands are built here.” Kadavu was also known, along with the Yasawas and Macuata, for making the mats used as canoe sails (Derrick 1957:121).

While sailing canoes are a thing of the past, most Kadavu villages nowadays have at least some old wooden flatboats or punts about, in various stages of repair.

Transportation to other parts of Fiji is likewise problematic. The Kadavu Passage, the deep strait between the island and Beqa to the north, is often rough if not stormy. Strong currents are funneled through the relatively narrow passage between the northern edge of the Astrolabe Reef and the fringing reefs of southern Viti Levu. Fresh southeast breezes blow unobstructed, spawning a heavy swell. While sea-going double canoes had little difficulty with such a journey in the past, they have long disappeared
from the scene. Today there is a lack of adequate transport between Kadavu and Viti Levu (Sofer 1985a:133). Several private commercial concerns have operated over the years, with mixed success. The most consistent carrier has been Paterson Brothers, with the old double-story steel ferry *Princess Ashika* making the Suva-Vunisea trip once a week. The vessel is often full of passengers.

A tiny grass runway spanning the full width of the narrow isthmus at Vunisea serves as Kadavu’s air transport facility. Two carriers (Fiji Air and Sunflower Airlines) schedule several flights a week from Suva, and a weekly service from Nadi International Airport. Most of the passengers are tourists visiting the few small resorts on the island which tend to cater to divers.

Kadavu affords very few opportunities for wage employment. This results in two related phenomena: a high degree of independence and traditional reliance on gardening and fishing as subsistence activities; and frequent labor migration from the island to core areas both within Fiji and elsewhere in the Pacific. Suva functions as the nation’s primate city, and many *kai Kadavu* relocate there either on a temporary or semi-permanent basis. Lengthy sojourns on Viti Levu to visit relatives often result in transitory stints of employment. For example, when friends of mine from Lomati village stayed outside Suva for several months so that Saula could look after his brother’s house and family, Seini worked during that time in a garment factory. Regarding this kind of labor circulation, Sofer (1992:125) recently found that “within Fiji, Kadavu was the area with the highest mobility.” Earlier, Ward (1961:261) had reported that in 1956, Kadavu had the lowest percentage (54.0) of registered landowners who were still residing in their province. Other migration is of longer duration and occurs farther afield. Levick and Bedford (1988) documented a case of villagers from Galoa
Island working for a full year as a forestry gang in New Zealand. They reported that “the Galoa workers in New Zealand in 1987 continued a long association between villagers from Kadavu and the work permit schemes” (Levick and Bedford 1988:19).

Historical geography

There are no archaeological studies of Kadavu; thus our knowledge of the past must come from oral traditions and conjecture based on comparative data. In the time prior to European contact, most settlements were inland, nestled among the protective topography of serpentine ravines, wooded slopes, and precipitous spurs and ridges. It was a cultural landscape formed by the typical Fijian propensity for inter-tribal conflict. Tippett (1973:61) reported that “nearly all the villages of Kadavu ... have their old fort besides their village, maybe half a mile or more back.” In the sections to follow, we shall see that this was exactly the case at Ravitaki.

Oral traditions tell of migrations from Viti Levu. Riesenfeld (1950:577) reported that “a number of tribes of Kandavu Island trace their origin back to Nakauvadra.” Often people even recount the name of the canoe in which the voyage was made: “In many villages in Kadavu the people know the names of the craft that brought them to their current locations, and something of the route taken” (Tippett 1968:105). The Ravitaki people, for example, are said to derive from a migration led by Tui Nukunawa in a canoe called Volaulagi, which came from Nakauvadra to Tavuki, on the north coast of Kadavu. From there the canoe journeyed to Kabara, in the Lau Group, and finally, back to Kadavu, to Ravitaki (Tippett 1968:105). It is interesting to remember here that Kabara was once the most noble of the islands in Lau, and, as we noted in the previous chapter, was said to have had direct
connections with Nakauvadra, via Verata. Moreover, this small island was also known as a center for canoe-building (Banack and Cox 1987).

There may also be direct connections between Kadavu and the powerful polity that was Verata. We recounted in the previous chapter the various legends linking Nakauvadra with Verata, and the sagas of the culture hero Rokomautu, who was the son of Lutunasobasoba, and the founder of Verata. Hocart (n.d.(a):475), in an unpublished manuscript, related the following tradition:

Lutunasobasoba, son of Ndegei, when about to die told his sons to seek out lands for themselves. They came to sleep in Verata, then in Mbatiki, thence to Sawageke, then to Moala. All the places where they slept are noble states. They came to Matuku where a Tui Matuku was installed. He died on Kadavu and his six sons went in quest of lands. The sixth went to Ono. The eldest came to the village of Kadavu, which on that account gave its name to the whole island.

During the period prior to the Cession of Fiji to Great Britain, the eastern Viti Levu powers established claims to parts of Kadavu. Rewa conquered Kadavu in 1829 (Derrick 1957:57), and Allen (1907:16) stated that the island’s status was as “vassalage to Rewa.” The officers of the U.S. Exploring Expedition witnessed a ceremony in 1840 during which quantities of tapa and mats were presented to the king of Rewa as annual “tribute by the people of Kantavu” (Wilkes 1845:121). But Kadavu was not led easily to playing the role of vanquished. Tippett (1973:47) wrote that Rewa often had its hands full with the southern islands: “Kadavu and Beqa involved them in continual wars of subjugation, and were continually at war among themselves ... these wars continued until the late ‘sixties.” During the final throes of the seemingly perennial conflict between Bau and Rewa, there occurred the decisive battle of Kaba on April 7, 1855 (Calvert 1858:193), in which Tongan warriors assisted Cakobau’s forces in defeating Rewa.

Cakobau’s cousin, a chief named Mara, who was on Rewa’s side, later fled and...
took refuge at Galoa, Kadavu (Derrick 1957:114). Veidovi, a Rewa chief of whom we will learn more momentarily, lived for years on Kadavu. As a result of all this interaction, bolstered by the inevitable intermarriages, Cook (1975:9) reported that “Kadavu and Rewa ... have a relationship which is historical, involves a claimed ancestral connection, and assumes reciprocal rights and obligations.”

For a time, Bau declared dominion over southeast Kadavu (Derrick 1957:63), but relations between them appeared to be ceremonial and respectful, unlike the rather contentious linkages between Rewa and Kadavu. Allen (1907:86) wrote of the fishermen from Soso, Kadavu who were installed on Bau, and Barker (1926b:24) stated that of the three tribes comprising the people of Bau, one is the Butoni clan from Kadavu. Interestingly, Soso is one of the villages on Kadavu that still maintain irrigated taro terraces. We know that the connections between Kadavu and the eastern Viti Levu powers are of sufficient vintage to affect dialect. In assessing regional language differentiation, Hocart (1915:74) noted that the vernacular on all of Viti Levu's outlying islands is similar to the western dialects, “except Kadavu and Beqa, which belong to the East.”

The existence of several pieces of columnar basalt placed intentionally as components of sacred space within the more powerful matanitu offers tangible and highly symbolic evidence for the connections between both Rewa and Bau, and Kadavu. Moseley (1879:273) noted the twin basalt columns on Bau that were “intended to have been used as posts for the king's house,” and cited Dana, the geologist for the U.S. Exploring Expedition, as having said these columns were “brought by a Bau chief from a small island in the harbour of Kandavu ... and they were long desperately defended by the inhabitants, who held them sacred.” At Rewa, Cumming (1881, vol.1:187)
observed that around the church building "have been set up a series of rude stone pillars, some pentagonal, — which are supposed to have been brought from the basaltic cliffs at Khandavu, the outermost isle of the group," and further wrote: "I noted a similar pillar among the ruins of the heathen temple at Bau."

Due to its downwind position at the equivalent latitude, Kadavu may have been visited by Tongans more than other parts of Fiji outside of the Lau Group. Pritchard (1865:197) reported the presence of a certain tribe “known as ‘vosa-namu’ which maintains a distinct social and political status in Fiji, and which traces its origin to the crew of a fleet of war-canoes that was blown away from Tonga-tabu, and drifted to Kadavu.” Seeman (1862:240) commented that the prevailing winds often took Tongan voyagers to Kadavu, “and hence the mixed race inhabiting that fine island is accounted for.” Fison (1904:26) also reported that Tongans had drifted to Kadavu. Tongan influence on Kadavuans likewise captured the attention of Brewster (1922:229), who wrote that “the people there are strongly impregnated with Polynesian blood, and are consequently light-skinned, good-looking and inclined to gaiety.” Cheerful dispositions aside, this admixture of Tongan blood is still noticeable in the people of Kadavu, especially in villages along naceva (Fig. 8.3). Residents of Ravitaki told me of a Tongan settlement that was situated near their present village of Namanusa. Houses there were constructed in the Tongan fashion, with rounded ends. Tippett (1968) has examined Tongan house type elements which have persisted on Kadavu into the present century. The Tongan chief Ma’afu, who had designs on conquering all of Fiji, placed Tongan teachers on Kadavu during the 1860s as a sort of frontier occupational force. He had recently taken Matuku, Totoya, and Moala — the group of islands to the east — and in 1859 invaded Beqa, the
FIGURE 8.3. Young residents of Ravitaki. It is easy to see the Tongan influence in the bright faces of Mereani Funaki and her little sister Sera.
island off Viti Levu directly north of Kadavu. Other than actively conveying their leader's opposition to the possible Cession of Fiji to Great Britain, the Tongan teachers on Kadavu posed no real threat, and politically the occupation was of little consequence (Derrick 1957:140).

European communication with Kadavu was sporadic at first. Perhaps the first European to sight Kadavu was William Bligh, in a return to Fijian waters three years after his ill-fated ordeal in the *Bounty's* lifeboat. This time he was in command of H.M.S. *Providence*, which sailed along Kadavu's south coast on August 10, 1792. Designated as “No. 2” on the ship's charts, the island's isthmuses fooled Bligh, who wrote, “We passed the south side of No. 2 (which I suspect is three islands) about 10 leagues in extent from E.N.E. to W.S.W. ... the whole country was like continental land doubling hill over hill, moderately wooded and cultivated” (Mackaness 1951:275). The island was again sighted in 1799 by Christopher Bentley, piloting the American ship *Ann and Hope*, which entered Kadavu Passage en route to Viti Levu (Im Thurn and Wharton 1925:xxxi). We have already taken note of D'Urvâîie's nearly disastrous 1827 reconnaissance while aboard his flagship *Astrolabe*, which passed along the eastern reefs and south coast of the island (Derrick 1957:65). Because there was no sandalwood, sustained contact between *kai valagi* and Kadavuans did not occur until the 1830s, when ships seeking *bèche-de-mer* visited the reefs offshore.

With the commercial success in procuring *dri* elsewhere in Fiji, ships began to range over the extensive reefs off Kadavu. But here they were met with shrewd and circumspect behavior on the part of local villagers, which escalated at times into outright violence. In September, 1834 the American brig *Charles Doggett* was seeking *bèche-de-mer* at Ono Island, off Kadavu's eastern tip, when several of the crew were killed by Fijians in an
unsuccessful attempt to take the ship. The chief responsible for this attack was a Rewan named Veidovi. Four years later, Veidovi seized an Australian ship at Kadavu and demanded a huge ransom of valuable whales' teeth (Derrick 1957:71). During the United States Exploring Expedition's survey of Fiji in 1840, an investigation into the deaths of the crew from the Charles Doggett resulted in Veidovi being taken prisoner aboard the flagship U.S.S. Vincennes, and a Salem, Massachusetts newspaper reported that "he is from the town of Rewa ... hereditary chief of the large island of Kadavu" (Ward 1967:464).

Veidovi was in fact the brother of Qaraniqio, high chief of Rewa, and his placement at Kadavu indicates that island's tributary relationship to the greater authority of Rewa. Derrick (1957:57) wrote that "Veidovi ... was carried under arrest to the United States on the warship Peacock" (another expedition vessel) and that "presumably he served a sentence in America" (1957:92); but Ward (1967:467) reported that Veidovi died on board the Vincennes. Wilkes (1845:235) himself only wrote that Veidovi was transferred from the Peacock to the Vincennes while the two ships were anchored at Bua Bay on July 5, 1840, and that the prisoner "remained on board of her [Vincennes] until the expiration of the cruise." Dodge (1971:350) resolved any apparent discrepancies in these accounts when his research revealed that Wilkes indeed brought his prisoner to the United States, but that the chief "died of pneumonia three days after the Vincennes returned to New York."

While some bêche-de-mer was collected from Kadavu reefs, the island was never as productive an area as the Macuata coast of Vanua Levu or the Yasawas. During the next phase of European contact with Fiji, however, Kadavu figured prominently. In a remarkable piece of scholarship,
Townsend (1935) examined hundreds of logbooks from whale ships, and marked the locations, in latitude and longitude, where whales were taken. He also noted the month of the logbook entry, and differentiated among the four species of whales targeted by the South Seas whaling fleet. He plotted these data on a series of maps, which exhibit the following geographic distributions. Bowhead and humpback whales were both found during the austral winter in the vicinity of Tonga, at latitude 22°S, longitude 175°W, while right whales spent the summer east of New Zealand, in a cluster centered at latitude 35°S, longitude 165°W. Sperm whales, however, were found across a wider area, depending on their seasonal migrations. During April and May they congregated far to the south, around the Kermadec Islands, but by June were being taken just south of Tonga. During the height of the winter, from July through September, they were numerous in Fijian waters around Kadavu, Lomaiviti, and the Yasawas. At this time, whale ships would periodically need to fetch shore to rest the crew and obtain provisions. Often ships recruited labor in the islands, and trade was carried on with local villages.

