

**RESOURCE-USE SYSTEMS  
OF ANCIENT CHAMPA**

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## AUTHOR'S 2009/2016 PREFACE

In 2009, I retyped my 1972 Master's thesis using Microsoft Word 2003. It was uploaded to <http://scholarspace.manoa.hawaii.edu/handle/10125/27418> in 2011. Since then, I discovered over 500 typographical, spelling, and missing lines from the 2009 retyping, and several incorrect bibliographic citations in the original 1972 typescript. These are corrected in this 2016 electronic Microsoft Word 2007 version, and I have added diacritical and tone spelling marks in the LITERATURE CITED section but not the main text. All other editorial word changes are marked like [this]. I have tried not to change the meaning of my assertions, including those that have been overcome by subsequent scholarship.

I electronically retyped the thesis to make it available to interested students and scholars, but also to make a follow on revision and update easier. Starting in 1972-73, I began to receive letters from interested fellow Chamists from all over the world requesting a copy of my thesis, some of whom were doing their own Champa research. In the 1970s, the cost of photocopying my originally 209-page thesis was too costly for this poor student. By the 1990s, I could afford to photocopy the thesis, and I handed out copies to a few fellow Champa scholars when I met them, and after 2002, to native Cham in California. I also donated copies to the Univ. of California at Berkeley and the Univ. of Washington libraries.

I feel very fortunate that there were a few scholars who really wanted to read the thesis, and were able to access it from the University of Hawaii Hamilton Library. As a non-university independent scholar without a Ph.D., I am honored that my M.A. thesis has been cited by respected scholars such as:

- Claude Jacques, "Sources on Economic Activities in Khmer and Cham Lands," in Marr & Milner, eds., Southeast Asia in the 9<sup>th</sup> to 14<sup>th</sup> Centuries, Singapore: Institute of Southeast Asian Studies, 1986, pp. 327-334;
- Robert S. Wicks, Money, Markets, and Trade in Early Southeast Asia: The Development of Indigenous Monetary Systems to AD 1400. Ithaca: Southeast Asia Program, 1992, page 209, Note 88;
- Richard O'Connor, "Agricultural Change and Ethnic Succession in Southeast Asian States, Journal of Asian Studies 54 (1995): 968-996; and
- Victor Lieberman, Strange Parallels: Southeast Asia in Global Context, c. 800-1830. Vol. 1. Integration on the Mainland. Cambridge, UK: Cambridge University Press, 2003, page 390.

I dedicate this electronic version of my 1972 thesis to the memory of my undergraduate mentor, William L. Thomas Jr. (California State University at Hayward). I also express my great appreciation to the tireless editing of my now retired thesis chairman, Brian Murton (University of Hawaii), to my [now deceased] good friend and colleague, Wilhelm (Bill) Solheim II who was my Anthropology thesis committee member, and to my beloved wife, Helen Sox-Leung, who has endured my years of Champa studies.

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## **CHAPTER I**

### **RECONSTRUCTION OF A PAST ECONOMY**

In Vietnam there is an old saying that describes the country as two baskets of rice connected by a shoulder-yoke. The "rice baskets" refer to the rich flood plains and delta to the north and south, while the "shoulder-yoke" may be interpreted as referring to the territory of the former kingdom of Champa where an ancient civilization flourished into the seventeenth century of the Christian era. Not only does the saying model the territory of Champa in physiographic terms but it has always been as if a "yoke" has restricted development of an enduring civilization comparable to that of the Indians, Chinese or even Vietnamese.

#### **PROBLEM, QUESTIONS, AND OBJECTIVES**

The nature of that "yoke" and how man adjusted himself to it is the problem to which this thesis addresses itself. In particular, I shall reconstruct the origins, operations, and control and management of systems of food capture and production for the ancient Chams. The time period is up until about the thirteenth century and I have necessarily restricted consideration of internal marketing and commerce.

There have been innumerable studies about the Cham and Champa (see Embree & Dotson, 1950:399-419); American University, 1966:927-929), but never a single study of the economy. It is true that Maspero's classic history (1928) summarized the economic activities and related cultural features of Champa in his initial chapter (English trans., Embree, 1949), but it was an analecta that did little more than compile previous primary and secondary descriptions and set them in an often

misimpression of spatial and temporal uniformity. He offered only sparse interpretation of the economy and did not attempt to use the present to reconstruct the past.

Boisselier (1963) has reinterpreted much of Maspero's historical account which bears significantly on the economy, but as an art historian he make no direct analysis of the economic system itself or patterns of livelihood.

Leuba's general work (1923) presented comparatively the most detail of the modern way of life—actually it was based on field work done in the first decade of the century—but it was very limited in areal coverage and she offered only some brief scattered insights into the ancient economy.

More recently Christie has characterized the Cham economy as one which "depended on a nice combination of rice-culture, the exploitation of nature resources, and the profits from "piracy" (1960:53). He illuminated the spatial links required to carry on Champa's export economy, but followed the current trend of historians of Southeast Asia by placing too much emphasis on the description of the king over all phases of life (see Benda, 1962). Apropos my study, Christie readily admits he is unsure how the country's economy could have depended on royal foundations (temples) and he cannot understand "the process by which goods were converted into more utilizable forms to pay for royal construction" (1960:53).

More speculative is the respected North Vietnamese historian Dao-duy-Anh who uses a previously untapped Sino-Vietnamese source to aid in reconstructing the economy and social system of tenth century Champa (1963). In my opinion, he exaggerates the truth in order to fit Cham culture into a

Marxist mold, yet he still offers insight well worth considering.

There are two additional comments, both by Americans, whose misinterpretations did much to prompt this needed study. Cady has said:

The meagerness of Champa's agricultural resources...imposed inescapable limitation on its population. It forced the Chams to exploit their mineral and forest resources and to emphasize seaborne, mercantile and other naval pursuits (1964:107).

Cotter may unwittingly be citing Nguyen-thieu-Lau (1941) says:

The Cham did not work their rice-growing areas as intensively as the Vietnamese because the soils were poorer, the available land was much less and the Chams themselves were seafaring people rather than sedentary" (Cotter, 1965:27).

In light of the cited works and comments, and acquaintance with many like ones, I believe that a number of questions should be raised concerning how the Chams supported themselves in their rugged land.

- What were the origins of the people and of the various components of their culture?
- What was the nature of their technologies?
- What were the parameters affecting man-environment interactions? How did man imprint himself on the landscape?
- What social, economic and religious institutions controlled and managed the production of resources?

I set forth four propositions that I contend will aid in understanding the Cham resource-use systems of ancient times:

1. The Vietnamese preserve many distinct adaptations and mal-adaptations to Cham boating, fishing, irrigation and cropping technology and some to economic organization.

2. Most of the Cham's technology and much of their social institutions were of indigenous prehistoric origin.

3. The subsistence food economy was comprised of finely adapted resource-use systems that exploited all possible habitats from open seas to mountain slopes.

4. These resource-use systems were controlled and managed through an integral set of clan feudal-like systems, macro-economic temples, and sodalities or mutual-aid associations.

Using conceptual viewpoints or frameworks of cultural ecology and resource-uses, I intend to reconstruct the prehistory of Champa within its Southeast Asian setting in order to establish the indigenous basis for most of the Cham technology and much of its institutions for control and management of resources. Using same conceptual frameworks, I shall examine the food subsistence economic system of Champa in terms of functional interactions among a) the biophysical environment, (b) human technology, and c) institutions of production, control and management.

As a geographer, I am describing a place and determining the processes of man-environment interaction. These processes have imprinted themselves on a cultural landscape in the past, provided a better understanding of a current landscape and perhaps may someday contribute toward a prognostication of the future landscape. Beyond considerations of the landscape is the wholly inadequate understanding of the past and present-day way of life of the Cham; the latter should be of more concern to planner for a postwar Vietnam. Thus the systems of resource manipulation that emerge from this study may begin to reveal that which Knight calls the "ethnogeography of a place—the behavioral reality in resource-use regions" by which rural evolution may be more wisely planned (1971:49).

### **AREAL AND HISTORICAL CONTEXT OF THE PROBLEM**

Champa is located on the Indochinese peninsula, that region between the Indian subcontinent and the mass of the ancient Middle Kingdom of China (Figure 1).<sup>1</sup> For the coast hugging sailing ships that plied the seas between China and India, ports along the rugged coast of Champa were welcome havens from the choppy seas and long tedious journeys. A rich trade in exotic products (including man) found on the plains and procured from the inland valleys and highlands early developed and continued to be a major stimulus to the ever varying chronicle of human events. From prehistoric times, people from the mainland and islands, and from as far away as China, India, and even Persia, had occasion to pass through and sometimes settle on the coast, thus creating a *mélange* of race and culture. Champa did not have expansive plains of abundant cereals equal to the Middle Kingdom nor even that of the Red River delta, yet from the unknown millennia of the past until the seventeenth century of this Christian era, a distinctive civilization flourished on the coast and into its hinter-lands. Much of this distinctiveness was derived from indigenous Malayo-Polynesian (or Austronesian) speaking peoples, who before "contact" with Chinese, Indian or Persian cultures, evolved by themselves advanced techniques of fishing, boat-building, irrigated and plowed agriculture and

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<sup>1</sup> I use the term "Champa" as equivalent to the "Coast of Vietnam" or "Central Vietnam" which at its maximum ranged from 20° to 10° 30' North latitude. Champa subsumes the regional names and their Vietnamese equivalents as listed: Lin-yi (Chin) is Quang-binh, Quang-tri, and Thua-thien; Amaravati (Skt) is Quang-nam, Quang-tin, and (as far as we know) Quang-ngai; Vijaya (Skt) is Binh-dinh; Da-rang (Cham or Viet -?) is Phu-yen; Kauthara (Skt) is Khanh-hoa; and Panduranga or Huan Wang (Chin) is Ninh-thuan and Binh-thuan. The terms are used interchangeably here but I try to use the modern ones [Provinces] in describing environmental parameters or when referring to present-day situations.

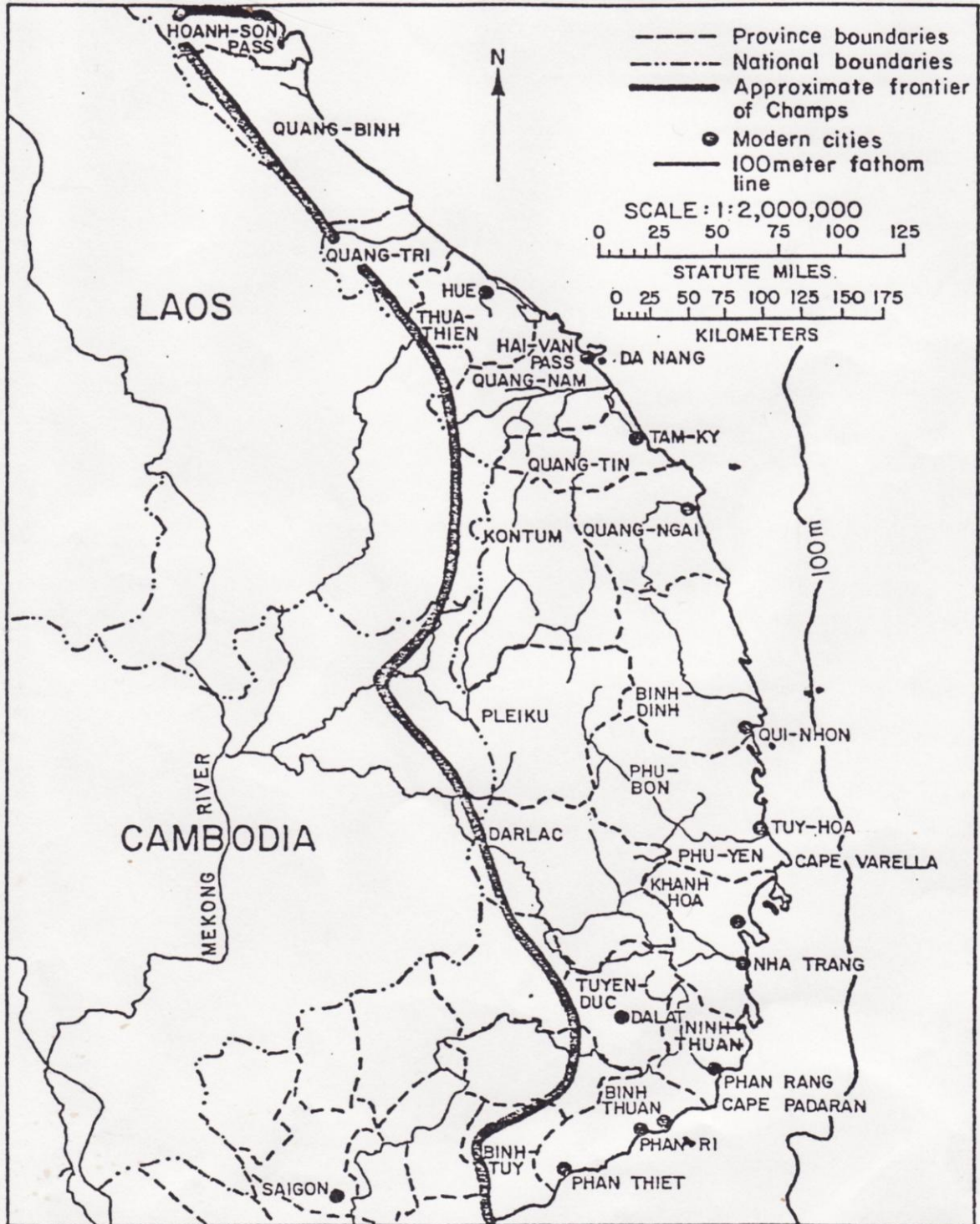
animal husbandry. Even today the Cham have left their imprint not only on the Vietnamese that followed them, but more importantly on the patterns of economic, social and political relationships between a former lowland people and a long-time highland people.