Because of its central location, whalers began to put in at Kadavu (Burns 1963:55). Derrick (1957:70) wrote that “whalers frequented certain parts of the group, especially Tavuki Bay, Kadavu,” and noted that in 1840, eight whaling ships visited Tavuki in the space of two months. Tavuki Bay is a fine sheltered cove along the north coast, and was the land base for whaling vessels when they were in Fijian waters. In its time it became as well known a watering spot as Lahaina on the island of Maui, and Akaroa, on Aotearoa’s south island. Even as late as 1860, whalers were still calling at Kadavu. During that year, on August 13, Seeman (1862:137) observed at Tavuki “three American whale ships in the bay, taking on wood, water, and
fresh provisions." But the tendency for whalers to procure their necessities at Kadavu was also influenced by factors beyond the actual location of the whales. Callahan (1901:55) revealed that by the 1850s, "American whaleships which had been getting supplies at Samoa or Tonga were now beginning to go to Fiji on account of the exorbitant prices recently asked by the natives of the former islands."

Not all whalers were on familiar terms with Kadavu at this time, however. Robert Coffin was a crew member of the whaler *Logan*, which departed from New Bedford on July 27, 1854, and ran aground on Rapid Reef, some 640 km southwest of Fiji, on January 26, 1855. Leaving the wrecked ship, the crew sailed their open whaleboats north:

On the fifth day we made the island of Kadavu and ran along the reef until we saw a smoke signal; then we waited to see what would happen. The natives to the number of about twenty built a great fire, shoved a big canoe off, and started to come out to us. We didn't like their actions, and we sailed away (Coffin 1941:70).

The whaleboats finally landed on Gau, the southernmost island of the Lomaiviti Group, and were treated kindly by the people there. After shifting to Levuka, on Ovalau, Coffin later had the opportunity to visit Kadavu as a crew member on a small trading vessel:

We now shaped our course toward Kandavu. The whites called it 'Cantab'. It was the first land we sighted when coming from the wreck, and I was curious to set foot on it. Did not learn anything new except we would have been as well received as at Ngau (Coffin 1941:109).

While we have no direct record of the effects of the whaling vessels on the agricultural resources and landscapes of Kadavu, we may infer that the production of foodstuffs was bolstered by the trade with the ships. In any case, the situation on Kadavu was probably not as extreme as that occurring in Hawaii at this time. There was no bêche-de-mer industry in the northern Pacific islands, but otherwise the series of encounters with the emerging
global market was remarkably parallel to what was going on in the South Seas. The period of whaling in Hawaii was between 1830 and 1855. With the demise of the sandalwood industry, the chiefs forced commoners to grow “saleable food surpluses” to service the whaling fleets and the growing urban population of Honolulu: “Hence the following years would see the revival of local agriculture ... with a renewed intensity to irrigated plots of taro, stands of paper mulberry, and hillside gardens of sweet potato” (Kirch and Sahlins 1992, vol.1:97).

During the 1860s, when cotton planters first began to settle the Ra coast, several other places in Fiji also experienced the boom, with “the Rewa River delta and the island of Kadavu being the favored areas” (Morrell 1960:141). Unscrupulous behavior by greedy Europeans eager for land did not go unnoticed by the people of Kadavu. Derrick (1957:183) reported that “as early as 1860, the Kadavu chiefs had complained to Smythe of a false claim by Burt to Bulia Island.” One of the first Europeans to settle on Kadavu, George Burt located there in 1857, and was, by all accounts, an especially unsavory character. Describing Burt as being “unusually cruel”, Young (1984:142) wrote: “On Kadavu he had set himself up as a trader, then, in partnership with a man named Taylor, as a planter. In 1866 he was employing some men from the Ra coast.” An American Indian who had left a whale ship was another settler new to Kadavu who was no less shady in his dealings with the local people. Indian John, as he was called, came to own the island of Taudromu, in Soso Bay, as reported by Seeman (1862:142): “Taudromu ... scarcely half a mile round, now belongs to an American Indian of real flesh and blood, and in former times was inhabited by Ratu-va-caki, a mighty spirit.” Ironically, Indian John apparently rendered assistance to
American consul J.B. Williams in stealing land from some of the Fijian chiefs (Derrick 1957:95).

After the cotton boom went bust, Kadavu enjoyed its own sleepy version of a heyday when Galoa Harbor was selected as a port of call for the new mail steamers. This occurred after the U.S. transcontinental railroad was completed and the San Francisco - Sydney mail service began (Thomson 1889). Derrick (1957:220) wrote that Galoa harbor “was not a busy port, and was used for only about three years” [1875 to 1877], and noted that “shipping at Galoa reached its peak on 9th and 10th August [1876], when three warships — two corvettes and a schooner — and two large mail steamers were in the harbour at the same time.” When Stonehewer Cooper arrived at the “noble harbour” of Galoa, anchored there also were the steamer *Australia*, awaiting New Zealand mails, along with H.M.S. *Nymphe* and the steamer *City of Sydney* (Harvey 1946:91). Derrick (1957:240) reported that the steamer *Macgregor* had run aground at Galoa in 1874, and this may be viewed as a fitting metaphor for the harbor’s short-lived fame. The brevity of this period should not undermine Galoa’s importance to transpacific transport and communication, however, for not only was Galoa a stop for the San Francisco to Sydney ships, it also served as a transshipment point for steamers to New Zealand. But when a professional survey of the harbor was conducted by the hydrographers from H.M.S. *Challenger* in August 1874, it was just in time to be too late to be of any commercial use. Kadavu’s maritime glory faded with the establishment of the new Colony’s capital city at Suva.

The H.M.S. *Challenger* was a pioneering British oceanographic vessel that circumnavigated the globe during the 1870s. Expedition personnel included a number of scientists and naturalists who took soundings in the open ocean, analyzed samples of sea water, collected specimens of marine
fauna, and were keen to visit any lands they came upon. In addition to the official narrative (Tizard, et al. 1885), several officers and scientists who were on board published their own account of the voyage (Spry 1878; Moseley 1879; Campbell 1881). The *Challenger* visited Kadavu in August, 1874, and we are fortunate to be able to read about conditions on the island as noted by this team of trained observers. Furthermore, the letters of crew member Joseph Matkin have only very recently been published (Rehbock 1992).

Spry, a naval officer, called Kadavu “truly beautiful,” but complained of the “rough roads” that transformed a walk in the interior into a tedious trek across ridges and valleys “all clothed with tangled vines and shrubs” (Spry 1878:150). He stated that “except around its highest mountains cultivation or its traces can be seen in all directions” (1878:151). Moseley was one of the expedition’s naturalists, and an enthusiastic commentator regarding all aspects of land and life. On an outing to shoot pigeons and parrots for the ship’s collections, he noted that the track they were taking from Galoa “lay first amongst beds of reeds on a small expanse of flat land at the mouth of the valley in which the stream runs; then skirting a mangrove swamp bordering the shallow interior lagoon part of the bay, led amongst ‘taro’ beds, and up a steep slope into the densely tangled woods” (Moseley 1879:261). The taro beds he mentioned are still in use there along the western shores of Galoa Harbor.

Lord George Campbell was more inclined toward poetic and romantic portraiture. His description of Kadavu is nonetheless accurate: “Grand hills, smothered with tropical verdure, rise abruptly from the shores, their spurs and ravines rounded and softened by this forest of intense vegetation, veiled morning and evening by pearly haze, dew drops sparkling on every leaf, and palms flashing quicksilverlike in the sunshine and breeze” (Campbell
His discovery of irrigated agriculture on the island came one hot day when, in the company of his retriever Sam, he managed to "lose the path, get caught in a web of insinuating creepers, tear my clothes, bless tropical growths, turn back, and again lose myself, and flounder ankle deep in mud and water irrigating a 'taro' patch" (Campbell 1881:153). He also noted "cultivated yam grounds of considerable size" (Campbell 1881:155).

Matkin described Kadavu as "mountainous & fertile" and wrote that "there are natives on it & a few white people but no town to speak of. There is a good harbour formed by an enormous line of coral reefs which extends across its entrance & acts as a breakwater" (Rehbock 1992:180). When the Challenger left Kadavu on August 10, 1874, and sailed west toward the New Hebrides, the crew never even saw the top of the great mountain of Nabukelevu, "as its summit was clouded the whole afternoon" (Tizard, et al.1885:509).

Agricultural geography

It is perhaps appropriate for the present study that before anything else was known regarding Kadavu, it had received a reputation as an agricultural place. Wilkes (1845:289) stated that "the people of Kantavu are industrious, and the chief said they had abundance of provisions." Another early visitor, Seeman (1862:140) wrote: "The island of Kadavu, of which so little is known, is highly cultivated." The Challenger's crew related similar observations, as noted above. In an amazingly astute article published in the Scottish Geographical Magazine, J. Thomson (1889:650) described agricultural activity on the island in the following passage that deserves to be quoted at length:

The Kadavuans are thorough practical agriculturalists, and their importance as food producers is fully recognised ... They pay their taxes in kind, and their plantations produce, in addition to that required for their own use, sufficient for the consumption of a considerable export trade to European centres in different parts of the group. They plant tobacco, sugarcane, maize, cotton, kava,
yams, several varieties of sweet potatoes, pumpkins, arrowroot, beans, taro, etc. They are expert irrigationists, and its value in enriching and improving land has long been known to them. Their agricultural land may be divided into two classes: alluvium flats and hill-side slopes. Plantations in the former are in all cases bounded by natural boundaries, and subdivided artificially into sections of uniform areas representing individual shares. That these artificial division marks may consist of stones, muddykes, furrows, or stakes will altogether depend upon natural conditions and individual peculiarities. Natural boundaries are usually creeks and rivulets whose waters, being ever permanent, are conducted to the cultivated subdivisions by artificial channels and wooden troughs. Hill-side plantations are usually terraced and irrigated by the waters of neighboring creeks gravitated thither, sometimes from considerable distances, through bamboos and artificial races. Although both classes of plantations show great agricultural method and skill, the latter presents greater artistic features, and when well executed it is somewhat picturesque.

Many of the irrigated terraces of Kadavu appear to have survived the turn of the century, at least. Ross (1909:74) noted that “here and there the slopes were terraced with taro beds, which were irrigated by channels leading to them from some permanent water supply, singularly resembling the descriptions given to us of the cultivated terraces of the Pamirs.”

Deane (1921:210) reported that “the Kadavuans ... raise yams, taro, kawai, kumala, and kaile in abundance.” It is interesting to realize that Deane’s roster contains only root crops (kawai and kaile are both a type of yam), which, along with the arboreal starches breadfruit and plantains, represent to the Fijians “true food” (kakana dina). This traditional emphasis has continued to the present, despite the early attempts, recognized above by Thomson, at developing agricultural exports (Sofer 1985b:420). In her relatively recent ethnography of the island, Cook (1975:17) listed Kadavu’s “main garden crops in their order of importance: taro, manioc, yams, sweet potato, breadfruit, cabbage, eggplant, pumpkin, bele, tomatoes, onion (varasa), and pineapple.” The varasa is a type of onion (Allium cepa) (Capell 1972:256), and bele (Hibiscus manihot) an edible green. Although the
introduced manioc, or cassava, has largely displaced other tubers, we can see
that the five most important crops on the island are still *kakana dina*, with
taro listed as the most important. While this may be due in some measure to
Kadavu's peripheral position relative to markets in Suva and beyond, it also
speaks to the strength of traditional Fijian culture. In this section, I present
some general observations regarding agriculture on Kadavu, and then focus
specifically on irrigated terracing.

We may take as representative of Kadavu the conditions and crops that
are evident on the western end of the island (Fig. 8.4). Sofer (1985b:420)
stated that “Kadavu agriculture is typically a semi-subsistence form of
production characterized by shifting cultivation patterns.” Thus, many
garden areas are planted to the various crops that are part of the traditional
subsistence system, but from which villagers may also derive limited cash
income. There are a few exceptions, representing predominantly
commercial production, and it may be instructive to examine these first. The
following examples serve to illustrate the circumstances of cash cropping on
Kadavu.

Behind the village of Dagai there is a low, wet area in the forest near
where a stream enters the sea. Formerly this area had been used for the
cultivation of *via kana* (*Cyrtosperma chamissonis*), the giant swamp taro that
was the essential component in the subsistence landscape of the Rewa Delta.
Because of incessant pig damage, the villagers of Dagai have now planted this
area to *voivoi* (*Pandanus caricosus*, Rumph., or *Pandanus thurstonii*), the
smaller variety of pandanus which is used for weaving. Seeman (1862:354)
accurately described the appearance, habitat, and economy of this plant
more than a century ago: “a stemless species, with leaves ten to twelve feet
long, which delights in swampy localities of the forests, and is occasionally
Western Kadavu

5 kilometers

FIGURE 8.4. Western Kadavu. Adapted from Woodrow (1980).
cultivated to meet the demand. Fans, baskets, and the finest mats ... are made of its bleached leaves.” Degener (1949:128) also noted that voivoi is cultivated in plantations, and suggested the plant was a indeed a cultigen, for it “never flowers like the common wild pandanus (vadra) P. tectoris.” From their voivoi plantation the people of Dagai harvest the green leaves and process the raw material into a product. First, they cut and gather the green leaves and carry them in large bundles back to their houses in the village. There, they strip off the sharp points from the leaf edge with a shell tool or knife and remove the central spine, in preparation for drying the leaves in the sun (Fig. 8.5). After drying, the leaves are rolled into bundles that are then ready for transporting to Suva, where they are marketed as mat weaving material. As a non perishable and relatively light weight product of the soil, voivoi is very nearly a perfect crop for the isolated agricultural economy of Kadavu. That it also encourages the traditional craft of weaving and perpetuates the manufacture of customary mats (na ibe) elsewhere in Fiji is of additional significance, rendering voivoi an even more appropriate Kadavu export.

In the past, especially around Daviqele, coconut plantations had been active, but the vicissitudes of the copra market have taken their toll. At Napoidi estate, just west of Daviqele on the southern flanks of Nabukelevu volcano (on some maps rather incongruously named Mt. Washington), the Babitu family has all but given up on coconuts, and now look to small-scale tourism as a way to make ends meet. Several guest houses provide an out of the way experience for visitors to Fiji who wish to get off the beaten track.

The most important cash crop grown on Kadavu is kava, or yaqona (Piper methysticum). Based on his fieldwork in western Kadavu, Sofer (1985b:422) noted that “yaqona substituted copra as the major cash crop as a
FIGURE 8.5. Cleaning *voivoi* leaves in preparation for drying. Dagai.
direct response to the fluctuations in price level of both commodities."
Cultural preferences have stimulated a favorable commercial environment
for kava exports. Other Fijians seem to prefer yaqona grown on Kadavu, and
kava originating from the island tends to fetch higher prices at the Suva
market. Like voivoi, yaqona is dried before transport, and hence is a
relatively light weight and valuable agricultural export (Fig. 8.6). Nearly
every village on Kadavu has marketed yaqona at some time. Brookfield
(1985:190) noted that commercial marketing of yaqona began on Kadavu
during the 1930s. Sofer (1985b:428) found that Kadavu had become by far the
leading supplier of yaqona to Suva, representing "more than forty percent
of the total" stock on hand at the market. The western Kadavu district of
Nabukelevu is particularly active in selling kava at the Suva market.

Yaqona is grown extensively at Lomati, where garden lands are
situated on the northern and eastern flanks of the volcano. There it is often
intercropped with dryland taro. In this way, the large taro leaves provide
the protection of shade required by the young yaqona plants. After at least
ten months and within two years of its planting, the taro will be harvested.
It will be at least another three years before the yaqona is mature. Other
plants such as bananas and plantains (Musa spp.), dalo ni tana (Xanthosoma
sagittifolium), and via or giant taro (Alocasia spp.) are also planted in these
plots. The advantages of such a system include the manner in which the
same piece of land is in both the subsistence and cash system. It points to the
blurring of this division, and indeed, the differences sometimes are hard to
distinguish. Kava grown at Lomati is consumed in the village, and also taken
to urban markets. Here on Kadavu, as elsewhere in Fiji, there may not be
such a sharp differentiation between subsistence and cash cropping.
FIGURE 8.6. *Yaqona* preparation, Lomati. Saula Sukaloka chops up roots and stems of *Piper methysticum*. These will be spread to dry on sheets of corrugated roofing material, and then transported to market at Suva.
There are six types of *yaqona* currently being cultivated at Lomati: *yaqona loa; yaqona karawa; yalu; beranavakacoko; kubukubuleka;* and *yaqona nigau.* At Lomati, I also gathered data on the different cultivars of some of the more useful and common subsistence crops. There are ten varieties of breadfruit: *uto ni samoa; uto levulevu; uto dina; uto kogo; balekana; uto saca; uto vatu; uto bovua; maliva;* and *uto kokocoko.* Five kinds of plantains include *luveniika; waiwaileka; makogai; leqanakurokava;* and *mami.* There are also five types of coconut: *niu ni tonga; niudrau; niuleka; niurea;* and *niu ni rotuma.* The four varieties of sweet potato are *apakuki; belesilika; kumala dromodromo;* and *kumala vulavula.* Three kinds of giant taro are recognized: *viadina; viakau;* and *via ni tonga.* There are also three varieties of cassava: *tavioka dromodromo; vulatolu;* and *sokobale.* No less than nineteen types of yam include: *togovuso; veuwa; kaumaile; kaumani; daniela vulavula; kasokaso; uvinivutuna; mataqiliqili; kaunisela; iota; rotuma; walesi; uvikuro; damuni; daniela dradra; saukaladuci; moala; uviniugini;* and *sebu.* There are fourteen cultivars of taro: *korokece; samoa; tausala samoa; tailevu; mataiwalu; sekaseka; vavai ni samoa; ilo ilo; manua; nereo; sadri; qere; vavai laua;* and *vujikoto karakarawa.* The last two taros are noted for being well suited to wetland production, although the irrigation systems in this area of Kadavu have been abandoned for some time. It is obvious that traditional food crops such as taro, yams, and breadfruit comprise many more cultivars than cassava. It is also interesting to recognize the names of other islands in some of the crop varieties. While some of these are recent introductions, it may be that certain varieties were brought to Kadavu from elsewhere long ago.

In the valley behind the neighboring village of Talaulia, a wide assortment of food crops are growing on the abandoned terracing that was
once used exclusively for irrigated taro. These stair step plots are no longer being irrigated, but have been planted to a mind-boggling mixture of tree crops and perennial and annual food plants. I observed the following cultigens all growing together: coconut, breadfruit, taro, papaya, chilies, tomatoes, dalo ni tana, sweet potato, eggplant, bele, and yaqona. This is intercropping taken to its extremes.

Many aspects of traditional Fijian terrestrial subsistence strategies may be characterized as agroforestry (Thaman 1992a). In addition to the cultivated tree crops such as coconut and breadfruit, the islanders utilize a wide variety of wild fruit and nut trees. Other trees are set aside for craft-making purposes. This custom was common on Kadavu, as Liversidge (1921:133) observed: “When I was in the island of Kadavu, Fiji, in December 1876, I was told that Fijians had a practice of selecting certain trees for special purposes, e.g. for making kava bowls and carefully preserving them by tambu until they were required, or had grown sufficiently for the intended use.” In Nabukelevu groves of trees are still tended for fuelwood supplies; others represent ordained haunts of old deities, and no wood may be taken. One of these sacred groves is situated between the villages of Talaaulia and Dagai, adjacent to the voivoi plantation.

Nasegai, located at the head of a protected embayment along the south coast of western Kadavu (see Fig. 8.4), was the subject of a recent case study by Ratuvakacereivalu (1992). He examined, from the perspective of political ecology and land tenure, the “character and structure of semi-subsistence agriculture”:

Coconut planting and harvesting was the chief income source for the people of Nasegai during the early years of colonialism; there was once banana cropping and some villagers had even grown cocoa. Yaqona or kava and taro crops, which in the past had always been grown for villagers’ own consumption or traditional purposes, eventually became the main cash crops or income
source, and these two crops have continued to play a central role in the economic development of the village (Ratuva kacereivalu 1992:83).

He noted that “semi-subsistence producers in Nasegai typically operate two or three gardens: the main garden (acquiring the greater proportion of the owner’s labour inputs) being associated with the major traditional cash crop (*yaqona*), with secondary gardens being directed towards crops for household consumption (cassava)” (Ratuva kacereivalu 1992:93).

Interestingly, a parallel situation to that noted above for Dagai is occurring at Nasegai with regards to livestock conflicts, and farms now must be located away from the village to avoid pig damage: “pockets of arable land close to the village are susceptible to domestic pig damage since poorly maintained pigsties, coupled with the apparent custom of households releasing their pigs for unsupervised ‘daily exercise’ (most commonly until the pigs voluntarily return to their sties or the owner repens them), effectively make farming close to the village synonymous with providing a ‘charitable soup-kitchen’ for village pigs” (Ratuva kacereivalu 1992:92). The apparent stagnation in agricultural development may be attributed to “the easy attainment of subsistence affluence in Nasegai, coupled with a significant increase in the price of *yaqona* after the 1987 coup” (Ratuva kacereivalu 1992:93).

Agricultural terracing was once widespread throughout Kadavu. Based on aerial photographic analysis, terracing is evident in stream valleys and hillsides along both *naceva* and *natokelau* (Fig. 8.7). Because Kadavu’s hills are not high enough to create a pronounced rainshadow, there is no leeward dry season, hence no incentive for north coast dwellers to irrigate more than farmers living on the south coast. The ultimate cause, therefore, may be a cultural inheritance: terracing was a technique passed down from the ancestors, and was applied regardless of climate and environment.
Agricultural terracing on Kadavu

Active
Abandoned

Scale
10 km

Presently there are five locations where irrigated terrace systems are known to be active on Kadavu: inland of Solodamu, a small village on Tavuki Bay; three areas along the eastern shores of Soso Bay between the villages of Soso and Tioma; and at Ravitaki, near the village of Namanusa. The next section presents the findings of detailed field research conducted at Ravitaki. This section concludes with a brief look at the Solodamu terraces.

The Solodamu gardens are a perennially cultivated set of irrigated terraces situated along Savulutu Creek, about a kilometer upstream from Tavuki Bay. When compared to the village system operating at Ravitaki, the area of these pondfields is not large, either collectively or individually, but the Solodamu gardens display some interesting and distinctive features. Perhaps as a way to avoid lengthy fallowing or cyclical rotations, some of the plots are planted in a half-pondfield, half-raised field fashion (Fig. 8.8). And, rather than using the customary hollowed out tree trunk or bamboo as an aqueduct, water is conveyed to the plots via plastic pipe. Where a stone would traditionally break the force of water falling into the pondfield, a sheet of corrugated sheet metal here serves the same purpose (Fig. 8.9). Such small details may seem insignificant, but the innovative adoption of these modern materials into terrace infrastructural design bodes well for the continued utilization and upkeep of the system.

Ravitaki land and life

The district of Ravitaki is located along the south coast of western Kadavu. The village proper is known as Namanusa, but it is locally referred to by the district name, and Namanusa villagers are known as kai Ravitaki. The village is situated directly on the water's edge along the western shores of Yauravu Bay, which is part of the collapsed caldera of Votuvotu volcano (Woodrow 1980:15). Nearby are shallow mangrove flats. The agricultural
FIGURE 8.8. Terraced taro garden at Solodamu, Kadavu. This plot incorporates design characteristics of both pondfield and raised field. Note the digging stick (doko) lying in the raised bed portion of the garden.

FIGURE 8.9. Water delivery apparatus for irrigated terraces at Solodamu. Plastic pipe replaces traditional hollowed tree trunk or bamboo, and corrugated sheet metal supplants stone.
land base extends inland for some 4 or 5 km to the crest of the island's central ridge. All the land between Vosavu Creek and Vanualevu is under the ownership of the mataqalis living at Namanusa (Fig. 8.10). Garden lands in various stages of the swidden cycle are evident on slopes to nearly the top of the ridge line (Fig. 8.11). Irrigated taro terraces are found in several locations. The large village-owned system is situated behind the school buildings, near the confluence of Nabaka and Nacoroga Creeks. Other smaller irrigated terrace systems are worked by members of the different mataqalis, and are situated along various water sources within the district.

The village of Namanusa has a population of 195, living in a total of 36 households. This is according to the latest available census data (1976). There has been some increase since then, and though the total population was not tallied, fieldwork indicated 43 households in 1992. Diachronic census data reveal a more than doubling of the population from a low point during the early decades of the 1900s (Fig. 8.12).

Early settlement was concentrated in fortified hilltop locations. Oral histories tell of two yavusa — Ravitaki and Vita — that lived in the area before Cession. As recounted in the Tukutuku raraba, these yavusa united at some point and became spatially integrated in one village situated on Nakorotu, the hilltop just inland of the present site of Namanusa. As Etuate Daulaca, the narrator for yavusa Vita's oral history noted, "there was plenty of warfare going on at that time" (NLC:yavusa Vita). As elsewhere in Fiji, food gardens would have been located in close proximity to the defensible habitation areas, and the village terrace system at Ravitaki probably dates to this period. Informants believe these irrigated taro fields are at least a hundred years old. After Cession the people relocated to a piece of land called Nagaumai, on the coastal flats near the mouth of Nacoroga Creek, downstream from the present
FIGURE 8.11. The vanua of Ravitaki. Note swidden clearings in various stages of fallow.
location of Ravitaki District School (see Fig. 8.10). But this was not a lucky place to build a settlement. As the narrator for the oral history of yavusa Ravitaki, Ratu Aca Lili Qavota, recounted, "The reason they left Nagaumai is because of tidal waves destroying this village whenever there was a cyclone" (NLC:yavusa Ravitaki). The village subsequently shifted several times for various reasons, including fires, water shortages, and colonial administrative perceptions of unhealthy "damp" conditions (NLC:yavusa Vita). The present site at Namanusa was chosen by the government.

* Na *laua* ni Ravitaki

Irrigated terraces at Ravitaki are known as *laua*. While they have been abandoned and transformed elsewhere on Kadavu, terraces are still a major feature of the agricultural landscape here. The *laua* are differentiated at Ravitaki according to tenure and complexity of the systems. The large system in the Nacoroga Creek basin behind the school is communally owned and managed by the village. Smaller areas of irrigated terraces belong to individual *mataqali* resident within the village, and are utilized by members of whichever *mataqali* maintains traditional claims to the land. These more diminutive gardens are located in various places in the *vanua*.