### **CONCEPTUAL FRAMEWORK**

The internal subsistence economy of Champa is reconstructed using an ecological viewpoint that focuses on structure, function, and dynamic equilibrium. With such a viewpoint therefore, I seek to describe the organization of a given set of interrelated phenomena, explain how and why the set is interrelated by tracing the flow of energy or material things within the set, from the set to the outside, and in reverse from outside to the set, and finally make inferences concerning the set's stability and potentialities of change. The concept of interaction or inter-relationship is paramount to the ecological frame of mind, so that to describe structure, I must seek to identify lines of linkages or points of articulation. At such points are found control functions, be they strictly deterministic, probabilistic or associational. Most often links are two-way functions, so for instance, analysis of feedback from political aspects of a problem to economic institutions and the physical environment may broaden understanding of the totality of a system. The systems or complexes of these interrelated phenomena are truly only models of reality and thus more educational devices than something representing the real world. What remains, however, is a way of looking at phenomena, a structured viewpoint (Geertz, 1963; Stoddart, 1967; Yengoyan, 1969:105-106).

When looking at an economic system, this frame of mind of cultural ecology is aided by another systematic approach, the

FIGURE I. CHAMPA SET IN MODERN VIETNAM



resource-use concept. A resource-use system as viewed by geography (College Commission on Geography, 1968:34) and by economic anthropology (Frankenberg, 1961:6) would seem to differ very little except by their traditional concerns for spatial and man-environment variables on the one hand, and social and economic structures that assure continuous movement of goods and services on the other. Such a concept I feel encompasses perception, acquisition-production, transformation and distribution, and allows a concentration on objects or energy the flow of which may be traced through functional systems with relative ease. To describe the subsistence economy of Champa, I have found Cohen's ideas of culture and resources particularly of use in discerning different technological systems for exploiting the potential and perceived energy resources in a given habitat. Each of the systems or groups of systems is accompanied by configurations of institutions and social relations appropriate to the effective use of that particular energy exploitation system (Cohen, 1968:42-43). Important to an understanding of control is identification of the point of decision-making articulation between man and his resources for "as societies change in their adaptive levels, different individuals and groups in the adaptive unit stand in new relationships to the process of decision-making..." (1968:47). Thus for example, when management of water is elevated from local village control to a multi-village control, a new "breed" of elite may be created, which, to make effective use of the great energy sources, will create new subordinate control (or administrative) structures. However, as Adams (1966) so well demonstrates, there is danger in not fallacy in assuming that technically more complex adaptation to the environment will lead directly to more complex control functions.

## RESEARCH METHODOLOGY AND DATA EVALUATION

The research problem to reconstruct a set of interrelated systems in a past period leads to the methodological problem of how to account for inevitable cultural and environment change. Further, how do I account for change within the historical period of concern, and how do I evaluate data that derived from contemporary and present-day sources?

### Approaches to Change in the Past

I do not intend to discuss changing economic structure and changing attitudes toward utilization of land as they varied in the short-run of Champa's history. Here I am more concerned with "traditions" of technology and economic institutions in the flow of Cham culture. Dunn defines "cultural flow" as "the intra-generational and inter-generational transmission of ideas, modes of behavior and the material products of behavior" (1970:1042). A "tradition is a temporal continuity represented by persistent configurations in single technologies or other systems of related forms" (Willy and Phillips, 1958, cited in Dunn, 1970:1043). A tradition may be, for example, the cropping sequence that accompanies certain varieties of *padi* or an association of cultivators or fishermen to setup an inter-village irrigation cooperative or intra-village fishing cooperative. These are the sorts of generalizations I seek to identify and describe in structure and function, an in dynamic interaction with other components or subsystems of the economy.

I try to argue in defense of the first thesis that most of the traditions that characterized the Cham resource-use systems were already established when historic contact with the Chinese and Indians was affected. Thus subsequent innovations from the alleged "Indianization" or from contact with Arab and Persian

merchants can be treated more easily as *additions* rather than *revolutions* in pre-existing systems.

Changes in technology, cultural institutions and the environment are recognized and analyzed when they contribute to an appreciation of what is indigenous and what is not, and also to an understanding of the gross functioning of institutions for economic control and management. However I present neither a "sequent approach" nor really a "cross-section approach" to historical geography (see Newcomb, 1969). I assume no gross changes in the basic indigenous "core culture" (see Steward, 1955:37).

#### **Evaluation of Data: the Present**

For a geographical reconstruction of the past, the research methodology depends heavily upon proper evaluation of data sources. Modern data sources must always be interpreted under the presumption that some cultural and environmental change has occurred. Yet because of insufficient raw environmental data for the present and the past, environmental change has been generally too difficult to assess. I have therefore concentrated my efforts on predominately cultural (man-oriented) features. Many of these features are vestiges in the landscape, in the subsistence technology of the Vietnamese, among isolated Chams living in marginal environments, among Cham-related peoples in the mountains, and among related societies in other regions. Cultural and perhaps some environmental information may survive in Cham vocabulary too.

First, vestiges in the Vietnamese landscape and in the subsistence technology and even some socioeconomic institutions have all been mentioned by other scholars, but never for the express purpose of reconstructing the past resource-use systems of the Chams. Yet I go beyond the contention that certain features of Vietnamese technology are borrowed from the previous

inhabitants to an argument that Vietnamese often made poor adjustments to pre-existing, and that which I have presumed is usually, superior Cham technology. "Poor adjustment" makes itself manifest by either incomplete borrowing, which exhibits little understanding or knowledge of an obvious Cham trait or total borrowing, which exhibits neither understanding nor existence of a similar (or analogous) trait in the Vietnamese homeland to the north. Both incomplete and total borrowings are anomalies, which of themselves may signal previous borrowings from the Cham. For the moment, I overlook any innovations that Vietnamese, (seventeenth century A.D.) Chinese, French and Americans have introduced to the coast in the post Champa centuries. Most of my data sources from the "modern" period pre-date systematic French efforts at upgrading the exploitative technologies of the Vietnamese, yet the same sources often have already taken in account Vietnamese and Chinese innovations.

For example, Moréchand (1955) has found little truly Vietnamese innovation in boat construction presently carried on by Central Vietnamese. The stern rudder together with a thin-bladed drop-keel sliding in a bow-post, and especially varnished basketwork hulls are completely original to the region of the former Cham domination and [he claims] may well be of indigenous Cham creation (1955:312-313). The fishermen themselves look physically different from farmers, a fact perhaps due to their occupation (Claeys, 1942:19; Vassal, 1910:160 and accompanying photo) and one fishing village--presumably not an unusual one--showed a strong mixture of Cham-Vietnamese blood while preserving the characteristic Cham settlement morphology (Mus, 1930:510). The necessity of such large-scale borrowing by the Vietnamese is supported by Gourou's remarks that the coastal fishing itself is not highly developed in northern Vietnam (1936:442-443), and Claeys openly claims that "the maritime

vocation of the Chams was much more active than that of the Vietnamese" (1959:1183).

In another way of looking at it, Moréchand's studies around Nha-trang gave him the impression of an incomplete acculturation to new subsistence techniques by the original Vietnamese colonists, who had often not been fishermen in their native home in the north. This incomplete acculturation to the pre-existing fishing technology of the Chams was manifest in an impoverished marine vocabulary, contradictory opinions on the advantages and faults of their equipment, and few concrete or large-scale contributions of true North Vietnamese fishing lore (1955:310-315).

Another example of Vietnamese mal-adaptation was, until recently, their irrigation systems on the central coasts. The French engineers who sought to improve the existing Vietnamese system or put a new one in, found themselves very often merely renovating ancient Cham dams and canals, which had been perfectly located and laid out (Touzet, 1934:234; Colani, 1940:58-59). The idea that Vietnamese had not adapted their patterns of land utilization to take advantage of the pre-existing Cham irrigation works has been the theme of most of the classic studies by the Vietnamese scholar, Nguyrn-thieu-Lau (1941:198-201; 1942; 1944). The best example of misuse of a system by the Vietnamese is at Ninh-hoa where Lau vehemently criticized the deeply cut canals, lack of water in the dry season and inadequate facilities to handle high water in the rainy season, and the lack of adequate areal coverage. In contrast to of all his other works, however, Lau aims his criticism at the Chams for building such a poor system. It fact it would appear that the Vietnamese may not have fully appreciated the tasks required of them to maintain such a

complex system in functioning order (1943; see their section, Chapter III).

A second source of modern data is among Cham and Cham-related upland people. Groslier has stressed the possibility "d'étude de la culture chame par les Montagnards du sud d'Indochine, parce qu'elle nous semble essentielle" (1952:340). Hickey brings some maturity to this statement in commenting that the many years of historical and ethnological research by Vietnamese and French scholars has laid a foundation for "using the method of controlled comparison within well-defined historical and geographical frameworks..." (1958:409). Such frameworks are the systems approach of cultural ecology and the resource-use concept that I have outlined above. Comparisons across time that involve pure Chams not yet fused with Vietnamese are beset by misrepresentation in the ethnographic literature. The bulk of the French scholarship concentrated on the Cham in the southern provinces of Ninh-thuan and Binh-thuan, who were long ago pushed into arid, inhospitable enclaves much unlike their former homelands on the fertile lower plains. I have tried to offset this by including descriptive evidence I feel is preserved among both pure Chams and Cham-related peoples in the regions of the ancient heartland of Champa from Quang-nam to Binh-dinh provinces. In addition, some highland people have also preserved Cham traditions such as the Churu near Dran. According to Gourou, they have the most perfected form of agriculture in the mountain country and they preserve Cham traditions with more care and vividness than do the Cham... (1945:454). I do not pretend to believe that there has been no change among these people, but it should be noted that much of the early and very thorough ethnography, such as by Amyonier (1891), was accomplished before Vietnamese had penetrated to any great degree into the mountains (see Bourette,

1955). Moreover, many of the traditional customs are preserved in oral hymns that have been handed down relatively intact since at least the sixteenth century (see Sabatier, 1940) and it would seem that much of the original technology has been preserved in the landscape.

There is much inadvertent description of Chams, Cham-related peoples or former Cham subsistence technologies by those who did not recognize the object of their research. Many early descriptions of mountain peoples are ~~lumped~~-[placed] into the common pejorative [of] "Moi" or savages. Thus when Le Marchant de Taignon draws a most attractive picture of the irrigated terraces of the upper river valleys of Quang-ngai, he is really speaking of the Hre and Da-vach Cham (1905; Bui Dinh, 1956, cited in American University, 1966:162-264, 864). Another example is the work done in naval ethnography by Paris (1942), Pietri (1949), and the Battelle Memorial Institute (1967). All are magnificent descriptions of boats and their origin, yet all three were written as though the authors were unaware that the previous inhabitants of Central Vietnam were more renown than the Vietnamese as sailors and accomplished fishermen.

A third present-day source is the comparative ethnography of related cultures. I cite Mus' thorough work (1933) that evokes the wealth of comparative ethnological and historical evidence in India and China to reconstruct the original nature of Cham religion (cited in Groslier, 1958:336). I also call upon the descriptions of corporate-like irrigation sodalities in Bali and on Luzon in the Philippines to describe similar such vestiges in present-day Vietnam (see Swellengrebel, 1960; Lewis, 1971; Nguyen-thieu-Lau, 1943; and Donoghue, 1962).

A fourth source I use sparingly is Cham vocabulary items which have been preserved from the fifteenth century in a list recorded in China (Blagden & Edwards, 1940-1942) as well as in a

Cham-French dictionary (Aymonier & Cabaton, 1904). Of the latter, some of the vocabulary items were gathered among the Chams in Cambodia (see Figure 3) where under better circumstances they have retained most of their old exploitative technologies. Yet they also have intermarried to some extent with Minangkabu Malay and probably absorbed some of the latter's vocabulary items. In addition, some fishing terms may have developed out of the new environment, so they any reliance on vocabulary is still tentative.

#### **Evaluation of Data: the Past**

The data sources from the past consist mostly of primary or first-hand information such as descriptions by Vietnamese, Chinese, Arabs, and Westerners, and also the native inscriptions in Sanskrit and Cham languages. It is the veracity and bias of these sources that is the subject to question. Of these only the Arab sources are subject to actual dispute for Wheatley warns against relying upon them much at all (1961:211-215), but the Westerner's few first hand descriptions of Champa can also be rather incredulous as I analyze one of them in Chapter IV (see Friar Odoric de Pordonne, ca. 1320 in Yule, 1866).

Many whole Chinese works on Champa have been lost, but the remaining materials along with the native inscriptions have permitted Maspero (1928) to fairly accurately reconstruct the history of Champa.

However the Chinese do not seem to have ventured very far inland due their fears of the Chams and thus their descriptions are likewise misrepresentative. Such faults have been magnified by Maspero (1928) and others following his failing to recognize the change in season and region in the Chinese works, and thus they have grossly over-generalized the Cham territorial and aquatic exploitative systems.

I have not used old Vietnamese sources very often. Whitmore cites untranslated Sino-Vietnamese works, which comment on the economic relations between Vietnam and Champa even before the former destroyed Vijaya (1970:373-379). These early Vietnamese sources and particularly the atlases of their military campaigns in 1471 and afterwards provide rich materials for analysis of the landscape through place-name studies and determination of physiographical changes along the coast. Claeys reminds the users of such ancient documents, however, that:

Le toponymie de ces descriptions est parfois difficilement contrôlable. Les détails qui avaient impressionné le voyageur ont disparu et l'aspect du site lui-même à change parfois considérablement. En Annam, le colmatage des deltas est extrêmement rapide; c'est ainsi qu'en XVII<sup>e</sup> siècle Tien-cha devant Tourane était encore une Ile. L'utilisation des documents anciens est, on le voit, extrêmement délicate et, comme l'a dit notre maître FINOT, "à l'occasion, assez décevante" (Claeys, 1939:36).

The most important primary source of raw data is from inscriptions in Sanskrit and indigenous Cham, which provide a wealth of insight into social, economic and ecclesiastical institutions and processes. For Champa they are an untapped mine of information just as the inscriptions of Cambodia area were really untouched until Briggs made his welcome contribution (1952). In my own work I have exclusively used Majumdar's English translations (III, 1927). Unfortunately he has left out some key inscriptions that the French had edited and too often he does not translate portions of the inscriptions that appear in Cham language, but neither have the French. Such portions contain valuable information about the detail of donations to temple economic centers and about place-names, both of which would make the structure and flow of goods and services much clearer. To this Boisselier adds:

Too many Cham epigraphs are still entirely unedited. The number of these that have been translated in full or

even simply transcribed is all but minute. The majority of the texts especially those which are inscribed in Old Cham have only been the object of summary translations...There is nothing to compare with Coedes' Inscriptions du Cambodge (2 Vols., 1937-1942) (1963:405, my translation).

### **ORGANIZATION OF THE THESIS**

After this introductory chapter, Chapter II, entitled Background: Prehistorical Origins and Historical Continuities, argues for the indigenous origin of much of Cham cropping, irrigation, boating and fishing technology and then analyzes some of the broad themes and processes of history such as events, introduction of innovations, trade and warfare as they may affect the exploitative systems and investment requirements of the economy. Chapter III, entitled Habitat and Production of Agricultural Resources, describes the systems of cropping, irrigation and animal husbandry after first summarizing the pertinent biophysical parameters. Chapter IV, entitled Capture and Production of Aquatic Resources, similarly describes the systems of boating and fishing by capture and production after summarizing the biophysical factors. Both Chapters III\* and IV emphasize man-environment interrelationships and are concerned with how technology is used to exploit the energy potentials in the particular environments. My [methodological] conclusions are presented in Chapter V, entitled Organization of Resource Control, which briefly speculates on the nature of the cultural landscape to synthesize the previous two chapters, and then poses some questions about the structure and dynamic functioning

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\* It is typed Chapter II in original thesis but it should have been Chapter III.

\*\* The term "methodological" was not in the 1972 thesis but fits here.

\*\*\* This whole sentence and any reference to Chapter VI was missing in the 1972 thesis so it is added here for clarification. Also these two additional footnotes \*\* and \*\*\* were not in the first 2009 online PDF version of the 1972 thesis.

of control and management institutions in the economy.\*\* [Chapter VI is the thesis summary and conclusions.]\*\*\* I include two appendices, the first which speculates about the economic role of the temple, and the second which is a glossary of foreign terms.

## CHAPTER II

### BACKGROUND: PREHISTORICAL ORIGINS AND HISTORIC CONTINUITIES

It is a major proposition of this paper that the Cham exhibited unique food resource-use systems of diverse origins, yet not at all explainable in terms of Chinese, Indian, Arab or Indonesian "genius". I believe that [the] resource-use systems of ancient Champa were largely of indigenous creation whose origins date back to many centuries if not millennia before the first historic contact with Han Chinese and Indian civilizations. That "indigenous creation" was what Steward termed the *core culture* (1955:37). It included nearly all of the technological components and cultural institutions that were to constitute the food resource-use systems of historical Champa.

This chapter is divided into two sections: the first deals with the period that relies primarily on data from archaeology and its related sciences – prehistory; the second deals with the period that has preserved written information that records man's impressions of what he has seen and experienced – history.

In the first section I will reconstruct the prehistory of the Champa region within the context of Greater Mainland Southeast Asia seeking to discover and trace the origins and development of key elements of the core culture, such as crops, cropping techniques and irrigation technology. However because recent archaeological excavations have upset previous concepts of Southeast Asia as a receptor of foreign ideas rather than a producer of innovations, I must also reformulate its prehistory. A review of some old ideas will show them remarkably accurate for the conjectural evidence upon which they were based, but it

is now necessary to push the levels of achievement up in quality and back in time.

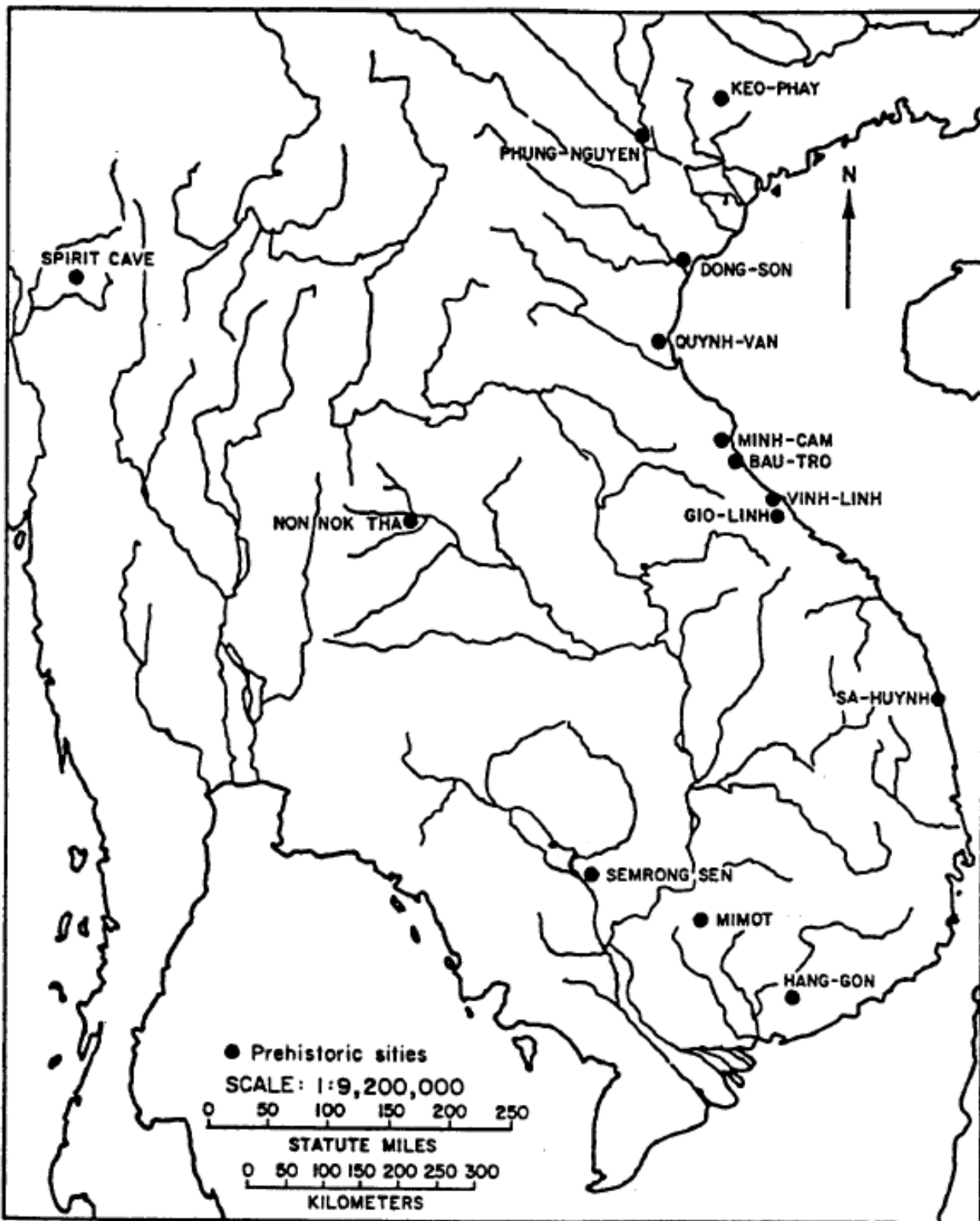
The geographical distribution of recently excavated sites however forces me to rely more on circumstantial evidence found in regions neighboring Champa than along the coast itself. The rationale is that if the level of human resource exploitative systems were apparently so relatively advanced in the prehistory of the North (generally the Red River basin and China south of the Yangtse) and the Southwest (generally the Mekong River basin), then why not in prehistoric Champa.

## **THE PREHISTORY**

### **Environment and Man's Primitive Adaptation**

The geological history and configuration of the coast has had long-range significance on the distribution of human settlement and on the mode of man's resource exploitation. To our knowledge, Man (Genus Homo) has been in Mainland Southeast Asia for at least 1,750,000 years, but it was only in the last 20,000 years that his cultural achievements directly affected the period of our concern in Champa (Solheim, 1972, personal interview). After the last glaciation, the shallow forested and undoubtedly inhabited Sunda continental shelf (Figure 1) was subject to gradual but fitful inundation until about 1500 B.C. (Sauer, personal interview, 1971). (All place-names to prehistoric mainland Southeast Asia are found on Figure 2). This slow eustatic rise in sea level caused the shore line to become longer, more sinuous, and more diversified due to indenting of a previous mature peneplain. A diminution of the land-carrying capacity of rivers occurred and there was corresponding increased upstream sedimentation due to loss of grade in the theoretical stream-profile (Dobby, 1967:53). These processes in

FIGURE 2. PREHISTORIC MAINLAND SOUTHEAST ASIA



relationship to the morphology of the submarine shelf and the Truong-son Mountains (Chaine Annamitique) accounted for the shapes and sizes of coastal plains.

South of Pass Hoanh-son (Porte d'Annam), the basically hard granitic Truong-son chain runs parallel to the modern coast, thus making it more difficult for rivers to cut transversal valleys further south (Gourou, 1945:45-46). From Quang-ngai province (14° 40' N.lat.) south to Ca Pass (Cap Padaran), the mountains fall obliquely into the seas where the submarine shelf drops off quite abruptly. In between the projecting spurs, the upstream sedimentation has formed alluvial river valleys and down stream delta extensions, which have broadened and interconnected to form narrow alluvial plains. Sparsely vegetated sand dunes that surround lagoons and line the shores are continually building out and many jetties of sand have already connected former islands to the mainland. South of Ca Pass in the former Panduranga region, the plains and sandy dunes widen again, as the continental shelf veers away from the mountains. There, red sand dunes from 60 to 200 meters high are found, remnants of one or more fossil marine terraces (Moorman, 1961:13). During the many millennia of eustatic sea rise, man must have found the riparian habitats, with their newly forming valleys, estuaries, and lagoons, to be both convenient for access to fresh water and for access to zones of ecological diversity. In these zones, man was assured ready to support for a sedentary life and the leisure required for experimentation with plants, animals and tools (Sauer, 1948, in 1963:257-258). It was in this early period of hunters and gatherers that basic habits of resource exploitation were formed that even today are largely unchanged.