Village system

The large system of irrigated terraces behind the school is a communal agricultural resource. The land where these gardens are located was once under the ownership of a single *mataqali*. After the 1874 Cession, this land was formally presented by the *mataqali* to the whole village. The following discussion outlines the operation, management, and cultural-ecological framework for this set of terraces.

The entire tract is divided into four sections of more or less equal area. This allows the system to be managed on a four year cycle of wet and dry
cultivation, with alternate fallow periods. Each of these sections is named, and the sequence of rotation follows a set schedule (Fig. 8.13). If there is a need to boost taro production, the actively irrigated section is easily expanded. Because the terraces are a communal resource, the right to extend the cultivated area (veivakadonui) is inherent in the system. After an irrigated laua is harvested, the garden is fallowed (cegu) for one year. The next year it is drained and planted with dryland taro, becoming a type of raised field known as vuevue. Following harvest of the dryland taro, the terrace is again allowed to rest for one year, before reverting to an irrigated laua. Thus, the four year cycle followed at Ravitaki consists of laua - cegu - vuevue - cegu.

A single spring named vurevure ni vanua supplies water to the system. It is situated at approximately 200 meters elevation, in the bed of Nabaka Creek, a draw that, if the flow was not directed to the laua, would enter Nacoroga Creek along its right bank at a point some 600 meters upstream from the bay. There is a substantial flow of cool and clear water from this spring, enough in most years to fully irrigate the one active section of laua in the system. The steady flow from this spring is not affected by storm events, and is thus more manageable in the irrigation system. One informant also claimed that the taste of taro grown in spring water is better than that grown in water from the creek. A few small laua directly below the spring are always planted for the chief, the Tui Ravitaki. From the lower terrace of these chiefly gardens, several canals lead to the different sections of village laua, and these are either open or blocked as required by the annual planting schedule. In some places, aqueducts made of hollowed logs convey water across points of uneven slope (Fig. 8.14).
FIGURE 8.13. Village system of laua. Year indicates scheduled sequence for active irrigation. Schematic diagram based on fieldwork; not to scale.

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FIGURE 8.14. Log aqueduct. Anare Coka Delaivuna displays a hollowed log used as an aqueduct within the network of irrigation channels.
Canals have also been constructed from Nacoroga Creek, and are utilized in the event that flow from the spring diminishes during dry conditions. These channels (*ivakata*) are normally closed off, and are only opened if necessary to augment decreased springflow. Springs are the preferred source of irrigation water for terraces. Heavy rains will swell a creek, causing uncontrolled flooding and possible damage to system infrastructure. The earthen terrace walls (*taratete*) often disintegrate as it is, and the damaged portions are then reinforced with a lattice-work of sticks. As a preventive measure, *taratete* are sometimes stabilized with vines and grasses (Fig. 8.15). There is also a type of taro named *rabei* that is planted along the terrace walls to strengthen them.

Due to the predictable damage from a stream in spate, the instream diversion dams at Ravitaki are not constructed entirely of boulders. These would not only be time-consuming and frustrating to rebuild after each washout, but would allow too much water to enter the canals and cause damage to the system during storm events. Rather, these dams — called *vonoti na ivakata* — comprise a rock foundation supporting a structure of plaited coconut leaves. Such an ephemeral barrage is readily repaired, and also washes away more rapidly should stream levels rise, thereby insulating canals and gardens from flood damage. Wilken (1987:161) reported nearly identical structures developed by traditional farmers in Mexico: “An old and still widespread form is the estaca dam constructed by driving stakes (estacas, palas) into the river bottom in a line, either straight across the channel or angled upstream. Branches (ramas) or reeds (carrizos) are woven into the stakes, and the whole may be reinforced with rocks (piedras) and plastered with mud (lodo).”
FIGURE 8.15. Terrace walls stabilized with vines and grasses.
The section of laua irrigated in 1992, Nadagota, contained 112 separate pondfields (Fig. 8.16). Because of the uneven and multifaceted orientation of the slope, these terraces were not of uniform area, nor were they constructed along contours in consistent stair step flights, but were irregularly sized and built in coordinated array according to the best fit of the terrain (Fig. 8.17). These gardens averaged 3 meters in width, with a mean area of 51 m².

The laua are prepared for planting beginning in January. Although the overall management of the system revolves around collective effort, each garden is actually assigned to an individual, and every man in the village receives at least one pondfield in the village system. The allocation of the individual pondfields is a process known as butulaua. Reed stems with small name tags sprout from the terraces during the busy planting season, helping villagers to find their garden. With the number of laua greater than the number of households, many farmers “own” several irrigated plots. Following the ceremonial harvest at Christmas (see discussion below), each household is free to take the taro within their assigned garden.

Planting of the irrigated terraces takes place between January and March. Wetland taro can actually be planted at any time of the year, and in the smaller mataqali-owned laua systems under the care of a single gardener, planting is done at any time. Quain (1948:64) noted a similar situation in western Vanua Levu, where July and August were primarily for planting yams, cassava, and sweet potatoes, and “taro is planted too, at this time; new ponds are prepared for it ... but it is planted at odd times throughout the year too.”

In the Ravitaki system, the villagers adhere to this schedule for several reasons. When taro is planted in February, it will mature and be ready to eat in December. At Ravitaki it is a Christmas tradition to eat taro...
FIGURE 8.17. Village terrace system. There were over one hundred pondfields in the actively irrigated section of laua during 1992.
from the terraces (*dalo ni laua*). All of the *kai Ravitaki* who live elsewhere and return to the village to be with their relations at this time expect this, and look forward to the big Christmas feast. In addition to social ecology, other motives relate to drought and cyclone hazard. Taro planted at the beginning of the year will have grown sufficiently robust to withstand possible drought conditions during the winter months of August and September, when there may not be enough water from the spring or the creek to fully irrigate the terraces. Furthermore, taro planted before March will have attained optimum tuber development by the onset of cyclone season in November. Even if a major cyclone should strike, villagers are still able to salvage a reasonable harvest from the damaged gardens. Based on her fieldwork in Samoa, Paulson (1993) recently discussed the value of traditional cultivation methods for root crops in the Pacific as a cyclone hazard mitigation measure. Finally, a taro harvest beginning in December fits into the traditional agricultural calendar, which was based on yam cultivation, and thus balances the availability of food resources. Hocart (1929:107) explained how taro maturing in November and December is needed due to yam storage in those months, and noted “there is no special season for planting taro, although certain times seem to be more productive than others.”

Prior to planting, the villagers must prepare the terraces within the designated section of the system to be irrigated that season. They first cut and clear all the weeds from the previously fallowed garden areas (Fig. 8.18). Terrace walls (*taratete*) are repaired and rebuilt as necessary. The men then till the soil, a process known as *tautauvata* — leveling the planting surface and removing all traces of old roots and other vegetative matter. They use metal spades now, but in the old days used a wooden tool.
FIGURE 8.18. Terrace being prepared for planting. Clearing vegetation from fallowed *laua* is the first step in preparation for planting and irrigating.
The *doko*, a dibble, or digging stick, was the all-purpose “traditional agricultural implement of the Melanesians” (Barrau 1958:9). It was a fire-hardened length of wood, carved into a pointed and flattened blade at the end. Regarding the “very clever agriculturalists” of Fiji, Scholes (1882:34) remarked that “instead of a spade they have a stick thicker than a broom handle, and pointed at the end.” An early photograph taken by A.M. Hocart illustrates a Fijian brandishing a typical *doko* (Fig. 8.19). Hocart (1929:103) found this implement to be particularly well suited to the dryland cultivation of yams, and discounted earlier comments by Basil Thomson: “Thomson says it ‘does little credit to the inventive powers of the Fijians’ ... I have experience of yam planting and can say that the digging stick is far better adapted to yam planting than a spade.” Cranstone (1961:74) told how teamwork was often involved when using the *doko*: “in Fiji a group of men standing in a circle thrust their sticks into the soil and lever up a large clod, which is then broken up.” Adams (1890:22) commented that “Fijian skill in using [the *doko*] has led some of the white residents to pronounce it a rival of the plow.” In neighboring island groups, such as Vanuatu, the digging stick is “still widely used” (Weightman 1989:50), but in Fiji, it began to be replaced during the last century: “while the digging stick is still in general use, there are in addition, spades and long grass knives in most native gardens” (Britton 1884:51). Some areas within Fiji persisted in their use of this traditional implement, as related by Raven-Hart (1956:112) for the far western Yasawas: “no spades were seen, and the wooden digging stick is still in use, generally of mangrove-wood about 8 feet long by 4 inches in diameter, pointed but with one side of the point flattened, to the shape of a quill tooth-pick.” At Ravitaki, villagers reported they once used several types of *doko*, with a smaller one designed specifically for the uprooting of tubers at harvest.
There are several terms for tilling, depending on the condition of the soil and the action of the spade. Turning the soil, or mud, in a wetland garden is known generally as drawe, and entails simply turning the earth over. If the soil is very wet, or soft, then an action known as voce must be used, whereby the spade is handled with a turning or twisting movement similar to that used for paddling a canoe. As the men work the garden soil, they also rebuild the taratete — the wall or bund of each terrace, carefully shaping it by hand and adding successive layers of mud to strengthen it. They take great pride in this particular aspect of the process, and the resultant earthworks approach artistic sculptures (Fig. 8.20). These operations begin at the top of the section and work in sequence down the slope. The canal leading to the reactivated section of laua is also cleaned at this time, and water is now delivered to the top terrace.

As water pours into each newly prepared garden area, the men stomp around in the mud and also bend over and knead the ground with their hands, mixing the earth and water together in a process known as malimali. This ensures the planting medium will have the proper consistency for setting the taro cuttings (suli). Water is let into each laua by cutting a narrow slot in the wall of the terrace immediately above. The same term is applied to these small canals linking the gardens as to the larger aqueducts — na ivakata. In order to provide an even flow of water throughout the entire system, several of these ivakata may be created for each of the larger pondfields. The men simply chop a vertical channel at evenly spaced intervals in the taratete of the upper terrace. Often several smaller gardens will spill their water into one larger terrace below; inversely, a set of smaller laua may all have intakes originating from a single larger garden situated above. Many terraces will have two intakes and two outlets (see Fig. 8.16).
FIGURE 8.20. Constructing terrace wall. The taratete is carefully shaped by hand using successive layers of mud.
Since all the laua are nearly adjacent, and the difference in level between terraces typically does not exceed a meter, the velocity of flow does not present problems. Where erosion is anticipated, a rock may be placed in the lower garden at the point where water splashes into it; sticks resembling a cricket wicket are sometimes inserted within the ivakata to slow the flow of water (Fig. 8.21). If any seepage is detected in the terrace wall, the men plug these leaks using a mixture of mud and the leaves of the ivi tree (*Inocarpus edulis*), which are resistant to rot.

Planting typically is a communal activity. Although each laua is assigned to an individual, the villagers cooperate and band together in a mutually reciprocative effort. Not only does this ease the burden of what might otherwise be a monotonous chore, it livens up the procedure through abundant bantering and joking on the part of the participants. Following *malimali*, one man brings fresh suli, taken from dryland taro gardens and usually carried in woven baskets, to the plot that has been readied for planting. Several men holding shovels stand in the supersaturated soil. They catch the taro cuttings that are tossed to them from the perimeter of the pondfield. These men dig into the base mud and set the stalks at regularly spaced intervals, typically 70 - 80 cm apart (Fig. 8.22).

There is no specific wetland variety of taro, just as there is no specific dryland type. The variety most often grown in the laua is known as vavai, which has a deep purple corm, and has been long recommended as a cultivar that does well in pondfields (Harwood 1938). But other types are planted as well. On the northeast coast of Viti Levu, Lasaqa (1963: 52) counted “about 20” varieties of taro, with the most common being Samoa, which “does equally well on dry and wetland plots.” He stipulated that vavai was “usually grown
FIGURE 8.21. Water control structure. Agricultural extension agent Waisale Ratudina inspects sticks resembling a cricket wicket installed in the channel between terraces to slow the force of water. Note rock placed in lower pondfield to prevent scouring.
FIGURE 8.22. Taro in newly planted laua.
for home use and particularly for the preparation of the Fijian pudding vakalolo, a role which has been superseded by breadfruit" (Lasaqa 1963: 52).

At Ravitaki, it is a practice to alternate suki from wet to dry, and vice versa. In other words, cuttings taken from a dryland garden will be used as planting material in the laua, and tops removed from a harvested laua will then be used to plant a non irrigated garden. The villagers told me they do this because they believe it strengthens the taro and renders it more resistant to disease. Sahlins (1962:41) noted an identical procedure on Moala, and Spriggs (1981a) reported the same practice on Aneityum, in Vanuatu. Such transplantation tactics have been seen operating at a wider scale as well. Ward (1982:15), citing the early research of Horne (1881) in Fiji, reported “the exchange of taro tops between districts as this gave better crops than if people kept planting the same kind.”