For many millennia on this coast of teeming natural fauna and flora, techniques have been devised for taking seafood that included collecting on the strand (the terrestrial zone between low-tide and high-tide), use of natural poison, hook-and-line, hand throw nets (which evolved in to hand seined, restraining weirs (or "fish corrals"), and small individual fish traps (Spencer & Thomas, 1969:351). Of particular note is a fishing instrument almost unique to the Cham coast, a small harpoon shot out of a blow-gun that is used against surface feeding fresh-water and salt-water fish (Colani, 1938:215-216, citing a letter from Nguyễn-văn-Tố).<sup>2</sup>

Other than tools made from bones, shells, and conveniently shaped stones found by the seashore, early man in the tropics found bamboo to be his most versatile plant product. Bamboo was so useful for all kinds of projectile containers, restrainers, and fasteners that I believe it would have been in man's best interest to encourage its accessible abundance. To accomplish this, I suggest that even in periods before plant domestication per se, man was consciously using fire to deflect the primary forest, in which speciation is high per unit area, into secondary succession. One of the first plants to colonize a burnt forest in the tropics is bamboo, which at least in the present day, has fire resistant seeds and may flower only at long intervals (Dobby, 1967:61-70; Van Collias and Saichume, 1967:192). In addition to bamboo, new marshy areas created by the changing seacoast were colonized by many other plants that were of potential use to man, such as perennial grasses yielding canes, reeds and seeds. There were also edible tubers and

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<sup>2</sup> Jett restricts this blow-gun harpoon to the coast of South India, making it "a use nearly exclusive" to this region, but does say that it was "likely attributable to contact with Malaysians" (1970:670, 682). It is thus tempting to suggest very early east to west diffusion for this simple weapon prior to "Indianization," which was likely not diffused the other direction.

various palms all of which man must have collected wild for thousands of years before he domesticated them (Sauer, 1948, in 1960:257-258).

The coast was a natural flyway for millions of migrating waterfowl and a home for countless terrestrial game birds, especially pheasants and red jungle-fowl, the latter being precursors to the domestic chickens (Spencer, 1954:92; Duong-văn-An, 1615, trans., Bùi Lương, 1960:28; Delacour & Jabouille, 1925:213-219).<sup>3</sup> These were probably caught by nets and snares, if it is fair to project back from the simple modern-day techniques still used by the Cham (Leuba, 1923:118).

Wild animals included deer, bear, panthers, tigers, elephants, rhinoceros and crocodiles (Ma Huan, c. 1413, trans., Rockhill, 1915:91; Duong-van-An in 1961:46). Whether malaria was endemic to the region or not is not known but the mosquito certainly was. These animals variably supplied food, raw materials, and were probably causal in the morphology of settlement patterns and housing styles that eventually developed.

The period of hunting and gathering was of course the longest for *Homo sapiens*. Therefore what was probably an originally undifferentiated population of hunters and gatherers very slowly diverged into distinctive cultures as preference systems and manipulative systems evolved, based on peculiar wild plant and animal assemblages (Spencer & Thomas, 1969:152).

#### **Origins and Regionalization of Domestication of Plants and Animals**

Differentiation was stimulated by domestication of plants and animal. The first evidence of this in Southeast Asia appears at Spirit Cave, located in the mountains along the Thai-Burmese

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<sup>3</sup> Note that the term "game-bird" presumes a cultural prejudice for a particular species of food and thus may not apply to this region or time-period.

border (Figure 2). There, in a narrow range of ecosystems from riparian to mountainous, man assembled a crop complex of mostly seed plants: nuts, fruits, and beans, along with pigs, deer, birds, bats and turtles. Notably missing were any tubers. Pieces of charcoal in association with the materials have been dated by Carbon-14 methods to a period from about 6,000 B.C. to 10,000 B.C. (Gorman, 1971). These early dates have encouraged Solheim to state that the early "Neolithic probably follows directly from the Upper Paleolithic within the Hoa-binhian tool complex" (1969:3), and Dunn has even argued against use of such terms as "Neolithic" because of the connotation of a revolution when actually there was continuous evolution (1971:1050).

In reference to the time lag between first domestication and other cultural developments, it is important to realize that the proportion of cultivated plants in the total subsistence resource system must have been minor as man had yet to perfect tool systems, crop-planting systems, and harvesting and storage systems. Because of the apparently wide complex of crops at Spirit Cave, I assume that plant domestication itself did not occur there. Instead I would contend, along with Solheim that crops diffused to there from earlier local regions of domestication (Solheim, personal interview, 1970). In contrast to Solheim, I believe that there were many different local regions for the independent invention of the same crop.

Following upon this, I would think that other plants being independently domesticated during the broad period could have encompassed Sauer's riparian complex of vegetatively-reproducing food plants, such as taro, yams, and bananas. This is corroborated by both Spencer and Thomas by their feeling (in the Sauerian tradition) that the two sets of seed and vegetative-oriented crop-planting systems were "not interchangeable in the beginning of crop planting," and that environmental niches about

which these two crop complexes developed could be identified with broad regional systems (1969:151-156). I believe the term "broad regional *ecosystems*" could well replace the above "broad regional *systems*" (my italics).

In this light, I would contend that the material from the "Spirit Cave" complex tells us that:

1. A predominately seed-plant system was generally cultivated under wet-dry (monsoon) climates on inland plains, in upper valley-bottoms with well-drained alluvium, and on valley slopes. The primary staple was probably millet or beans supported by some root such as the mesophytic *Dioscorea alata* L., yam, which has two wild relative[s] growing naturally in monsoon forests (Barrau, 1955; see Gormon, 1971). Fresh-water fishing and the hunting of terrestrial animals continued to provide the major source of protein.

2. A predominately vegetative-plant system centered around starchy root-crops including taro, yam, as well as banana and coconut. Its habitat was exemplified by that of a wild variety of *Colocasia aquatalis* taro, which is said to have been grown "in the ancient day of incipient horticulture in...fresh-water swampy depressions between beach rampart or river bank and foothill or alluvial plains" (Barrau, 1965:345). This vegeculture was a more sedentary ecosystem than seed culture and remained "tied to river-bank, seashore, savanna-edge and other habitats with assured supplies of animal protein (Harris, 1968 in Cooke and Johnson, 1969:139-141).<sup>4</sup>

3. A later third system perhaps intermediary between the first two may have been the grass *Oryza sativa*, or rice [system]. Its wild Asian form *Oryza perennis*, is found naturally

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<sup>4</sup> The reference to "savanna-edge" may be peculiar to the context of Africa, about which this book is concerned.

in tropical, seasonally inundated grasslands and marshlands, and even the present-day dry cultivated varieties retain the imprint of a marsh plant in their requirement for nitrogen and derivatives of ammonia (Barrau, 1965:342).

The first two systems were based on pre-domesticated "wild plant and animal assemblages," and during the long period which the first domestications were occurring, broad coastal and inland ecological regions were shaping distribution of individual crops into recognizable patterns or complexes. It is my proposal that linguistic and/or ethnic culture units can be linked to these food complexes and synthesized into the broad regional ecosystems that I mentioned before. This regionalization does not consist of culture regions nor of natural regions but of regions based on criteria from both culture and the environment. I would conjecture however that such a regionalization might only be realistic or valid in very prehistoric times when there were less cultural elements to consider.

Therefore, expanding the previous classification into specific regional and ethnic entities, I would propose that:

1. The seed-centered food complex may have been first elaborated in interior river basins and mountainous slopes such as the Mekong, the Chao Phrya and the Salween (such as Spirit Cave) where it was broadly associated with (proto-?) Austroasiatic speakers whose resource-use systems merged northward into those of the Sino-Tibetan speakers, the latter who were to become the Miao of southwest China, and also into the Yao people of mountainous southeast China.<sup>5</sup>

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<sup>5</sup> This is based on general reading of Eberhard (1968), Wiens (1954), and Lebar et al., (1964).

2. The root-centered patterns were found in regions of more regular rainfall patterns where alluvial soils tended to extremes of hydromorphism depending on the amount of rainfall. This could have occurred along the coasts of greater Southeast Asia and in the islands yet-to-be separated from the Mainland (Sauer, 1948 in 1963:266). These foods perhaps were broadly associated with Malayo-Polynesian speakers whose diet was also heavily dependent on aquatic and marine foods.

3. The third food complex was based on rice, which was probably derived at a later time from the juxtaposition of the dry-cultivating seed-centered (millet-?) food complex and the wet-cultivating tuber (taro-?) food complex. No less predomesticated than the other staples, I believe this complex was found in river valleys with alluvial soils especially in rivers that drained into the South China Sea and perhaps into the Yangtze River basin. It was perhaps associated with Tai speakers whom Benedict has significantly linked to Austronesian speaking peoples in a language group he calls Tai-Kadai(-Indonesian) (1942; Benedict, 1966; see also Lebar, 1964:239).<sup>6</sup> Whether it was true prehistorically or not, it has been said today that the Tai-speakers may be characterized as valley-dwelling wet-rice cultivators (Lebar, 1964:137).

**The Origin of the Indigenous  
Cham Food Resource Base**

The above hypotheses may be put in perspective by their relationship to the primary staples, ethnic origins, and linguistic origins of the Chams, or those people who became the Chams.

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<sup>6</sup> Tai is the older and larger parent language group to "Thai," Lao, and many other sub-languages in Southeast Asia and southern China.

The staple carbohydrate, which the Cham ate the most was rice, but they relied on millet and most probably taro—wet taro—either as regular staples in marginal environments in relation to (rich alluvial plains or basaltic slopes) or as famine foods.

The racial components of the present-day Cham are extremely mixed. In a study on the subject, Olivier & Chagnaux (1951) include a predominately but ill-defined "Asiatic" or Mongoloid element that is the result of long-term mixing with Vietnamese, and small percentages of an Indonesian element, which refers [to] (indigenous) Malayo-Polynesian speaking peoples or those preceding true Malays, a vague and unprovable Malay element, and finally an Aryan element in which the authors also admit to include Dravidian elements. They make only passing mention of Arab (or Semitic) racial elements, which are more marked among the Cambodian Chams, and note that elements of Negroid, Melanesoid and Australoid races must still exist among the older inhabitants of Southeast Asia but than any trace of them is indiscernible (1951:313-316).

The science of linguistics is somewhat more reliable than physical anthropology in reconstructing a past situation, but there is major dissension as to prehistoric Southeast Asia. In general, the linguists view the modern Cham language as being fundamentally Austronesian (or Malayo-Polynesian), but as also being closely related to Austroasiatic (or Mon-Khmer) (Maspero, 1928:7). Benedict (1942) hypothesizes the existence of an Austro-Tai (or Austroasiatic-Tai) language stock in southern China that was parent to his Tai-Kadai group (see above). Tai-Kadai was allegedly spoken by peoples along the coast of southern China and on Hainan and Taiwan. He believes that Cham is an "old enclave" on the Mainland along with Malay, presumably from an early Austroasiatic stock, but he does not feel that Cham is a linguistic extension of his Austro-Tai (1966:259).

Benedict is considered radical by other linguists and some believe his methodology to be unclear and even faulty (Thompson, personal interview, 1970; Clark, personal interview, 1971). He has however received backing from non-linguists, especially historians and archaeologists.

The pre-eminent historian George Coedes has suggested that Austro-asiatic speakers intruded into an area occupied by Austronesian speakers and split from them apart into Indonesian and Tai speakers (1966:25). The archaeologists Chang has postulated a common South China Neolithic sub-stratum that consisted for culture belonging to an "undifferentiated Sino-Tibetan/Malayo-Polynesian Complex" (1959:96). Lebar elaborates on this undifferentiated group as later differentiating into a southwestern Tai, Miao, Lolo, etc. group and a southeastern Indonesian-Cham group (1964:239).

In terms of Chams or proto-Chams, there are several other distinct ideas about their origin that do not rely on archaeological evidence. The mountain Rhade, for example, have oral traditions of having lived on the coast, being forced to flee to southern islands, and then having made their way back to their present mountainous homeland (Bourette, 1955:22-23). Whether these stories refer to prehistorical or historical events following the downfall of Champa in the fifteenth century is not known. Bourette presents the traditional view that both the Jarai and Rhade preserve memories of a common life on the coast, as partially revealed in the statements: "Nous et les Chams, nous somme frères de meme mere" (1955:27). This is vividly exemplified in the beds in which many of the mountain people sleep—they are virtual copies of long-boats. Very recently Dournes (1971) has noted that ceremonial decorations and personal beauty styles among women show relationships between present-day highlanders and ancient Cham sculpture. The

physical separation in term of highlander and lowlander is explained as follows:

L'adoption d'une culture étrangere par un partie de la population rejeta dans les montagnes les tribus les plus éloignées de la cote at les plus éprises d'independance...Les premiers habitants de l'Indochine se separaient en deux groups: les Montagnards restes fidlès à leur mœurs, et leur frères demeures sur le cote les Chams, qui, eux, se transformaient au contact des Hindous, don't l'empreinte se manifester surtout dans le domain de la langue (Bourette, 1955:27).

This viewpoint is countered by Sopher (1965) in a similar sea-land resource use orientation he found on the Malay Peninsula. Sopher did not simply see the dichotomy as a consequence of foreign conquest displacing an originally strand-based, sea-oriented population into the interior, but instead he felt that the sharp contrasts—or in my situation, the ability to personally exploit a broad range of habitats—"can only be adequately explained as the result of the juxtaposition of a sea-oriented culture and a traditionally land-oriented one..." (Sopher, 1965:385).

Bringing all these points together, I hypothesize that:

- (1) Rice cultivation in irrigated *padi* may have originated when an island (or "mountain) people ~~interested~~ interacted with a coastal (or "sea") people, not only a meeting in the ethnic or linguistic sense, but also in the sense of interacting ecological regions.
- (2) On the coast of Champa as northward, the process may have found an Austroasiatic predominately dry seed-cultivating culture existing in juxtaposition with an Austronesian predominately wet tuber-cultivating culture. When subject to the exorable rising of the sea they both would have found themselves crowded together. The combination of inter-zonal exchange of information and genes, together with the availability of favorable habitats, may well have seen the birth of wet-rice cultivation.

This model of early interaction between ethno-linguistic groups with their attendant food-resource systems within given ecological zones seems to offer one satisfactory explanation to the range of diet preferences found among the historic Chams and their closely-related "cousins". It also sheds light on the totality of habitats that were effectively settled from strand to mountain top.

However it is only one of several possible models that could "explain" the mysterious prehistory of mainland Southeast Asia (Gorman, n.d.). And to be sure, it is a model based on only part of the now available evidence of the prehistory there. It is with interpretations of data from archaeology of the past fifteen years that much more can be inferred.

#### **Traditional Interpretations of Southeast Asian Prehistory**

I shall first briefly look at some of the ideas about the prehistory of the mainland region. These derived from largely haphazard archaeological excavations (even by contemporary standards), often misleading "diffusionist" theories, and overstated, in my opinion—conclusions from art history. Yet the advantage of observing still *relatively* unchanged ethnic groups and the genius of discerning patterns others cannot see, both contribute to the viability that remains in some of the old ideas in face of the new evidence.

One highly criticized but yet recent prehistorian is Wales, who has synthesized elements of art, religion and mythology together with some racial and linguistic data to argue that Cham culture was originally an "Older Megalithic Culture" that underwent extreme acculturation from the cultures of Dong-son, Han China and India (1961:76, 96). According to Wales, who cites extensively from the works of Heine-Geldern, the "Older Megalithic Culture" in mainland Southeast Asia was brought about

by the entrance of Malayo-Polynesian speakers (Austronesian people) into the continent. Coming from the north between 2500 and 1500 B.C., they mixed with indigenous Austroasiatic speakers. This culture supposed was characterized by cultivation of rice and millet, raising of pigs and cattle or buffalo (for sacrifice), fabrication of pottery of certain style, construction of piled housing, and the custom of erecting stone monuments (megaliths or *menhirs*) as memorials of sacrificial feasts or as memorials to one's ancestors (Heine-Geldern, 1945:141).

It is significant to Cham culture that Wales overlooks evidence that points to the early Tai-Kadai language group as exhibiting elements of a megalithic culture. In southern and western China, they reportedly practiced cattle sacrifice, earth-god phallicism and erected ancestor tablets, all centering around the cultivation of wet-rice (Eberhard, 1968:192, 338).

The Dong-sonian element mentioned by Wales as basic to Cham culture was called the "Younger Megalithic Culture" and supposedly represented "a second Indonesian immigration" of Malayo-Polynesians dating from 500 B.C. The Indonesians were said to have carried with them Bronze Age influences grafted upon them from the north (presumably from China's Chou or Shang Dynasty) and thereafter nurtured in their homeland in South China and northern Indochina (Wales, 1961:82).

Although these traditional conceptions of migration of peoples and diffusions of technology are presently subject to criticism, the concept of a so-called "megalithic" culture may have some validity, at least to indicate a general technological horizon for selected ethnic groups in selected areas.

Yet it has been said that in light of the receding limit to cultural development in Southeast Asia, macro-regional and homogeneous "cultures" such as the Older Megalithic or the Dong-

sonian are becoming impossible to describe and analyze in all their component detail (Triestman, 1970:36). It is now more necessary than ever to return to the tedious task of describing, classifying and analyzing in functional terms archaeological sites that have been excavated using controlled stratigraphy and provenance, and have been subject to accurate physical dating techniques.

### Modern Interpretation Of Prehistoric Sites

Within Central Vietnam itself, excavation has been limited to very few sites of significance to prehistory, though such digging was carried out by the French on old Cham and settlement sites. Yet that was largely the uncovering of monuments, the so-called "monumental archaeology" in which any recovery of subsurface materials was a by-product of another objective. Thus most all interpretations of subsurface finds are without reference to horizontal or vertical position and often [offer] only a very generalized idea of site and situation. In spite of this poor coverage, first, I shall briefly discuss two of the most well-worked sites, mainly because much of the better work has been accomplished in Thailand, Cambodia, South Vietnam and North Vietnam[. Second,] I shall describe and analyze the implication of that work for cultural development and its possible effect on the Cham[pa] coast.

#### Champa

Subsurface sites are quite limited in former Champa. Early French archaeologists discovered Minh-cam, a Neolithic cave, and Bau-tro, a Neolithic shell-mound, both near Dong-hoi in old Linyi (see the History Section), but these sites yielded little information (Boriskovskii, 1968:23-24). Two sites in the southern region excavated by O. Janse amounted to little more than test-digs (Janse, 1942; Janse, 1959:111), but this esteemed

Swedish archaeologist has done more extensive work at several sites collectively called Sa-huynh (Janse, 1959; Solheim, 1959). And the North Vietnamese have excavated a small site at Vinh-linh during the last decade (Huyen Ngoc, 1965). There is also one surface site that was not well excavated because of its morphology, but where [the] report is an excellent example of historical geography for its time. This was the study by Madelaine Colani in Quang-tri (1940).

The main site at Sa-huynh is on a beach beside a partially protected bay (see Figure 2). Unfortunately it was poorly excavated at first and subject to treasure seekers afterward. It revealed a necropolis of jars, which by their shape and size reminded Malleret of the megalithic jars of Tran-ninh (the plain of Jars) in Upper Laos, and by some of their decorations of jars found at Samrong-sen in Cambodia (1959:113-119). Glass objects of a type only found in Luzon, Formosa and nearby islands were found there also suggesting to Malleret that there was some degree of trans-oceanic trade. In the jars bronze objects were rare, only one bracelet, a goblet and some small bells, but iron objects included many geomorphic figures, digging tools, and several cutlasses (Solheim, 1959:101-102).

A few kilometers south of Dang-pho, Boisselier comments on a stone slab room open to the east and another necropolis in Binh-dinh Province at Tang-long (location unknown), suggesting—which agrees with Malleret—that there was indeed some sort of a *Sa-huynh Culture* (1963:12, and citing Colani, 1935:755).

Colani's work in Quang-tri centered on the basaltic outcropping near Gio-linh that is covered with irrigation complexes, [which is] singularly anomalous in the whole of

Southeast Asia.<sup>7</sup> These complexes utilize natural springs for small-scale watering of communal village lands within macro-economic regional units (1940:28). A model unit might have consisted of: (1) dry field terraces at the top of a slope; (2) an upper tank acting as a reservoir to collect spring water; (3) a lower tank for domestic family or village needs; and (4) one or more fairly extensive wet-field terraces with flumes and channel inter-connecting them. The terraces, tanks, bridges, causeways and staircases are of dry-stone construction, which in addition to megaliths, stone seats, earthen pyramids and circular mounds, all attest to a megalithic cult basis of the complexes, according to Colani (1940:12, 15-21).

The works at Gio-linh are finely engineered systems that neither Colani, Wales (1961:79), nor Wheatley (1965a) will admit as being related to Cham irrigation technology. Wheatley agrees with Colani that the Gio-linh system may well have had a prehistoric origin in an Older Megalithic Culture and estimates it to date back to about 2000 B.C. (1965a:137). Boisselier goes further, asserting that there was a "Quang-tri Culture from Cape Lay (Vinh-linh) to Quang-nam", but does not give any reason for extending it so far south (1963:11; parentheses are author's). To him, the *Quang-tri Culture* and the *Sa-huynh Culture* signify "vast currents of exchange from North to South along the coast" and therefore point to the existence of many cultures previous to the implantation of Hinduism there (1963:12).

In contrast to these prehistorically-oriented views, Janse feels that based on available data, including his own observations, that the burial customs at Sa-huynh resemble historical or modern Cham customs, [but] "it is not yet possible

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<sup>7</sup> The existence of these valuable works is no longer in the present tense due to massive destruction caused by American and Vietnamese military fire-power (personal experience, 1967).

to determine whether or not the Sa-huynh industry is to be regarded as pre-Cham or not" (1959:109-111).

#### The Mekong River Basin

One finds that most of the significant sites that may relate to Cham culture are found within the drainage basin of the Mekong River, except for the basaltic plateau north and northeast of present-day Saigon. Practically all excavation work in this region is of high scholarship, permitting more far-reaching inferences than those from the former Champa itself. Moreover, the availability of Carbon-14 dating for organic objects and thermo-lumenscence dating for pottery has greatly increased our knowledge of Southeast Asian prehistoric chronology.

The breakthrough really came at Non-Nok Tha in the wet-dry interior of Northeast Thailand where a cemetery has revealed the earliest copper and bronze tools and the earliest rice yet found in all of southern and eastern Asia. There is a sequence of cultural development from the probably fifth millennium B.C. through the first millennium A.D. The first positive imprint of a rice kernel appeared from 3500 B.C. and is thought possibly to be the domesticate *Oryza sativa* Japonica (Takashi Okasaki, 1971, personal interview). At the same site archaeologists have found a socketed copper tool, resembling a spade, which dating from 3500 B.C. is the oldest known metal tool in Eastern Asia and the oldest socketed tool anywhere. Bronze axes are estimated to appear before 3000 B.C. and positively by 2300 B.C., and were produced by the advanced technique of double-mold casting. This was over a thousand years before the first bronze is known to appear in China. In addition to a probably more common usage of stone and bamboo, the bronze spades and axes were used as implements in a horticultural and perhaps agricultural system. Portions of cattle similar to Zebu (*Bos indicus*) and tentatively

identified as domesticated have been found there, and I have recently been shown the small figurine head of a probable horse (Solheim, 1969:10; Solheim, 1971:335, 338). Both animals date from about the third to second millennium B.C. (Solheim, personal interview, 1972).

In the forest between the Mekong River and Tonle Sap is the site of Samrong-sen, where double-molded bronze axes in association with pottery have been typologically dated older than similar pieces at Hang-gon I. Hang-gon I is one of the many analogous site located on a basaltic plateau northeast of Saigon and only 120 km. east over easy terrain to the Cham city of Phan-thiet. At Hang-gon I, molds have been dated by associated materials to 2000 B.C.  $\pm$ 250 years (Saurin, 1968:3).

The pottery at Hang-gon I is virtually identical to other pottery in the same general area that dates by Carbon-14 to the fourth to second centuries B.C., thus suggesting a possible continuous occupation by the same cultural group. This site consisted of fifty jars each of which contained precious stones, blue glass beads, a preponderance of iron (including knives, scissors and an iron sword) but very little bronze. Both sizes of the jars and their assemblages are the same as at Sa-huynh. Finally the decoration on the pottery is supposed to be related to Sa-huynh pottery too (Saurin, 1966:33).

Following this line of argument, it is apropos that the site near Vinh-linh on the coast yielded double-molds of axes, presumably bronze, which elsewhere dated to the third millennium B.C. (Huyen Ngoc, 1965). Furthermore, the earlier Carbon-14 date for iron objects in mainland Southeast Asia now goes back to about 1200 B.C. (Solheim, personal interview, 1971). That suggests Boisselier's so-called *Sa-huynh Culture* may have existed during the first millennium B.C. at least with iron, and it could have extended southward through the Hang-gon region.

Of the earlier bronzes, the site at Non-Nok-Tha, Samrong-sen, and Hang-gon I all set a definite chronology and a standard of technology. The Vinh-linh site may too follow this chronology as most certainly do the soon-to-be mentioned sites to the North. In the Mekong basin, however, it may also be reasonable to hypothesize that Groslier's yet-to-be described excavation of a "Neolithic stratum of astonishing richness" at Mimot, Cambodia, may represent a least a contemporary time period with the first three sites. Indeed the author, one of the most respected professional archaeologists in East Asia, estimates his site to date about 2500 to 2000 B.C. (1966: 195, 267).