Only men work in the irrigated taro terraces at Ravitaki. While many gardening tasks, such as planting and weeding cassava or dryland taro, are accomplished by both men and women, all of the work in the village laua is performed by men. Quain (1948:139) noted a similar division of labor for wetland taro production in western Vanua Levu, where he found that “the maintenance as well as the building of ponds and canals is the work of men.” At Ravitaki, although it is not tabu for women to visit the irrigated gardens, traditionally they do not work there. But women do participate in the process. As the planting of the terraces nears completion, the women prepare for a cere — a festive race held along the beach in front of the village. Prizes are offered to the best runners and a general gala atmosphere prevails. Hocart (1929:102) reported an identical custom from Lakeba during the yam planting season: “women got together manufactured articles for a race ... the digging party ran a race for the gifts.”
Young boys learn early the tasks associated with terrace construction and maintenance, and the care and attention that irrigated taro requires. Children go up to the laua with their fathers at a young age and learn by doing. Some have their own garden by the age of nine. Thus, not only do these budding horticulturists acquire the skills necessary to design and build all of the components of the laua system, they come to appreciate the advantages and rewards of communal organization. At the same time, they are also able to realize the pride and responsibility that results from tending their own taro crop. This direct transfer of cultural-ecological knowledge undoubtedly carries on a tradition of using the same long-established techniques. During the narration of the video documentary, Anare Coka Delaivuna repeatedly stressed that both the method and design used in constructing and maintaining the laua were neimani qase mai liu mai liu, "passed down to us from the ancestors."

Several times a season, the village men undertake a weeding of the gardens. This operation — called yakumata — is a one day event that takes place every third month or so. It is announced by the chief on the advice of the men who periodically work in the gardens and observe their condition. During a yakumata, men work together and weed all the terraces in sequence, starting at the top of the system and working their way down. They step into the flooded pondfields and pull out the weeds, throwing them on to the banks and terrace walls to dry and decompose (Fig. 8.23). All the laua must be weeded in a single day, to allow the silty water to pass through the entire system at once. If weeding were done on an individual basis, lower gardens would suffer the effects of excessive sedimentation.

The taro in the village laua are expressly reserved for harvest at Christmas time. If a household requires some taro from these gardens prior
FIGURE 8.23. Communal weeding of the gardens (yakumata).
to the communal harvest, the steward of the plot must first seek permission (vakacawa) from the chief. The taro is meant to be harvested for the Christmas feast, when relatives living in other parts of Fiji return to Ravitaki to spend time with their families. Everyone looks forward to eating this special food at this time, particularly those kai Ravitaki who dwell in Suva and do not often get the chance to taste irrigated taro. Taro grown in irrigated pondfields tastes different from that grown on dry soil. It is richer, more glutinous, and with a finer texture. People seem to prefer the taste of wetland taro. As Quain (1948:132) pointed out for the inverse on Vanua Levu, "most kinds of taro may be grown in dry gardens, but ... the flavor and texture suffer." Ward (1965:288) also noted a taste preference for irrigated taro on Vanua Levu.

Of course not all the corms are pulled up for the Christmas feast. But the December harvest signals an end to the restrictions imposed on taking taro from the village system. After this initial ceremonial yield, people are free to remove taro from their individual gardens as needed. The taro may be left in a pondfield for many months and still retain its flavor and vitality. Thus, the laua act as a form of storage for an otherwise easily decayed food item, and this is another of its advantages over dryland taro cultivation.

Centrally located amidst the four sections of the village laua system is a place of worship known as na sava tabu (Fig. 8.24). It is in fact an agricultural shrine where offerings have been made in the past to propitiate the deities during times of drought or when the flow of water from the spring (na vurevure ni vanua) became too meager to fully irrigate the gardens. It consists of an altar built from a pile of rocks upon which sits a more or less rectangular stone slab. A number of weathered conch shells (davui) are arranged atop the altar. These were once used to summon the
FIGURE 8.24. Na sava tabu, Ravitaki. An agricultural shrine centrally located in the irrigated terrace complex. Note conch shells (davui) once used to convoke services.
convocation whenever ceremonies were necessary. On the ground, organized in two lines extending outward from the altar, are a series of flat stones. This is where the village headmen gathered to participate in the service.

Brush (1988:121) wrote that “canal maintenance and water division involve the most sophisticated organizational structure found in traditional agriculture, and they are often ritualized.” There are intriguing parallels for the locational juxtaposition of religion and irrigation from places as distant as Hawaii and Indonesia. Of course, while these two regions may be geographically far apart, culturally they share ancient affinities with each other and with Fiji that could shed light on the shrine at Ravitaki. In their recently published tour de force on Anahulu, a valley on the island of O'ahu, Kirch and Sahlins (1992, vol.2:16) presented a pair of maps depicting the spatial correspondence between major temple sites (heiaus) and irrigated agricultural areas where a surplus could be generated for ruling chiefs. On Bali, Lansing (1991) conducted a study of the relationship between water temples and irrigation management in a landscape of rice terraces. He found that rituals are an important part of agricultural production: “Agriculture, in short, is a social as well as a technical process, which is structured by the sequence of agricultural rites” (1991:6). Probing this structure, Lansing discovered 3 layers of temples (in descending order of scale): regional, large canal, and subak (“a block of irrigated terraces with a common water source”); and below that hierarchy of temples, three or more layers of shrines: weir, spring, and the point where water enters the first terrace (1991:54). In these cases perhaps the sacred and the profane, or at least the mundane, truly merge.
In Fiji, there was sometimes but a thin line between the exercise of religious rites and the practice of sorcery known as *vaka draunikau taka* ("to effect with leaves"). Seeman (1862:188) told of a person known as the "clerk of the weather", who "professed to exercise a direct meteorological influence, and said that by burning certain leaves and offering prayers ... he could make the sun shine or rain come down." The people of Ravitaki, as in most areas of Fiji, are staunch Wesleyan Methodists. In the village of Namanusa they are busy erecting a new church building that will be the largest in the district. But the old beliefs may still simmer beneath the surface, especially out in the gardens, and, perhaps specifically, here among the irrigated *laua*, the design and functioning of which has been passed down from the ancestors. There are hints of this in the cleanliness and order of the shrine at *na sava*.

Cato (1947:146) has given us a glimpse of the possibilities of old religious expressions persisting within the established Methodist structure on this, perhaps the most traditional of all Fijian islands. At an undisclosed village along *naceva* (Kadavu's south coast), Cato learned of a religious order founded by a *vuniwai vakavitki*, or medicine man. This medicine man and self-proclaimed prophet had built a church compound out of traditional materials, which was located in a more prominent position within the village than the "dilapidated and unpainted Methodist church." He was also elected to be the *turaga ni koro*, the local administrative official of the village. A comparative ethnographic report from the Lau islands of eastern Fiji may serve to encapsulate the situation here at Ravitaki: "For some time the ancestral gods were eclipsed by the Christian god who, because of the white man's power, appeared to have more mana. But the old gods were still feared..."
and secretly propitiated, and the natives were tormented by a conflict of loyalties" (Thompson 1938:194).

**Mataqali systems**

In addition to the communal village system of laua, there are numerous smaller versions scattered about the village lands. They are constructed wherever an appropriate water source can be coaxed into providing a steady reliable flow. As may be expected, many of these locations have also been used for several generations, and can be identified with names. These systems typically comprise just a handful of pondfields, usually between five and ten gardens, often in linear array (Fig. 8.25).

Unlike the village system, these smaller laua are owned and operated by the individual mataqalis. The members of the mataqali will establish the right to use the irrigated areas in the same way that a household or itokatoka comes each year to garden the same area of dry ground. As long as the family continues to benefit from the land, nobody else will ask to garden there. If a household in the same mataqali notices that a piece of agricultural land is not being utilized, they may petition the head of the mataqali for the right to use it. Sometimes, it even happens that a household may ask to farm land that belongs to a different mataqali. Of course, the irrigated terraces owned by the various mataqali are highly coveted, and once a family has established the right to use these laua, they will not lightly abandon it.

**Discussion**

Ultimately, we must ask two questions: 1) why did irrigated terracing develop on Kadavu in the first place?; and 2) why do these systems persist in some places on the island, when they lie neglected and abandoned in others? The answers may be generally applicable to the questions of agricultural
FIGURE 8.25. Small terrace system under mataqali ownership. Josaia Naisoro stands beside one of the terraces that are built along streams throughout the Ravitaki vanua.
intensification and disintensification elsewhere in Fiji, and indeed, the rest of the Pacific.

Irrigation technology was part of the cultural baggage on board the canoes that brought people to Kadavu from Viti Levu. These new settlers continued to build irrigation systems because the relative isolation of the island prevented opportunities for the exchange of food items with other areas, and hence specialization. Irrigated taro production was one component of a diversified agricultural base. Unlike other areas, the people on Kadavu found it necessary to fully exploit every gardening strategy available to them. It was noted in Chapter 6, for example, that the island of Koro was widely known as a great yam producer. This was a consequence of its central location within the Lomaiviti group and the accessibility to trade networks among neighboring islands and on Vanua Levu and eastern Viti Levu. Interestingly, I found evidence for only one small irrigation system on Koro. Those islanders did not need to diversify. The people of Kadavu, however, were required to achieve a measure of self-sufficiency. What Kadavu did specialize in was the building of canoes and sail mats. This represented an attempt to overcome its peripheral position, and was probably stimulated by the long period of interaction with Tonga.

The topography of Kadavu, although mountainous, is not sufficiently elevated to cause marked differences in precipitation. While there may be small micro-climatic increases in precipitation near the top of the ridges due to orographic tickling of clouds, there is no clear rain shadow on the leeward side of the island. There is no greater need for irrigation along natokelau than along naceva. This is apparent from the distribution of irrigated terracing on the island (see Fig. 8.7). There is evidence of just as much, if not more, irrigation occurring on the windward coasts. Unlike the situation
evident on Viti Levu, irrigated terracing on Kadavu developed not primarily as an adaptation to environment, but more as a definite expression of culture. This is not to say that irrigated terraces have no environmental advantages, however. People have invested time and labor in terrace construction and maintenance with a clear notion of overcoming natural hazards and increasing productivity. Villagers at Ravitaki cite the ability to overcome potential drought and damage from cyclones. Taro yields are higher. Storage capacity is enhanced. But the human factors — communal labor organization, preferred taste, and above all, the Christmas feast — seem to be more significant incentives. The distribution map also provides an important clue concerning this ultimate cause of irrigation development. There is an intriguing concentration of terracing in western Kadavu and along the eastern shores of Soso Bay. This points to terracing being favored by particular groups of people who settled in those areas.

Agricultural terracing has persisted on Kadavu because of the island's noted adherence to traditional Fijian culture, and because of its entrenched position on the periphery of the modern Fijian space-economy (see Sofer 1988). Kadavu never participated in the political intrigues of the larger matanitu. It exhibited independence both in its external relations and internal development. Only during the nineteenth century did the greater polities within Fiji pay any attention to their remote southern neighbor. Rewa only sought to play the victor here when its power base was being eroded elsewhere. Bau did not so much subjugate as placate. The organization of discrete and equally ranked vanua on Kadavu still resembles the big-man structure that was common in Melanesia prior to the evolution of chieftainship. The Polynesian style elaboration toward statehood did not happen here (see Sahlins 1972:135-48).
European transformation of Kadavuan landscapes never took place. There was no sandalwood to exploit. When bèche-de-mer ships did call they were typically met with subterfuge and violence. The whalers found Kadavu hospitable only because they were ephemeral visitors and simply wanted to trade for their own necessities. They were not taking anything away from the island, and villages around Tavuki Bay dealt with them on Fijian terms. During the 1860s, with the onset of the European planter invasion, Kadavu was initially favored for its fertility and reputation as an agricultural place. Early settlers tried cotton but these embryonic attempts at establishing a plantation economy failed. Chiefs on Kadavu did not want the settlers there to begin with, local people refused to work for them, and the volatile and evanescent global marketplace eventually delivered the coup de grâce.

When the transpacific mail steamers were calling at Galoa, it looked as though Kadavu might begin to interact with the world at large. But this period was so brief it did not even spur the development of a town. The crew from H.M.S. Challenger universally complained of poor roads and lack of shore amenities. Suva became Fiji's primate city, leaving Kadavu to fend for itself, but without the advantages of the chiefly connections and missionary influence that helped bring the equally peripheral Lau Group into the big picture. That traditional agricultural technologies such as irrigated terracing should persist under these conditions ought to come as no surprise.

In one sense, irrigated taro terracing may continue to exist on Kadavu because villages there are prevented from entering the World System due to isolation and lack of export commodities that can be marketed on a large scale. The development of copra never did amount to much, either on the private plantations or in government sponsored projects. The exports from Kadavu that have succeeded are strictly for the support and perpetuation of
customary lifeways. Even today, two of the most important exports are **voivoi** and **yaqona**, both of which are emblematic of traditional Fijian culture.

The one export of any use to the modern capitalist economy is labor. Labor movement from the periphery to the core is “a typical response to the pattern of uneven capitalist development” (Sofer 1992:119). Kadavu thus exhibits characteristics of a MIRAB economy, relying on “migration, remittances, aid, and bureaucracy” (Bertram and Watters 1985). Sofer (1992:126) provided evidence that “there is clear movement from the Kadavu villages in the form of permanent and circular mobility, mainly towards the core of Fiji’s economic space - the Suva area.” But we have also witnessed **kai Kadavu** seeking wage employment in New Zealand (Levick and Bedford 1988). Such labor migration and circular mobility tends to support the spatial structure of uneven development, ensuring Kadavu remains an economic backwater. Bayliss-Smith, et al. (1988:8) concluded that survival of a ‘Fijian way of life’ in the outer islands is something of a **faute de mieux**, the product of an externally imposed political economy more than of conscious resistance.” Sofer (1988:67) determined that “the ideology of Fijian rural society persists and the benefits contained in its existence are championed by the chiefly class ... to encourage Fijians to stay on their land in the periphery, the state has been allocating resources to improve the level of services and the welfare of the inhabitants.”

As to why irrigation has been neglected in some areas of the island, while remaining vibrant in others, cannot be explained by the data presented here. Comparative analysis of places on Kadavu where abandoned terraces are evident, using the methods of landscape archaeology and historical geography as outlined in the previous case study of Nakauvadra, may help to answer this question. I suspect it has more to do with social and
political ecology than with environmental determinism. Based on fieldwork, both Sofer (1985b, 1988) and Ratuvakacereivalu (1992) have provided valuable studies of semi-subsistence agricultural activities on Kadavu, though neither addressed the issue of disintensification and decline of irrigated taro production. Ironically, their data derives from locations — Talaulia, Tawava, and Nalotu; and Nasegai, respectively — where terracing was once a productive sector in the subsistence landscape. Unfortunately I was unable to conduct research at Soso and Tioma, so these conclusionary statements are based solely on conditions at Ravitaki. Nevertheless, they may have broader applicability, at least on this one island.

At Ravitaki, the techniques for building and maintaining the *laua* were "learned from the ancestors." As noted above, this was emphasized during the narration of the video documentary. It indicates the traditional nature of the design and construction methods for irrigated terraces. Custom also holds that taro from the *laua* is a ceremonial food. The Christmas feast featuring *dalo ni laua* is a pivotal event in the social calendar at Ravitaki. Relatives reunite at that time, and look forward to consuming this special food, an even more authentic *kakana dina* than non-irrigated root crops.

Irrigated terracing contributes to social solidarity in other ways, too. The communal work required for terrace creation and maintenance is an example of what Lansing (1991:128) has termed "hydraulic solidarity". Based on his research in Bali, (Lansing 1991:130) reached the following conclusion: "in the long run it is the social relationships constructed by water temples, not the mechanics of water flow, that create and sustain the terrace ecosystem." The persistence of terracing at Ravitaki could derive from a similar rationale.
CHAPTER 9
SUMMARY AND CONCLUSION

This concluding chapter encapsulates the evidence presented above and discusses the place of agricultural terracing in Fijian land and life. I review the design of the variety of these earthworks that evolved in Fiji, and suggest what may be cultural influences based on comparisons with systems elsewhere in the Pacific. I briefly summarize the environmental context that worked in concert with culture to enable the development of this particular expression of agricultural intensification. I then outline the factors which contributed to the decline of these intensively cultivated landscapes. Finally, I account for the deviation from the normal pattern of disintensification, which allows agricultural terracing to persist in the Fiji Islands, and then offer a brief set of conclusions.

Design

Terracing is an expression of culture as much as it is a response to environmental conditions. Indigenous adaptations stem from a base of shared knowledge. We may view agricultural terracing as an artifact accessible to comparative analysis in the same manner as pottery, music, canoes, or any other documented culture trait. As Jane Allen (1991:121) noted, terraces represent “craft specialization.” This conjures up the potential for aesthetic justification for irrigated terrace construction and maintenance. Further research in this direction may one day discover a general “law of terracing” (Richardson 1993).

As part of their attempt to understand terrace morphogenesis, several recent studies of these landforms in Latin America have stressed the “incremental”, almost accidental nature of terrace development (Treacy 1989, Doolittle 1990b, Williams 1990). Theoretically this may have been
possible for the very earliest experiments in emulating fallen trees across a slope, for example, as Williams (1928) noted for Papua New Guinea. But once the conceptual breakthrough was made terracing became a culture trait. This knowledge must have proven itself a valuable possession as people moved into new environments, or rendered their own difficult to work because of maladaptation and subsequent degradation. Review of the soil stratigraphy from the Nakauvadra excavations confirms the intentional methods used to construct both hillside and streamside gardens. The trench across the upper Matanivanua set of hillside gardens revealed a systematic and ordered manner of cutting into the backslope, scraping extraneous material outward and downslope to form the fill, and forming the lip or bund at the outer edge of the cultivation platform. Likewise, soil layers within the Rukuruku streamside terrace evince a deliberate and premeditated formula for raising this garden above the flood level of the stream by laying down a substantial subterranean foundation of stonework, and possibly bringing in fill material from elsewhere to achieve a stable and secure planting surface.

In reviewing the various types and forms of terracing found in Fiji, it can be seen that some were distinctive and carefully sculpted designs, as if following a pattern, while others seemed to be of generic shape and size, built to fit available space. Most of the streamside terracing, for example, was constructed to take advantage of the pockets of relatively level terrain along alluvial borders. Contoured hillside forms were more of a type, especially in the past. The abandoned tuatua at Nakauvadra, for example, display more evidence of having followed a set pattern than do the loosely arrayed yet equally effective iauea at Ravitaki.

Despite a warning that such comparisons are of dubious value and tend to suggest "a false sense of culture historical connections" (Spriggs 1993), I
present the following observations. The extensive flights of contour terraces at Nakauvadra seem to resemble the *tarodières* of New Caledonia more than any other terrace form found in the Pacific. Because I have not visited New Caledonia, these comparative comments are undeniably flawed from lack of direct inspection of Kanak systems. They are based on accounts I have read and the diagrams and photographs I have viewed (Barrau 1956a; Doumenge 1975; Spriggs 1981a), and I hereby offer them more as tantalizing possibilities than avowed conclusions. But the probability certainly exists that terrace forms in New Caledonia and Fiji derive from common origins and a long history of cultural interaction. Lapita occupation of sites from both locations was roughly contemporaneous, and Irwin (1992) has indicated the ease with which early navigators might have made landfall in either direction. Striking similarities between Fijian and New Caledonian musical structure, canoe design, and ceramic styles have already been noted.

The smaller streamside gardens were more likely general adaptations to local conditions. Even so, affinities with Polynesian terrace forms are apparent in the careful use of stone in making rock walls or bund facing. In some cases, areal dimensions along with wall height were very similar among widely distant terrace complexes. I remember coming upon one set of three rock-walled gardens behind a large *baka* tree along upper Rukuruku Creek. These terraces once would have been irrigated by the runoff from a spring situated above the topmost platform. I was struck by an immediate recognition of a nearly identical set of rock-walled gardens that I had previously encountered among the terraces comprising one of Earle's (1978) study areas on the north shore of Kaua'i.

Thus, resemblances among Pacific island terrace forms could very well represent attributes of a shared culture, however many years,
generations, or eras separate the local expressions from their common origin. It seems likely that the Lapita cultural complex could in fact be the “stone-using immigrants” described by Riesenfeld (1950:665) as being “light-skinned, wavy or straight-haired, mongoloid people” who “invaded” Melanesia, and who manifest associations with canoe-building, pottery, house mounds, irrigated taro terracing, and the husbandry of other subsistence items such as the pig and the coconut (1950:664). Not limiting his assessment of construction techniques used by these people to stone-faced terraces, Riesenfeld (1950:666) offered an additional valuable notion: “Besides the stonework rendered necessary to this system of agriculture, the very complicated works of earth shifting connected with it are a characteristic feature of these stone-using immigrants.” But it did not have to be a cohesive cultural migration that engendered such similar forms of terracing among the islands of the western Pacific. Diffusion of a culture trait can just as rapidly occur through interaction of different social groups, learning from each other and applying newly acquired skills to home turf.

Development

The development of agricultural terracing in Fiji was probably the result of a combination of this common cultural heritage acting in concert with the need to ensure adequate Colocasia yields in areas exhibiting seasonal soil moisture deficits. Cartographic data presented in Chapter 6 clearly show the remarkable covariation between precipitation patterns and terrace distribution. Environmental stress caused by landscape degradation in these leeward dry zones may have reinforced and precipitated the necessity for applying irrigation to taro gardens. Exceptions to the coincident pattern, as encountered in the scattered occurrences of irrigated terraces on windward Viti Levu or on Kadavu, may be accounted for by remembering that
terracing is an acquired trait. But there is no need to stress cultural migration in explaining this pattern, even though Riesenfeld (1950:638) held that "Nakauvadra [is the] place we have seen to be the very centre of the stone-using immigrants." As noted above, diffusion of culture traits can occur without migration. An equally powerful causal determinant for agricultural terracing in Fiji was the hostile social environment that seemed to be ubiquitous prior to European arrivals and widespread religious conversion. The traditional state of war forced settlement patterns toward a condition of isolation and territorial circumscription, inverting Carneiro's (1970) idealized mechanism of socio-spatial evolution proceeding the other direction.

One conclusion this research studiously avoids is a pronouncement of population levels derived from the subsistence needs that could have been met by the intensive agricultural methods under scrutiny here. There are too many untenable assumptions inherent in even suggesting estimates. Of major concern is the proportion of fallow and active gardens in any given terrace system. Parsons and Denevan (1967:100) warned of this in their study of raised fields in South America: "Estimates of population density based on the extent of the ridged fields, however, are risky. For one thing, we do not know what fraction of the fields in a given area were under cultivation at any one time." This caution can operate at several time scales. It can apply first of all to apparent field systems whose individual components may have been constructed and used sequentially over a long period of time, perhaps several generations or longer. Terraces in one area, for example, may be abandoned because of declining yields or a change in the hydrologic conditions of the water source, while terraces in adjacent areas may then be constructed. Without precise dating and chronological control, we could end
up erroneously assuming that a large area of terraces was operating as a single system. Second, even if all the garden plots were contemporaneous, i.e., they were all built and designed to be used within a certain limited time period, say, a generation, the seasonal functioning of the system may well have called for only a certain percentage of the gardens being put into production. We have witnessed, in the Kadavu case study, a situation where only 50% of the terraced system is under cultivation during any given year, and of that, only half again would have the elevated yields afforded by the application of irrigation. Brookfield and Hart (1971:115) told of the same situation on New Caledonia, where “only a third or a quarter of the terraces were in use in any one year.”

Another unknown is the relative proportions of intensive and extensive (dryland) cultivation techniques in the overall agrosystem. We have seen how irrigated taro is but one component part of the whole array of gardening strategies. What’s more, some irrigation methods would not leave a mark in the landscape. Spriggs (1982b:10) points out that “simpler irrigation practices such as planting along the sides of or in the beds of streams would of course be archaeologically invisible. Thus a suite of irrigation techniques, capable of producing substantial yields, may leave no archaeological trace at all.”

Beyond these simple arithmetic caveats, we also need to allow for the notion that much of the taro grown in terraces may have been earmarked for tributary or ceremonial requirements. Brookfield (1972a) has stressed the need to consider social production in any cultural-ecological algebra. Spriggs (1993) cautioned that particular attention should be given to “ritual and social demands” as important elements in the search for the causes of intensification and, specifically, irrigated terrace development. And Kirch
(1977:272) stated that “we need to revise our theory of production so that it takes into account the general pressure of needs rather than being restricted to a population-based, calorific-obsessed theory.” He concluded that “the relation of production to the needs of entire social systems (including items such as prestation and ritual, and not merely subsistence) is significant.” In her case study from Oahu, Allen (1991:121) provided field data for such a theoretical revision, and emphasized that the irrigated terraces there “functioned within a complex cultural system that eventually required the production of large quantities of foodstuffs for purposes well beyond simple subsistence.”

While investigating the mythical terrain of Nakauvadra, I was working under the hypothesis that the Matanivanua area quite possibly contained a certain mana, or special power, religious or otherwise, that was respected by the early inhabitants, due to its location along the flanks of these sacred mountains. I considered the possibility that taro grown there perhaps might itself be injected with such mana, and presented this idea in a report on my preliminary research findings (Kuhlken 1992). Following further reflection on this matter, I believe that this is probably not entirely the case. Taro, as we have seen, carries special meaning in Fijian ceremony, and was often a component of tributary presentations. Although yams were the usual and necessary ingredient for the isevu, or first fruits ceremony, the position of taro was decidedly “higher”. As Hocart (1929:106) pointed out on Lakeba, “taro is not planted on so large a scale as yams, but is more esteemed.” Turner (1984:134) stated that taro is “an important item of ritual exchange, and it has sacred connotations.” But there is nothing to indicate, beyond the one example of the oracular tuber at Rewa, that taro could be infused with supernatural power.
Why should taro receive such great care and attention in its cultivation? We know from Chapter 8 that taro, especially irrigated taro, is considered a special food for traditional feasting, a food shared on the occasion of families coming together. When the kai Ravitaki living in other areas of Fiji return to Kadavu at Christmas, they partake in what amounts to a communion feast. The gathering at Christmas merely represents a Christian substitution for traditional feast occasions. Of course yaqona has retained its place as the prototypical Fijian communal sacrament, with all the attendant ritual and protocol associated with its formal consumption (see Lester 1941; Toren 1991:275). But taro, combining the properties of ceremonial offering with sustenance, is the quintessential kakana dina — “true food.”

At Nakauvadra, the importance of taro is evident in the cooperative endeavor that these carefully terraced gardens represented. All of the villages along the mountain shared in the construction and maintenance of the tuatua at Matanivanua-Naikoro, fashioning these systems into a communal project on a scale not often encountered in Fiji. To be sure, of all the streams tumbling off the escarpment, Matanivanua Creek maintained the most reliable flow of water. But, as Lansing (1991) found on Bali, it was more than flow of water that kept these systems going. I am reminded of the suggestion made by Mathewson (1985:840), who wrote that “we must not divorce the realm of the sacred from our considerations of what made mundane farmers move so much earth, in such intricate patterns.”