He sees Mimot as one of the "moi forts" similar to finds described by Malleret in 1957 as ranging from Thailand to western Cochinchina, and always located on fertile basaltic formations. Groslier's Mimot site consist of remnant habitations on hillocks surrounded by two concentric circular forms, the inner one an earthwork and the outer one an external ditch (1966:195, 261 no.61). Before Groslier had done the Mimot excavation, he described the same site or one of the many very similar ones as a town of Chen-la. He suggested that the moat was an irrigation tank that stored "captured" water from a higher perennial stream and the tank then supplied interior rice-fields. This he thought served as the model for later Khmer irrigation works, the latter which he differentiated from the drainage-oriented Funanese canals (1962:70). The question then arises if Mimot is indeed contemporary with other sites which date from the third millennium B.C., does the pre-excavation explanation of Mimot in terms of a system of irrigation maintain its validity? Of course without the detailed report Groslier has failed to make public, I may only suppose that a "Neolithic stratum of astonishing richness" in terms of mid-1965 knowledge

might include those objects that today are dated by Carbon-14 dating to the third millennium B.C.

Looking at the problem from another view, it is impossible to determine exactly who was responsible for these remarkable innovations but prehistorians were probably right in terming the Mon and the Khmer (Austroasiatic speakers) as indigenous to the main continent of South-east Asia (in Wales, 1961:61). It is possible that their appearance—appearance in the sense of either a movement into the continent or a divergence from earlier original stock—may be related to the change in the tool-complex that Gorman reports took place at the Spirit Cave site approximately 6600 B.C. (1971:314-318). If my model of Austronesian-Austroasiatic interaction is valid, it should have taken effect by the third or second millennia B.C. when the highest level of the sea had already occurred. The first appearance of rice in 3500 B.C. would perhaps suggest that if the model is applicable to the Mekong region, some Austronesian influence would have been found in the delta, which offered water-borne access to the interior.

The earliest dates are from the Hong-gon sites that exhibit apparently similarly decorated pottery in both the third and first millenniums B.C., with the latter tentatively identified with the pottery at the Sa-huynh site. Although Solheim has hypothesized an island-wide spread to his *Sa-huynh-Kalanay* Pottery Complex starting from the second millennium B.C., he cautions against any close correlation with any one particular culture. Still I am tempted to look at the Austronesian-speaking peoples whose dispersal nearly parallels that of the pottery complex (Solheim, 1967:162-167). And according to Solheim's latest chronology, seafarers from the South China seacoast may have begun to move out from the fourth or at least the third millennium B.C. (1971:339). However, I am not suggesting that

Austronesian speakers moved from South China (or the southern islands) to the Mekong region with (wet-rice) but that they were always there from the Mekong delta northward along the coast of Champa, the coast of Van-lang (later North Vietnam) and through Hainan east along the coast of China.

The historical appearance of Funan in early centuries of the Christian era strengthens the weak link with the Sa-huynh-Kalanay Pottery [Complex]. Funan was a widespread maritime empire, the first such "Indianized" empire according to some historians, and the trade entrepôt for goods moving between the Mediterranean, Persia and India on the one hand, and China on the other. Despite Briggs' bold assertion that Funanese spoke an Austroasiatic language (1951:15), I would contend that Funanese were Austronesian speakers, primarily because their obvious orientation toward the sea, not only in their settlement patterns but also in their early propensity to using long sea-going boats (Coedes, 1968:36-62; Wang, 1958:41).<sup>8</sup>

The next section deals with the direct contact between Funan and early Champa, but here I would suggest that despite the proposed lowering of linguistic barriers and the historical fact of Funanese occupation of part of the region, there was little exchange of technological systems because different environments required different adjustments.

#### The Red River Basin

At the same time this proposed high level of innovation was occurring in the Mekong River basin, the northern part of Greater Southeast Asia was no less an innovative center. The definitive chronology is less clear, but that is only because of the lack of systematic Carbon-14 dating such as is reported from

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<sup>8</sup> Because of its formidable length, I have not read the source of all modern archaeological data about Funan, Malleret's three volume set, L'Archeologie du Delta du Mekong (1959-1963).

the southern region. Certainly the level of technique of excavation and of scholarship in interpretation of prehistory is equal to that from the Mekong region, a result of Soviet technical aid in the early 1960s and a rare dedication to building up the national image of the Democratic Republic of Vietnam yet without degradation of its image of credibility – at least for prehistory.

According to one writer, in the Red River valley and delta there is a continuous cultural evolution from the "Paleolithic" that intensifies in the late "Neolithic". At that time, that which Pham-van-Kinh calls the *Phung-Nguyen Culture* was scattered up and down the Red River mainly in lowland sites, exhibiting a stone-tool horticulture that evolved through copper into early use of bronze tools. This was related by stone-tool and pottery affinities with a middle Bronze-age culture called the *Go-Mun*, which in turn was succeeded by the well-known *Dong-Son Culture*. According to this reconstruction, the Dong-son was a culmination of thousands of years of indigenous development that represented a transition into the Iron-age (Pham-van-Kinh, 1969).

After a decade of reliance only on guesses, there are now Carbon-14 dates to go along with this revolution in Vietnamese archaeology. Unfortunately however, they are of the sites earlier excavated by the French. A "Bac-sonian" site at Keo-phay, which is typologically dated to post Hoa-binhian Paleolithic, and is an equivalent of the present early Neolithic (according to Gorman's chronology), dates to the sixth millennium B.C. The previously termed "early Neolithic" site at the shell mound of Quynh-van is now the approximate equivalent of early Phung-nguyen, which seems to date to the third millennium B.C. Finally bronze artifacts not linked with any one

site, have been dated to about 1350 B.C.  $\pm$ 250 years (Quitta, 1971, personal communication).<sup>9</sup> The first two dates are not dissimilar from the sequence at Thailand, but the bronze may represent randomly chosen "later" objects. Yet the typologically dated materials from the recently excavated sites present a sequence that would seem to date earlier than those radiocarbon dates and I eagerly await a dating of their artifacts.

Significant to the development of horticulture in the northern region is the apparent evidence of hoe cultivation and possible evidence of simple animal husbandry (Le-van-Lan & Pham-van-Kinh, 1968:38-39). More speculative is the existence at Phung-Nguyen of large earthen-ware grain jars, remains of pig and water buffalo bones, and evidence that points to cultivation of rice on hill-slopes and also notably in *submerged fields* on the plains (Nguyen-khac-Vien, 1969:12-13).<sup>10</sup> The existence of Vien's "submerged" wet-rice fields is not substantiated in the Vietnamese-language materials I have translated, but since the long sequence in the Phung-Nguyen Culture is typologically equivalent to the fourth and third millennium B.C. sequence in the southern region with its attendant discoveries of early rice and hypothetical Mimot Culture, the Phung-Nguyen may not be overrated by Vien.

As to the middle Bronze-Age Go-Mun Culture, almost all its identifying artifacts are those that formerly were tossed into a "hodge-podge" Dong-Son Culture. This means that many of these artifacts are of course much older than previously supposed,

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<sup>9</sup> Dr. H. Quitta is associated with the Deutsche Akademie der Wissenschaften, Zu Berlin, East Germany.

<sup>10</sup> Nguyen-khac-Vien is writing in an English-language propaganda series, but is generally a responsible scholar and the content of his article is mostly based on documented (though not in his article) evidence taken from the historical journal, Nghien-Cuu Lich Su.

when the Dong-Son had been dated to about 800 B.C. (Heine-Geldern, 1945:146-147; Wales, 1961:81-91; Le-van-Lan & Pham-van-Kinh, 1968:38-41).

Such is the case with five bronze plowshares found at different sites that all date by typology to the early Go-Mun Culture (Lan & Kinh, 1968:38-41). Earlier in the 1960s, Nguyen-dong-Chi had reported that on the basis of bronze tools excavated at Thieu-duong and elsewhere, there had existed plows which were supposedly pushed and pulled by man, and that the Han Chinese in the first few centuries B.C. had improved upon this technique by the introduction of the water buffalo (Nguyen-dong-Chi, 1964; see Kramer, 1966:85-88). Now there is evidence for domesticated water buffalo in the northern Red River basin and Zebu in the southern Mekong River basin both at least by the third millennium B.C. I must note this does not necessarily indicate use of draft animals. Eberhard has significantly reported that water buffalo, pigs and elephants were used to turn-over and trample wet-fields in southern China, an alternate and probable precursor to using domesticated animals as draft animals (Eberhard, 1968:228, 265). Despite this, in the later Go-Mun the coincidence of water buffalo and the plowshare encourages an optimistic viewpoint. It is further evidence pointing to a high level of technology around the general region of coastal Champa during a period of time that could have well included intensive use of land such as irrigation works at Gio-linh suggest.

### **The Prehistory of Champa**

As I have said, much of the reconstruction of prehistory in Champa must be based on that which has been discovered to have existed in the region to the north and southwest of the central coast. The diffusions of which I speak are those that contributed to accumulation of the "core" culture of the Chams

prior to any systematic contact with Han Chinese and Indians. Elements of this core culture would have included staple and secondary crops, draft animals, plows, and artificial irrigation systems—assuming that these and other innovation were not independently invented by the proto-Chams.

With little question it can be established by the end of the second millennium B.C., if not probably earlier, there was already advance bronze, some iron metallurgy, and certainly the beginnings of true agriculture, in both the Red River basin and the Mekong River basin. This generalization is of course subject to differential diffusion so that some more remote peoples remained primarily stone-tool users and in a shifting horticultural mode. I definitely do not feel that the "narrow and rugged" coastline of Champa can be termed such a remote area. It is known that there existed overland routes such as through the valley of the far-reaching Da-rang River and prior to about 1500 B.C. there were possible coastal routes on exposed land along shore. Moreover if it is possible to accept Solheim's scenario that seagoing ships were plying the coast from as early as the fourth millennium B.C., then I can find it difficult to imagine the alluvial plains of the Champa coast escaping the advances of the northern and southwestern neighbors.

Furthermore, I argue that if the hypothetical Mimot Culture did engage in tank irrigation of some sort, and was contemporary to the other sites in Northeast Thailand, Cambodia, and South Vietnam, then by at least 2000 B.C. there could have existed at Gio-linh a conscious ability to use water and engineer it within permanent systems for the purposes of year-around cultivation. And on the fertile basaltic soils of both Gio-linh and Mimot, there also existed the physical capability of irrigated rice. Thus if there was domesticated rice here as far back in time as Non-Nok-Tha indicates, tank irrigation could have even permitted

double-cropping and certainly guaranteed enough moisture for a single crop. The importance of access to these resources may well have led to a concentration of control into the hands of elites who apportioned out the resources to the masses, thus perhaps stimulating the emergence of a class society (see Adams, 1966:54). A population provided with a relatively permanent source of food and area upon which to expand could then have multiplied to considerable proportions.

Such could have been the "Older Megalithic" Culture that earlier prehistorians had predicted or the "Expansionist" cultural tradition which Solheim has proposed (1969). Yet instead of one homogeneous culture, there was in Mainland Southeast Asia a "picture of local cultures, each with its own unique history but each also participating in active intercultural exchange (Triestman, 1970:363). One such unique culture existed along the coast of later Lin-yi and Champa, perhaps centered near the present-day Gio-linh and/or Sa-Huynh, in addition to many yet undiscovered sites lying under the rubble of war.

Perhaps reflected in the cloak of mystery that surrounded the prehistoric cultures of Southeast Asia until most recently, is the fact that a decline in level of broad cultural achievement must have occurred, probably in the first millennium B.C., relative to the peripheral regions of India and China. In the latter regions, due to various factors, man was able to evolve more efficient and stable social organization and economic management, processes that are discussed in the two contrasting theses of Wittfogel (1956) and Adams (1966).

### **Summary**

It is not unlikely that early man settled alongside the streams that ran into the sea from the abrupt eastern face of

the Truong-son mountains. Favorite sites were just at the base of the mountains where water was readily available in natural springs at the interface between impermeable rocks and permeable alluvium. Here too the blood of the land could be tapped as it came down the slopes and led away through sinuous artificial channels into waiting rice padis. Permanent and temporary dry-cultivated fields found sufficient moisture in the soil or from the fall monsoon rains. The rivers and ponds created from old meander scars on the flat plains supplied varied forms of life both beneath and above their waters. Many burned pockets into the mangrove forests that surrounded the estuaries and inner fringes of the lagoons, or settled on the sparsely vegetated sand dunes. For them life was little more than oriented to the sea, which returned bounty-fully to those who chose its expanses rather than the land on which to sow their labors.

The life of the farmer-fisherman that slowly developed was partly an original adaptation by an indigenous aquatically-oriented people who subsisted on products from the strand and from the soil. Fish supplemented taro and bananas and other predominately vegetatively reproducing plants. The settlement of the [possibly] malarial back-valleys and hillsides was made easier by the mixing of a dry-cultivating grain-eating people with adventurous souls from the lagoons. The early marriage of the broad language groups perhaps gave birth to the full-bodied goddess of rice, whose nourishment in rich silt-laden waters provided her subjects with a food of unending harvest.

The joining of these two systems of food collection and production was a potentially strong and viable subsistence resource-use system. Yet restricted by narrow valleys and coasts, over-shadowed by steep and heavily forested mountains fill with wild beasts, fronted by often tempestuous seas and rock shores, and subject to a climate that waxed and waned at

will, early men of Champa were called upon to use their fullest powers in order to ameliorate the hardly controllable forces of nature.

### **THE HISTORY**

"Prehistory" and "history" are entirely relative terms that only refer to [absence and presence of] written records. In many respects then, the summary to the first section acts as a link, for throughout the story of the Cham people, life was carried on much as I have described. Even the process of inter-ethnic mixing was part of the continuum of life. History chronicles images and consequences of human behavior deriving from social interaction with other men and in articulation with the bio-physical environment. In other words, that which history records at inception is only the beginning of the recording but not the beginning of the event or process. It seems like an abrupt change into the detail of history, but is only an illusion.

In this second section, I continue to examine my thesis that much of the technological and even institutional "core culture" [of Champa] is in fact indigenous from pre-contact times. Now I am able to truthfully use contemporary written evidence to discern *some* of the variables that characterize the unfolding story of the Chams. I concern myself with themes and processes of history that contribute to an understanding of the internal economy.

I broadly emphasize four themes in the second half of the chapter. First, I look through the eyes of the Chinese to reconstruct the beginning of the first historically known state of Linyi. Second, I rely on modern comparative historic analysis to discover how elements of Indian administrative genius may have reach Champa. Third, I introduce the dilemma that keep the Cham people from ever becoming a truly unified state system,

physiographic fragmentation that in an elaborated form encouraged particularist tendencies and the persistence of more-or-less independent clan-based chiefdoms. A consequence of fragmentation was temporal climatologic variation and spatial ecological diversity in resources that when overlain by a common and constant preference system, was manifested in human behavior by trade or exchange of, and internecine warfare or competition for, available subsistence resources. Fourth, I seek the causes and discuss the effects of domestic and international competition for resources on the viability of the internal economy of the Chams.

#### China and the Beginning of Historical Independence in Linyi

The first independent state that appeared in written records was Lin-yi (林邑), Chinese for an earlier native or Sanskrit name no longer remembered. "Lin-yi" in the contemporary Middle Chinese [language] was *Liēm-iēp*, meaning "forest city" (Shafer, 1967:17). This may have referred to the then prevalent forest vegetation but instead probably referred to a city or town with pallisaded walls and/or with houses erected on piles, both settlement and housing forms that are typical of modern Chams (Cabaton, 1910:341, 347).

Rolf Stein has used a controversial passage in a sixth century Chinese account to painstakingly locate this ancient state as ranging between Hoanh-son Pass (Porte d'Annam) and Hai-van Pass (Col des Nuages). He suggests that its capital was at Van-xa, just north of the modern Hue, and that there was a northern fortress at K'iu-sou (區鷓), near the modern Ba-don on

the Gianh River (Figure 3) (R. Stein, 1947:317-320; Hall, 1951:332-333).<sup>11</sup>

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<sup>11</sup> Coedes supports Stein's locations (1968:43), but Majumdar (1927:14-19), Claeys (1951:90), Bourotte (1955:25), and Wheatley in Schafer (1967:290, n. 5) all extend Lin-yi to Quang-nam or Cape Varella. This latter argument is based primarily on Auroseau's interpretation (1923:153).



During the initial Chinese domination to which history directs our attention, the region of Lin-yi was known to the Chinese as Jih-nan (日南), or Nhat-nam in Vietnamese, having been conquered according to tradition by the Han general Ma Yuan in about 43 B.C. (Keh Hung, c. 320-330 A.D., cited in Hsu, 1955:96). This interim of foreign rule saw continuous rebellion to regain the "richly productive farmland" (Wheatley, 1955a:132) and also to escape oppressive taxes (Wang, 1958:25-26).<sup>12</sup>

A Chinese historian Quach-Dinh-Di (1956, trans., Mai-Chuong-Duc, 1969) has recently pushed the dates for these uprisings further back than Coedes records (see 1968:43), noting that in 100 A.D. more than two thousand "barbarians" rose in unsuccessful revolt from the southern-most district of Hsiang-lin (象林) or Tuong-lam in Vietnamese. Hsiang-lin was equivalent to the southern part of the modern Thua-thien province. Soon afterwards in 107 A.D., there was a revolt on the border of Chiu-chan [Jiu Zhen] (九真) or Cuu-chan, the present-day Thanh-hoa to Ha-tinh, that put 1,800 [sic] miles of territory into the hands of the barbarians. If the border was the southern one, it would have overlapped the future Lin-yi.

In 124, the Chinese apparently lost some form of early influence over the people outside the borders of Jih-nan and reported it to be under the administration of the barbarians. Thirteen years later in 137 A.D., the natives supposedly captured the district capital of Hsiang-lin, then afterwards all of Jih-nan. Chinese reinforcements sent south were defeated and driven back (Quach-dinh Di, in 1969:138-139). In my interpretation of the sources is correct, it was then that the

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<sup>12</sup> The History of the Chin (Prior to 420 A.D.) reports Lin-yi to be poorly provided with *fei-wu t'ien* ( ), which means artificially irrigated (rice) fields (Wheatley, 1955a:132).

Chinese decided that only indirect rule would be used in this turbulent region, the rebellion in Lin-yi being the first successful challenge to the (still strong) Han Dynasty (Wang, 1958:26).

Finally in 192 A.D., a native official, Chi'i-lien (Khu-lien) founded the independent state of Lin-yi, initially out of the district of Hsiang-lin (Coedes, 1968:43).

The enumeration of dates is inconsequential in itself, but the frequency and success of apparently organized responses to foreign domination--diffused as it was--are of interest. In this context, R. Stein feels that these rebellions were internal in origin yet were organized from outside the Chinese sphere of influence, perhaps coming from the western hills (in Coedes, 1968:279 n. 56). The ability to wage continuous harassment, administer thousands of warriors, and for certain periods control some hundreds of [coastal] miles of territory may imply not the genesis of a new state, as Coedes and others have suggested, but the on-going tradition (in Dunn's sense of the word) of a distinct ethnic group whose technological and organizational capabilities had previously enabled them to coalesce into functioning political entities of rather substantial size.

Although the relationship between a given level of population and a specific degree of resource exploitation or mode of political organization follows no general law, it is interesting to note that in a census conducted by the Chinese in 140 A.D. in Jih-nan, there were recorded 18,233 households or approximately 100,676 persons (Wang, 1958:26). The census was taken just after the revolt of 137 A.D. in which such large parts of the rural population were lost to the "barbarians", ~~that~~ but Wang states that the figures probably represented only urban dwellers. This might put the rural population as high as

one million if an urban-rural ratio is considered at a conservative 1:10. If anything, the census figures would have been underestimated, for the advantages of this strategy might accrue uncountable taxes into the pocket of the Governor. The figures are curious in the light of a Chinese memoir of the fourth century that stated that rice played no part in the diet of the inhabitants of this prefecture, who lived solely off fish (Huan-Chung Chi, cited in Wheatley, 1965a:134). To me this seems to imply a Chinese disdain for the indigenous mode of food exploitation, as if they, the Chinese, had not contributed anything substantial to the agricultural "modernization" of the region. Ignoring for the moment the mode of food exploitation, I find it difficult to believe such a potentially high population could not have existed without relatively elaborate but still indigenous political structures, such as a system of stateless chiefdoms (see Cohen, 1968:53), descendants of one or more earlier independent states of substantial size. An indigenous political structure also seems to be supported by Coedes' observation that in even the earliest epigraphy, the grades of the official hierarchy and the ranks in the royal family were all from the vernacular "which probably go back to the pre-Indianized past", though admittedly the offices themselves had Sanskrit names (1966:222).

I am not saying here that there was no cultural input from the Chinese, for the coast's location demanded its economic and political orientation be always turned or at least attuned to the giant Middle Kingdom to the North. As I shall discuss below, Lin-yi [and Champa] probably contributed more in numbers of tribute missions than any other sovereign state in Southeast Asia from the third century through the seventeenth century. Much of the impact may have been concentrated into Lin-yi and not passed on into more southern Champa and Panduranga as such.

Anyway, Indian or Cham historians of the day were loath to mention the Chinese in anything but uncomplimentary terms. Still we see a glimpse of this cultural transference in the life of a reported Lin-yi born Chinese slave, who after serving his King and traveling back to his cultural homeland with a band of merchants, returned to Lin-yi and usurped the throne. There, as King Fan Wen, he instituted reforms in Chinese court architecture, fort building, town planning and the manufacture of tools and weapons (Wang, 1958:40).

**India and the Beginning  
Of Panduranga and Champa**

R. Stein attempted to synthesize the beginnings of Champa as follows:

De l'imbrication des suzerainetés du Fou-nan et des Lin-yi sur des états semi-independents due Sun-Annam du lieu, par ailleurs certain que unit directement le Fou-nan and le Lin-yi sont enfin le Campa héritées du Lin-yi agrandi (1947:318).

There seems to be little question of Fu-nan suzerainty over that part of the southern coast that was to become known as Kauthara and Panduranga (Khanh-hoa and Phan-rang to Binh-tuy) at least until the seventh or eighth century (Dupont, 1949). As I have suggested in the first section, the Cham and Funanese were probably of the same linguistic and ancestral culture group, but their exploitative strategies were probably quite different. This region's impact on the long-term economy of Champa was less in terms of Southerners receiving their Indian culture through the filter of Fun-an than probably in terms of allowing themselves to establish the tradition of independence, or in the context of Cham history, intransigence.

If one accepts Stein's and Coedes' position regarding the southern boundaries of Lin-yi, it is only conjectural to what degree Lin-yi's influence was felt south of Hai-van Pass. The

situation is clarified somewhat in a Chinese document written about 280 A.D., which states that Lin-yi

...touches Funan in the south. Their tribes are numerous; their friendly bands render mutual assistance; taking advantage of the ruggedness of their region, they do not submit (to China) (Pellicot, 1904, cited in Coedes, 1968:42).

I contend the statement that Lin-yi "touches Funan" refers more to the contiguity of the two states' claimed suzerainties than an actual common border between two territories under close and constant supervision. Thus it is possible that loose associations existed among the semi-independent principalities, possible continuing a state of affairs that antedated the Christian era.

There is really no way to establish the beginnings of Indian contacts with mainland Southeast Asia because archaeological materials are largely undated. Besides the Indian articles in interior Thailand that reportedly date from the first century A.D. (Bronson, 1971, personal communication), the earliest known historical recorded is found on the Vo-can-h stele inscription that dates variously from the second or third century A.D. This stele was discovered just inland from the old Cham-Indian center of Nha-trang. It recounts how a king names Sri Mara died only after having "satisfied his sons, brothers, and kinsmen by enjoying wealth in common with them..." (Majumdar, III, 1927:No. 1). This king may have been Funanese, Indian, or even the Lin-yi Chi'u-lien according to one scholar (see sources cited in Coedes, 1968:278, n.28 & n.41), yet significantly it is the earliest extant inscription in the Sanskrit language yet found in Mainland Southeast Asia.

In the central part of the Champa coast, just south of present-day Da-nang, there developed another early Indian

center. However, there in Amaravati, historic evidence is not found until about 400 A.D., dated by paleographic analysis. A series of inscriptions tells of the hero-king Bhadravarman I establishing a complex state (Amaravati) based on the king-temple system about which the Cham internal economy probably centered.<sup>13</sup>

As modern archaeology has pushed back in time practically all of our previous suppositions regarding *prehistorical* cultures and particular sites, it seems not unreasonable to also do so regarding the beginnings of Indianization. Thus I suggest that a late manifestation of this Indian contact in prerecorded times may be the reference in the Chinese literature that in 124 A.D., some sort of influence over peoples outside the borders of Hsiang-lin was reduced (Quach-dinh-Di, 1969:139). This may have referred to the beginnings of a newly organized state [Amaravati] originating at the confluence of the Song Ba and the Tra-bon rivers.

The state presumably would have evolved and expanded to when in the period of Bhadravarman I, a king's inscription could be found down the coast at Phu-yen. Mention of his name was even found in an inscription at the Khmer temple of Vat-Phu, which to the Cambodians is also known as the Temple of Bhadravarman (Coedes, 1968:48-49; Wales, 1957:128), and there is also a highly conjectural reconstruction of his name in an inscription found in Java (Ferrand, 1913:685, ref. p.685). Bhadravarman's territory was based in the present-day Quang-nam and designated by the Sanskrit name of Amaravati. It formed the nucleus of "classical" Champa and served as the religious center from the sixth century through the fifteenth century A.D.

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<sup>13</sup> The temple system is discussed in detail with the Appendix.

Although I have suggested that from prehistorical times there was some sort of a system of principalities to be found among the pre-Indianized Chams, it was the introduction of certain key foreign innovations that allowed expansion beyond the immediate confines of a river valley and that permitted the emergence of a distinct elitist "Great Tradition."

### **Processes of Indianization**

At the outset I must emphasize that "Indianization" like the other culture contact situations that emanated from the Chinese and Arabs was not necessarily restricted to a particular time-frame. They were all continuous phenomena that functioned throughout Champa's history. Yet in terms of relative structural change in society or technology, it is undoubtedly proper to confine oneself to certain periods.