The name matanivanua, in addition to the vernacular label for “chief’s herald”, can literally be translated “face of the land”. Hocart (1952:23), in discussing the meanings for mata, wrote that “a face is a sacred spot, a grave, a temple.” When applied specifically to vanua — the land — it takes on additional significance as “opening up of the land”, or “the coming
out place of the god of the land”, hence hallowed ground or sacred space:

“Face of the land’ (mata ni vanua) means the landing place (matavura) of
the gods (vuvu), their entrance, where the gods come up” (Hocart 1952:163).
I would conclude, therefore, that the Matanivanua watershed — the physical
place where most of the Nakauvadra gardens were constructed — did indeed
possess a particular significance. The terraces were constructed and
maintained in some measure because the people of Nakauvadra wished to
grow kakana dina in sacred space. It was a conscious embracing of
traditional Fijian culture that was only abandoned after contact with
competitive European lifeways.

At Nakauvadra, I have raised the possibility that the irrigated terrace
systems may have been incorporated within the tributary network that
extended outwards from centralized power centers. How likely is it that
Nakauvadra was located inside the “tributeshed” of powerful chiefdoms? It
has already been established that Verata probably did not find it necessary to
exact tribute from Ra, at least in the form of ceremonial food items or
property. The demands of Bau certainly reached the coastal areas of Ra, even
if a few places such as Navatu clung to autonomy. Bau’s canoes often sailed
along the north coast, seeking tribute or simply posturing. Ma’afu’s
installation of Tongan warriors at Rakiraki is significant in that it was led by
Tui Bua, under Ma’afu’s authority to be sure, but also perhaps in deference to
old tributary ties.

The fact that sandalwood and bèche-de-mer vessels were able to
procure yams and pigs, specifically along the northern Ra coast, is another
indication of the relationship between this peripheral area and the centers
of power. These ships could only operate in Fijian waters and take on cargo
from the shore with the compensated permission of the ruling chiefs.
Furthermore, the reputation of Ra men as laborers on the early European plantations points to an established subservient order of relations, whereby Ra labor was ultimately at the beck and call of the elite along Viti Levu’s eastern shore. This relationship was depicted in a nineteenth century account by Litton Forbes (1875:82-83), who described one way to discipline Ra laborers on Taveuni plantations:

There is, fortunately, however, one method by which these Fijians may be kept somewhat in order. Their country is nominally subject to Cakobau, and they are therefore to a certain extent vassals of Bau. Hence the word of a Bau chief according to his rank generally carries more or less authority with it. Such a chief used to be found ever present in the person of ratu Johnny [Madraiwiwi], who used regularly to visit those plantations in Tavinni [sic] where Ra men were at work. A word from a planter would always procure the presence of this formidable personage. Before him the most loud talking and rebellious Ra man would collapse as quickly and completely as did Thersites before Odysseus.

It is entirely feasible that by the mid-1800s, Bau should have been receiving tribute from most of the Rakiraki area, and the gardens at Nakauvadra may have been constructed to supply the taro for these offerings.

Prior to the ascendancy of Bau, Verata especially would have looked back to Nakauvadra, venerated place of their kalouvu, and the ritual demands of tribute and traditional exchange would have followed naturally along the lines of ancestor and myth. Thus, a more likely reinforcement for the Nakauvadra terrace systems has to do with the religious geography of the mountain. The summit of Uluda is the terminus for at least three known sala ni yalo (“spirit paths”), including the Tualeita, which traverses Viti Levu eastward from Vuda. Brewster (1922:42) portrayed this trail as “the spiritual road, over which pass the shades of the dead after they have departed this life in the southern and western parts of the island. They go by it to the Holy Land, or Mount Olympus of Fiji, the shrine of the great Ndengei, the creator god.” Another sala ni yalo connects Nakauvadra with Verata. These trails
are no figment of the Fijian collective imagination, for they actually exist and can be followed even today. Mythological terrain has been transformed into physical features of the cultural landscape, which may have acted to stimulate taro production. Although the metaphorical pathways were strictly for the souls of the deceased, many people made pilgrimages along the more tangible routes to the lair of Degei. They still do, if the visit of the national rugby side is any indication.

In the past, offerings of taro were commonly left atop the mountain. We have seen that irrigated taro is held in higher esteem than dryland varieties. The tuatua at Nakauvadra could have functioned much the same as a candle vendor at a Catholic church. Pilgrims arriving at the mountain would most likely have rested at one of the villages along the flanks of the range. A visit to the shrine would require offerings in the form of fresh taro. After the iotu, or conversion of the country to Christianity, this activity naturally would have diminished, possibly contributing to the decline of the irrigated terrace systems. Brewster (1922:269) reached the summit of Uluda on May 3, 1886, and described what he found there:

We at last reached the shrine of Ndengei, which turned out not to be a cavern at all, but the extreme summit of the Kauvandra. This mountain ... is just like a Dartmoor tor with a peak crowned with three huge boulders, two lying together with one on top. There is a slight crevice between the boulders, and the Fijian word for any cavity, whether a huge cavern or a superficial crack, is qara, hence the mistake I and others had fallen into in imagining that the lair of the snake-god was a vast and gloomy cave. The fissure between the boulders faced the north-west, the orthodox point of a thimbathimba or jumping off place for the spirits of the dead. In front of the shrine was a heap of votive offerings, and the ground all around was strewn with them: old spears, clubs, whales' teeth and almost every description of native property, but all mouldering, honeycombed and rotten with age. There were also a few fragments of foreign plates, which pointed somewhat to modern times. But even they seemed to have been offered at some period comparatively remote. Everything presented the appearance of decay and neglect; even the track seemed unfrequented and our guides had to use their knives to clear the way. Evidently the god had fallen into disrepute, and it
was quite evident that no pilgrims with pious gifts, for some considerable time, had disturbed the sleep of the huge serpent that was supposed to slumber there.

When I attained the summit more than a century later, on November 25, 1992, the only clues I could find that this was once a most sacred spot were the few broken fragments of weathered davui shell lying in the shadow of the metal cross.

Decline

Simple depopulation certainly affected the operation of the more labor-intensive forms of cultivation. Evidence for dramatic loss of population from disease is clear and unequivocal, and can be seen from the numerous accounts of empty villages and neglected gardens. For people in a weak or debilitated condition, fields and crops requiring the greatest inputs of labor would be among those initially dismissed. Fewer people, of course, also meant fewer mouths to feed. The lower yields of dryland cultivation may well have been sufficient to sustain the needs of a diminished population. A comparable conclusion was reached by Smith and Schilt (1975:316), following their research on pre-contact agriculture in north Kohala, on the island of Hawai’i: “the change in cultivation in all these valleys was due somewhat to the dropping demand for taro, but was mostly due to the great drop in population since contact.” Elsewhere in the Hawaiian islands, Kirch and Sahlins (1992, vol.2:87) likewise reported similar reasons for the Anahulu valley irrigation system abandonment on O’ahu during the period 1815-1829: “population decline due to foreign diseases ... coupled with the forced extraction of sandalwood.” In this case there is a compound association of depopulation and labor displacement, factors that are also combinant in Fiji.

Other fundamental changes in Fijian land and life are also partly responsible for terrace abandonment. Introduction of new cultigens,
establishment of plantation agriculture, opportunities for wage labor, imposition of colonial authority, and the breakdown of traditional social systems and chiefly control over modes of production are all factors that have contributed. It is a story that is familiar to every student of development — the overlay of colonial structures onto indigenous resource systems. In the case of Fiji, it is a story that is complicated by efforts to at once both transform the economy and stabilize what was perceived to be traditional patterns of land tenure and native authority. Numerous scholars have studied Fijian economic change in relation to subsistence agriculture (Ward 1964a, 1964b, 1965, 1969; Rutz 1976, 1978a, 1978b; Knapman 1976; Nayacakalou 1978; Young 1984; Brookfield 1987; Ravuvu 1988). Harvey (1949) began his paper with the following statement: “The general course of agricultural development in Fiji has probably been little different from that of other tropical islands in which an indigenous population maintained a self-sufficient economy prior to the advent of western culture with its disruptive economic and social pressures.”

Contact with *kai valagi* resulted in the demise of a number of culture traits. During her study of the inhabitants of Lau, Thompson (1938:196) reached the following conclusion: “As they acquired a taste for European trade goods, they began to neglect their other economic pursuits such as fishing, gardening, canoe building, and inter island trade.” Agricultural terracing may be viewed as a manifestation of traditional Fijian culture that diminished along with the decline of many others, including pottery making, canoe building, and constructing traditional thatched bures.

Diet and food preferences also underwent transformation. This definitely contributed to agricultural disintensification, for it was the customary crops (yams and taro) that traditionally received the most lavish
attention. Quain (1948:1) remarked that "the old as well as the young had neglected their gardens to tickle their palates with new foods." Speaking of Pacific islanders in general, Barrau (1958:83) wrote: "Progressively he replaces his traditional diet with a diet of rice, bread, and tinned meat or fish." Thaman (1991:94) called the reliance on imported food in Pacific islands a "second fatal impact." This process has continued to the present. Many a village meal in Fiji these days consists of imported rice and canned corned beef.

Exotic crop introductions emerge as leading candidates in the search for causes behind the dwindling of intensive cultivation practices. Frazer’s research in Ra Province led him to directly implicate a new cultigen as a reason for agricultural disintensification as expressed by irrigated terrace abandonment: "Of these new crops, it appears that at the time the most important and the most quickly disseminated were new types of taro which tolerated dry conditions at least better than those previously in use" (Frazer 1961:166). He was probably referring to the American aroid tannia or cocoyam (Xanthosoma sagittifolium). But this cultigen may not be the culprit everywhere. Lasaqa (1963:53) reported that at Dawasamu-bure, on the northeast coast of Viti Levu, "dalo-ni-tana (Xanthosoma) is not highly regarded by the villagers and it is eaten only when other varieties are not available in large quantities." Brookfield and Hart (1971:121) decided that "reduction in irrigation of Colocasia is partly due to introduction of Xanthosoma, but more to a spread of the food base, so that lower yields of Colocasia can readily be tolerated."

Cassava, also known as tapioca or manioc (Manihot esculenta), can be identified as the prime suspect in the death of intensive agricultural practices in much of Oceania. Calling cassava "the TV dinner of the Pacific,"
Thaman and Thomas (1980:3) concluded that “its ease of cultivation, environmental tolerance and productivity make cassava synonymous with change in much of the tropical world.” Regarding Fiji, Ward (1964b:488) reported that “tapioca increased in importance as yams and irrigated taro declined.” In Ra Province, Frazer (1961:168) noted that “tapioca has supplanted taro and yams in all but a few villages, and even in these there are probably none where it amounts to less than 40 percent of the food roots.” Brookfield and Hart (1971:121) found there was generally a “replacement of yams by manioc in Fiji.” On Tikopia, a Polynesian outlier island within the Solomons, Kirch and Yen (1982:31) noted a similar transformation in the agricultural geography: “The presence of the root-crop complex of Dioscorea yam and Colocasia taro, with the increasing dominance of the American sweet potato (Ipomoea batatas) and — especially in the case of Tikopia — of manioc (Manihot dulcis) in field cultivation, attests a commonality throughout Oceania of an early agricultural baseline and of subsequent crop-plant adoption in historic times.” They reported that Manihot was now “the most important of root crops” on Tikopia (1982:32). Fijians were reluctant, at first, to relinquish their traditional staple tubers, and to some extent may have been coaxed into adopting cassava because of declining soil fertility (Ward 1964b:488). Increasing demands for participation in the World System may have engaged Ziptian dynamics, and the minimal labor expenditures required for its cultivation soon proved to be a powerful incentive for an increasing reliance on cassava.

There can be no doubt that the demands of commercial agrosystems have had a negative impact on traditional horticulture. Ward (1964b:484) felt the “grafting of cash cropping on the subsistence economy ... has become the main factor resulting in accelerated cultural and geographical change.”
Farrell (1972:56) noted that the “emphasis on new cash crops and new eating patterns resulted in the neglect of traditional crops.” In contrast to the self-sufficient, self-contained ‘subsistence affluence’ of traditional, broad-based, polycultural agrosystems, cash cropping can bring about what Grossman (1981) has termed ‘subsistence malaise’. Cash cropping also creates spatial transformations in village agriculture. It requires the use of the best agricultural lands on valley bottoms and lower hillsides. This has displaced food gardens, forcing them out to lands farther from the village, and on to steeper slopes.

The use of land for pasture also displaces food gardens, as Ward (1987:39) has pointed out: “alluvial land close to the village, which was formerly intensively used for root crops, may now be devoted to low intensity grazing. The pasture is often inadequately fenced and thus the risk of cattle damaging food crops leads people to avoid such areas for taro or cassava gardens.” We have seen how the depredations of livestock were responsible for a complete crop change in the productive wetlands beside Dagai in Nabukelevu, Kadavu. I also noted the astonishing lack of even kitchen gardens at Vatukacevaceva, and depicted the one heavily fortified example found there (see Fig. 7.33).

These same forces acting to transform the cultural landscape exerted pressures contributing to the breakdown of traditional social structure in village society. As Marksbury (1975:22) wrote, “with most of the village labor force gone, the village began to decay and many customs fell into disuse. Homes were broken up and gardens were ruined by neglect.” In one passage, Coulter (1967:70) manages to implicate both social reasons and exotic introductions for the lack of adherence to traditional cultivation practices: “In view of the fact that the chiefs have lost much of their old power to
compel the natives to plant sufficient quantities of the proper crops, they tend to raise only those which require the least effort ... raising cassava almost exclusively.”

Deviation

The persistence of irrigated taro cultivation on terraced pondfields in Fiji may be seen as a deviation from the normal path of agricultural disintensification. In the face of overwhelming reasons not to practice such intensive methods, its perpetuation is surprising, though understandable in the context of cultural forces supporting the esteemed position of wetland taro in ceremonial and social gatherings. The careful management and constant monitoring required by irrigated terraces represents an underlying defiance of modernization and industrial efficiency in agriculture. Investment of time and labor is aimed at more than a single growing season. Conscientious attention to cropping limitations and application of alternate-year fallow periods ensures the long-term stability of the agrosystem. On Kadavu, the Ravitaki iaua have been used continuously for generations. Siwatibau (1984:365) found a comparable situation on the next island to the east: “On the island of Matuku, villagers claimed they had grown dalo in the same swampland over many generations without adding fertilizers and without affecting the yield.”

The artistically created earthworks are tactile symbols of harmonious relations with the land — the epitome of cakacaka vakavanua. There is conservation of soil and water, and a balance between human effort and nature's reward. Communal organization guarantees perennial renewal of the planting and harvesting cycle, but also provides social benefits. Working together instills a sense of pride and purpose to the labor, and likewise strengthens village solidarity. Sahlins (1957:462) described a

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feedback loop for this rationale among the villagers on Moala where taro irrigation was practiced: “In Keteira the extended family maintains itself in the face of the encroaching money economy because the traditional land use customs have not been changed.” Peet (1980:113) offered an observation on additional advantages of such social organization: “If the people of peripheral countries like Fiji are to retain what remains of their indigenous cultures, to resist being synthesized into an expanding world cultural system, and to determine their own progress, they must first gain [or maintain] communal control of the material basis of life and culture — that is of all the production system.”

Ward (1965:288) related a cultural-ecological setting for the irrigated terraces at Sasa, on the Macuata coast of Vanua Levu, which is remarkably similar to that encountered at Ravitaki:

The larger set of terraces in preparation consisted of 24 terraces, each 18 feet long by 4 feet wide, with a drop of 12 to 18 inches between each. The wet, sticky soil was prepared with forks, and, once weeds had been removed, digging sticks were used to lever holes in which the stems were planted. Each terrace was surrounded by a low earth wall and water was fed into a corner of the top terrace from a narrow ditch tapping the creek some distance farther upstream. Water flowed through each terrace from a top corner to an outlet in the diagonally opposite corner. Two crops are usually taken from the terraces before a new set is cleared and the old one allowed to revert to grass fallow. In this dry zone area this is the most satisfactory way of ensuring adequate taro yields, although the work involved is heavier than planting dry taro. The Sasa people also consider that wet taro tastes better than dry. Work on the terraces is performed as a cooperative effort involving planters from all the four mataqali. The terraces are regarded as the property of the group who take part in the digging and one or two terraces are allotted to each planter. Apart from work on the terraces all food garden preparation is done individually or by households.

Thus, communal organization and management of irrigated terraces may serve as a clue to their longevity.

Another important factor in the continuation of irrigated terrace cultivation is its geography. The persistence of terracing may result from its
location within enclaves of traditional culture on the economic periphery. This represents a dramatic inversion of the probable situation prior to European contact and the imposition of capitalist structures. Previously, intensive agricultural landforms most likely reflected cohesive social organization and control within core areas of the major chiefdoms (e.g., the expanse of vuči on the Rewa delta), or represented specific expressions of social and political ecology (e.g. the terraces constructed as a larder for the upper Rove Creek tribes during the Naloto war, or the massive Nakauvadra terrace systems). These days, in most places the attention to agriculture in the form of labor inputs has been upended, and traditional intensive forms can only occur where there exist no or very few opportunities to participate in the larger economy.

We have seen how the island of Kadavu lacks direct economic ties with the rest of Fiji, let alone the World System. A similar situation obtains even in the ultradeveloped spatial context of the Hawaiian Islands, where Begley (1981:29) reported that there were once immense taro "patches" along the eastern shores of Mamala Bay prior to the tourism transformation at Waikiki, but that the production of this crop is now marginalized and pushed to the periphery: "taro production in Hawaii today is confined to valleys which are somewhat isolated from Honolulu." Likewise, the two places where irrigated taro terraces are still operating in Fiji — Gau and Kadavu — are relatively remote and isolated islands only marginally involved in the modern capitalist economic geography of the nation.

**Denouement**

By way of an extremely terse synthesis of the above discussion and summary, I offer the following conclusions:
1) Agricultural terracing in Oceania derived from a symbiotic combination of cultural knowledge and environmental conditions. These two forces — culture and nature — acted in concert to enable human populations to form these landscape modifications that were an integral component of the subsistence base on so many islands. Irrigated taro terraces are thus the emblematic embodiment of cultural-ecological relationships among a majority of Pacific peoples.

2) Terracing in Fiji may always have been merely one tactic within a broader, widely-based agricultural strategy. Intensification and expansion of terraced areas may have been due to a build-up of population. More likely is the impetus created by a socially hostile environment. Warfare imparted a precautionary imperative in locating food gardens adjacent to isolated and defensible settlement positions.

3) The decline and demise of agricultural terracing in Fiji was caused by a number of factors, any one of which cannot, by this study at least, be implicated above the others. European contact, an end to traditional internecine conflict, population decrease, and the emergence of Fijian society into a global marketplace each contributed to the obsolescence of these carefully fashioned landforms.

4) Terracing persists in the Fiji Islands because of its location within enclaves of traditional culture situated on the periphery of the modern Fijian space-economy. While terracing cannot be said to thrive in these areas, its very presence signifies deliberate adherence to customary values and traditions. Irrigated taro terrace technology represents a valuable store of indigenous ecological knowledge that may help to enable small island nations achieve some measure of self-sufficiency in a world of rising populations and a shrinking resource base. The existence of irrigated
terracing, however tentative or fragile its place in modern Fijian agriculture, should be held as an example of harmonious relations between people and the land that sustains them.
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Preliminary note on Fijian orthography: Fijian words are written according to the orthographic system devised by the Wesleyan Methodist missionaries during the 1840s. Most of the pronunciations are the same as in English, with the following exceptions:

- **b** is pronounced **mb** as in number;
- **d** is pronounced **nd** as in end;
- **q** is pronounced **ng** as in finger;
- **g** is pronounced **ng** as in ring;
- **c** is pronounced **th** as in the.

The following expressions, except where indicated, are in the Bauan dialect, which has assumed the position of being the standard Fijian language. Most of the definitions are adapted from Capell (1973). An asterisk (*) denotes terms for irrigated taro system components in the local Ravitaki dialect collected on the island of Kadavu, by Robert Kuhlken, April-May, 1992.

**bekabekairaga** * - weed (water hyacinth - *Limnanthemum indicum*) often growing in the laua.

**bure** - a dwelling structure, usually denoting one of traditional thatched construction.

**butulaua** * - the allocation of irrigated pondfields in the village system to individual farmers.

**cakacaka vakavanua** - to work “in the manner of the land”, denoting activities done in traditional fashion.

**cukivovo** * - turning the soil in a dryland garden (in Nabukelevu: vorau).

**dalo** - taro (*Colocasia esculenta*).

**dalo ni tana** - tannia, new cocoyam, or American taro (*Xanthosoma sagittifolium*).

**drawe** * - turning the soil, or mud, in a wetland garden.

**galala** - an independent Fijian farmer, living away from the village but maintaining certain customary obligations and traditional ties to it.
ikeli* - drainage ditch in vuevue gardens.

isevu - first fruits offered to a chief, usually consisting of the first yams harvested that season.

itokatoka - the enlarged family unit, or group descended from brothers, a unit of eastern Fijian society, with a headman under the head of the mataqali.

ivadaganiwai * - the first or uppermost laua in the system or subsystem; from here the water is distributed terrace by terrace to the rest of the system, and thus has special significance. It is also planted with taro in Ravitaki, although in Talaulia, the term vaso is used for a large terraced area at the head of the system which was not planted, but served to collect water runoff from a spring. From the vaso a bamboo pipe supplied water to an excavated ivakata which delivered it to a system of laua.

ivakata or ivakatatawai * - channel from source (mataniwai) to the first terrace (ivadaganiwai) in the system; usually excavated and sometimes rock-lined but can also be aqueducts formed of bamboo pipes or hollowed tree fern trunks.

kai - inhabitant(s) of a place.

kakana dina - “true food”, referring to root crop staples and arboreal starches necessary to make a meal complete.

koro - village.

koromakawa - abandoned village site, often exhibiting fortifications.

kumala - sweet potato (Ipomoea batatas).

laua * - individual terrace or irrigated taro bed; also the collective term for the entire system.

laua tava * - a long, linear terrace, near the mataniwai, and from which several ivakata issue to bring water to separate subareas within the laua system.

lotu - conversion to Christianity.

malimali * - the mixing of the mud by hand in a laua and removal of all vegetative matter prior to planting with taro cuttings.

masi - cloth made from bark of the paper mulberry tree (Broussonetia papyrifera).

matanibure - term for itokatoka in Ra dialect.

matanitu - confederated high chiefdom.
mataniwai* - source of irrigation water; can be either a stream (qalolo) or a spring (vurevure).

mataqali - the primary social division in Fiji, usually translated as clan.

niu - coconut (Cocos nucifera).

qele - earth, soil.

qereqere* - the lauci tree (Aleurites moluccana).

sauvata* - dry (non-irrigated) contour terraces for planting taro, yams, sweet potatoes, etc.

solooyacayaca* - sharpening stone for stone adzes.

suli matau; suli selai* - general terms for wetland taro (may be any variety - Samoa, vavai, etc.).

suli toqa* - general term for dryland taro.

tabua - whale's tooth, an article of special value and ceremonial meaning in traditional Fijian culture, used as a presentation on all special occasions.

taiasiga - “sunburnt”, referring to the scrub and grasslands occurring on the leeward side of the larger islands.

tanoa - the bowl used for preparing yaqona.

taratere* - irrigated terrace walls, typically of packed mud, although sometimes reinforced with rock.

tautauvata* - leveling the terrace during preparation for planting taro.

Tui - a chief.

uto - breadfruit (Artocarpus altlis).

uvi - yam (Dioscorea alata).

vala* - the vatu tree (Barringtonia sp.).

vanua - land, region, place. Politically, a collection of villages under a single chief; a minor chiefdom.

vasuasua* - another type of wetland taro planting involving no tillage of the soil or clearance of vegetation - a hole is simply made for each individual taro cutting.

via - giant taro (Alocasia macrorhiza).

t via  kana - giant swamp taro (Cyrtosperma chamissonis).
voce* - turning the soil when it is very wet, or soft.

vonoti na ivakata* - a water diversion structure placed in a stream to divert water into an irrigation channel, usually made of rocks and plaited coconut leaves.

v u - primai ancestor of a yavusa.

vuci - raised field designed for taro; in some areas a generic term for irrigated or wetland taro garden.

vudi - plantain, or cooking banana (Musa spp.).

vuevue* - a garden plot for taro where a drainage ditch circumscribes a raised bed; can be either a distinct garden on a flat, swampy area, or as part of a laua-fallow-vuevue cycle utilizing the terraced system.

yakumata* - a cleaning and weeding of laua involving all the men of the village occurring in one day - called three or four times a year by the village elders.

yaqona - kava (Piper methysticum).

yavu - foundation of a house.

yavusa - the largest kinship and social division of Fijian society, usually translated as tribe.
VITA

Robert Kuhlken was born in 1953 and was reared in the rural South, along the Colorado Front Range, and in proto-suburban Chester County, Pennsylvania. He graduated from Bishop Shanahan High School in West Chester, Pennsylvania, and attended Duke University on a Naval ROTC scholarship. Upon learning that neither the military nor an electrical engineering degree figured in his future plans, he attended Auburn University at Montgomery, taking courses in literature and geography. He eventually earned a bachelor of arts degree in English from Clinch Valley College of the University of Virginia, where he served for three years as editor of *Jimson Weed*, the college literary magazine. The summer of 1977 found him in Boulder, attending Naropa Institute's Jack Kerouac School of Disembodied Poetics and studying poetry under Edward Dorn. He began graduate work in 1979 in the Department of Geography at Oregon State University, and conducted research on agricultural land use and pastoral strategies undertaken by the Confederated Tribes residing on the Warm Springs Indian Reservation in central Oregon. He earned the master's degree in 1983, and worked for seven years in local government land use planning agencies in Oregon. Between jobs, he has traveled extensively throughout South America and the islands of the South Pacific. In 1989 he entered the doctoral program in the Department of Geography and Anthropology at Louisiana State University. In 1992 he was awarded a Fulbright Fellowship and was attached to the Department of Geography at the University of the South Pacific in Suva.
DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Robert Thomas Kuhlken

Major Field: Geography

Title of Dissertation: Agricultural Terracing in the Fiji Islands

Approved:

Major Professor and Chairman

Dean of the Graduate School

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