Determination of the processes involved in Indianization has been a favorite object of study among many historians but among all of their grand theories, it is important to remember that this is a broadly-based culture change that over long periods of time saw many different emphases.

Following Coedes' discussion, Krom believes that it was a demand for products and propagation of Buddhism that formed the chief components of Indianization. Van Leur advocates the idea that native chiefs called upon Brahmins to increase their prestige and to consolidate their power behind the latter's magical powers. Coedes himself seems to emphasize a way of life that was adopted by acceptance of a specific philosophical and religious doctrine, and Paul Mus believed that common, fundamental Monsoon culture made transfers easier and more familiar (Coedes, 1966:50-52). All these models are satisfactory and accurate to a certain degree. However Bekker make the point that most elements of Hindu culture that did penetrate to the population at large "were channeled through the principal

instruments of social control by which the local aristocracy exercised its leadership" (1951:7).<sup>14</sup>

What were the principal instruments of social control in pre-Indian times?

Insight into past social organizations may be seen in the previously quoted passage regarding the "friendly basis" that rendered "mutual aid" and also Sri Mara, who shared his "wealth in common with" his sons, brothers, and kinsmen. These two very early references seem to have in common a description of a clan system that still characterizes the Chams and the most Chamized mountain people today. As early as 280 A.D., the Chinese seemed to subsume "band" below "tribes" and emphasized the same "mutual aid" that occurs among many of the modern-day Cham and Cham-related highlanders (Pelliot, 1904: 255, cited in Coedes, 1966:423). Mutual aid and the sharing of wealth among one's kinsmen is characteristic of the action of extended families under the roof of one longhouse. Among these peoples the group is supreme; everybody works communal fields and shares the produce (Lebar et. al., 1964:250-253). "Mutual aid" may also mark the existence of sodalities, which are special-purpose "voluntary" organizations that tend to cut across kinship and territorial lines. Fishing and irrigation cooperatives are general examples of sodalities both of which I contend existed among prehistoric Chams. Although the matrilineate that Loeb and Broek have associated so closely with the Cham longhouse of the present and past (1947:4140415) ~~it~~ does not appear in these two quotations, a reading of the Sanskrit and Cham inscriptions with this characteristic in mind makes the conclusion that women

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<sup>14</sup> Chapter V discusses social control and management of resources. Here I am concerned with illustrating how culture change was effected and what the "core" social structure was.

played an unusually central role in society unavoidable (see Majumdar, 1927, Part II; Maspero, 1928:17-18, 19 n.2).

These were probably the main institutions of social and economic control that formed the "core" culture of the pre-contact Cham. I must agree with Bekker that the main thing Indianization brought to the Chams was state administration and the capability to unify local forces by subsuming many parochial traditions under one common symbol (1951:7). With no such organization, the region of Amaravati became the nerve-center of the new state of Champa, and temples dedicated to the memory of the hero-king Bhadravarman I, particularly at Mi-son, became the "Mecca" and "Vatican" of all succeeding kings, no matter where the political capitol was located. The initial spate of inscriptions from Champa however, give the misimpression that all important activity was centered at Amaravati. In fact it was there that the king was, but his authority over the outlying regions must have often been somewhat tenuous. From prehistoric times, each river valley had been developing itself, and certainly innovations from India and China were not restricted to Amaravati and Lin-yi alone. The Vo-canh inscription appears quite early at Khanh-hoa, and Boisselier believes there may have been Buddhist missionaries landing in Panduranga sometime before the Christian era (1963:13-14).

The physiographical division of the coast and the fragmentation of communications that it caused, certain must have upheld the strong feudal structure of the indigenous Cham culture in face of unifying forces from Indianization (see Boisselier, 1963:1-2).

#### **Fragmentation and Trade in Champa's History**

Closer examination of the reason for fragmentation and particularism not only gives one insight into the nature of internal dissention but also the stimulation of intra-regional,

inter-regional and international trade. The nature of the rugged and indented Champa coast combined with the knowledge of a wide range of fully adapted subsistence techniques, including terrestrial and aquatic exploitation, accounts for a settlement pattern of people into a series of isolated but self-sufficient valley enclaves. The rather narrow zones of differing resource exploitation created an extraordinary diversity and a highly localized distribution of raw materials largely up and down in altitudinal transect[s] involving the basic food crops and other resources. However, in light of the marine and terrestrial environmental parameters that are discussed in Chapter III and IV, it is conceivable to assume a probability over 0.5 that somewhere on the coast during any one year some sort of natural hazard destroyed enough of one or more food resources that a subsidy may have been needed to maintain survival. Therefore, depending on the particular circumstances, and over and above that which was met by local subsistence, I contend maintenance of the economy of any village or large territorial/kinship unit was achieved by 1) incessant warfare, by which communities procured such materials as necessary by periodically raiding a neighbor's region, and/or by 2) organized trade combined with part-time and full-time community specialization (see Sanders, 1968:93). Both these externally oriented means for satisfying resource needs would have had long-range implications for the history of Champa and its overall economy.

#### Piracy

Incessant or internecine warfare was often manifested as piracy, thus taking advantage of the Cham's "natural" proclivity for the sea. Sopher has suggested that piracy seems to be governed by three conditions: (1) the existence of productive but defenseless coastal communities or the existence of a regular sea trade along regular routes; (2) a "fluid way of

life" in which tribal warfare, feuds, and raiding are accepted institutions; and (3) superior striking power and speed together with a degree of invulnerability and immunity in its own home (Sopher, 1965:253). I believe that my reading of the literature has largely substantiated these three conditions for Champa, but for the purposes of this paper, I merely offer these opinions as hypotheses for further study.

#### Trade

For the economy as a whole, and certainly for many specialized villages and institutions, trade was a long-term feature of regular necessity. I would like to suggest that conflicts over trade policies and rivalries over access to products or trading routes are factors in Champa's relations with her neighbors that many historians have overlooked. In terms of the internal economy, and in addition to the above hypotheses regarding trade as one means of subsidizing a potentially precarious livelihood, I believe the consequences of these conflicts and rivalries were first, the outward drain on material and human resources for the purposes of supporting seemingly continuous warfare; second, the resultant destruction of capital resources when retribution was meted out; and third, the renewal of strain on the economy in order to forever reconstruct oneself.

The discussion below treats some of the recorded examples of conflicts particularly in reference to the Vietnamese, the Chinese, and the Khmers. It is not meant to be a complete listing of the trade conflicts.

#### The China Trade

It was trade that brought the Chinese to this country, bringing them back many times, sometimes in peace but too often in vengeful or covetous anger (see Wang, 1958:64). This trade consisted of the attraction of rare tropical animals and plants

and their products, to say nothing of abundant gold, silver and copper. Later Chinese sources talk of vast quantities of gold produced in Champa, so much that a king of Lin-yi in the fifth century A.D. allegedly offered as tribute—actually ransom in this example—180 metric tons of copper, 60 metric tons of silver, and 6 metric tons of gold (Wang, 1958:52). That is not too exaggerated as shown by the supposed capture of 50 tons of gold the next year in such a sacking of the Lin-yi capital at Van-Xa and its surrounding region that the state never again regained its former prosperity. The reason for this sacking was punishment against the Chams for decades of piracy and raids (1958:48).

Relying only on historical records and some projections into the past, Wang claims that by the end of the second century B.C., trade had already begun between Giao-chi, in the Red River valley, and Annam (a much later name) probably referring to Lin-yi. Thus one would be led to believe that organized and protected trade between the Chams and the Han Chinese would have begun from around the time of General Ma Yuan in 43 B.C. However in light of Solheim's and my own hypotheses, it is likely that some degree of "inter-regional" trade antedated this by something over one thousand years.

The archaeological excavations of Janse at Lach-truong in North Vietnam (1947-1958, 3 vols.) and of Malleret at Oc-eo in South Vietnam (1958-1960, 3 vols.) have both shown that the trading links ultimately extending to the Mediterranean civilizations had begun to import things into mainland Southeast Asia from at least the second century A.D. (Groslier, 1962:59). Throughout its history, the coast of Champa played an important role as a way-station and as a re-exporter of western goods to China (Wang, 1958:33). This is exemplified by Wang's statement that "the prosperity of Lin-yi must be recognized as a major

factor in making the first century after 623 the most successful period of the Nanhai (South China Sea) trade" (1958:91).

#### Tribute to China

Between 226 and 331 A.D, Cham kings began paying tribute to the Chinese emperor, a tradition that in comparison to other Southeast Asian states, Champa exhibited an understandably strong and fairly continuous record (Wang, 1958:31). Although the purpose of the "tribute" has sparked an unsolvable controversy among historians, it can generally be said that the states peripheral to the Middle Kingdom were made to pay tribute in order to get some political or economic advantages, assuming that a degree of prestige, power and distance made it advisable to do so (1958:118-119). For any one of the successive kingdoms on the Champa coast, all of these factors made trade more than just an exercise in profit-taking.

The association between the sending of tribute and control of the South China coast was also a factor. When communications with the northern heavily populated regions of the Huang-ho and Yangtse River valleys were disrupted, the volume of trade decreased. Yet when a new dynasty enforced the law and maintained order, missions were often sent immediately from the southern countries in order to establish relations and assure that they might be officially recognized and their merchants protected (Wang, 1958:52).

#### Trade Disruptions: The Chinese and Vietnamese

The direct effects of the disruptions in terms of Lin-yi and its successor states of Amaravati and Panduranga was often the occasion for raids on the relatively unprotected coastlines of Giao-chi and the southern coasts of China. These of course called for counter-raids by the aggrieved states, which had larger resource bases to provide larger armies (or navies). When the Vietnamese regained their independence in 960, an exorable

movement to the South began, which, in fits and jumps, gradually pushed the Chams further south and finally over-ran them in the seventeenth century.

In addition to the periodical lowering of defenses by the Chinese and the Vietnamese for whatever reason, I suggest these raids were seen from the viewpoint of the Cham in part as often rightful retaliation of oppressive and arbitrary applications of taxations and import tariffs. As early as the second century A.D., a Chinese document comments that concerning the corruption of a Governor in Giao-chi, "the junior officials and people (merchants) are very angry and (often) rebel in protest" (Hou Han Shu, cited in Wang, 1958:25 (後漢書); (parentheses are Wang's). And later in the fourth century:

The governor of Chiao-chou and the prefect of Jih-nan were very covetous and imposed a tax of 20 to 30% on their goods...But when Han Chi was prefect of Jih-nan, he assessed their merchandise at less than half its value, and then (intimidated them) with his ships and war-drum. Because of this, the various countries (from which the traders had come) were "furious" [Chin-Shu, quoted and trans., in Wang, 1958:45, comments in parentheses are Wang's).<sup>15</sup>

After the above incident, Wang continues that the usurper Fan Wen, the same Fan Wen previously mentioned, took the throne of Lin-yi "and after he had disposed of his rival states to the south and west, he marched on Jih-nan and captured [it] in 347" (1958:40).<sup>16</sup>

These raids enumerated above are only excerpted events in the long turbulent story of Champa's life. Jih-nan and in fact

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<sup>15</sup> *Chiao-chou* was the successor state to *Gaio-chi* though it remained under the control of China. About one century after independence was declared in 950 A.D., the name changed to *Dai Viet* and in the thirteenth century to *An-nam*.

<sup>16</sup> *Jih-nan* at this time refers to [the] river basin of the Song Gianh just south of the Hoanh-son Pass (Coedes, 1968:45).

most of the old Lin-yi, as I envision its borders, remained a bone of contention at first with the Chinese and later with the Vietnamese, until it was finally lost for good in the fourteenth century (Coedes, 1968:239).

The actual raids against China were mainly restricted to the first six hundred years of the Christian era. After the 443 sacking of Van-Xa and a later unprovoked raid on the new Cham capitol at Simha-pura, the Cham noticeably reduced their attacks on China's home soil.

#### Trade Disruptions: The Khmer

Disruption to the internal economy was also directed from the south and over the mountain by the ethnic Khmer for a period at least as long as that interaction from the north. At first this conflict probably manifested itself in competition over rights of access to mountainous regions and highland plateaus where certain products such as ivory, gold or aloes-wood were especially concentrated, or to certain tribes who may have exhibited a particular skill in producing such desired products. Later it was actually political domination of tribes and regions that cause bitter and bloody conflicts to spread destruction from the highland down to both centers of civilization.

A recently discovered inscription at the present-day Khmer temple of Vat Phu (near Cham-passak) has confirmed the oral tradition of the Khmers wresting the surround territory of the Middle Mekong from the Chams in the late fifth century or early sixth century (Coedes, 1956:210-220). The king who may have responsible for the expansion—if that was what it was—this far west was probably Devanika, or Fan Chen-ch'eng. He appears to have been the grandson of the king whose capitol at Van-xa was destroyed in 443. For several reason including the obscure history of Lin-yi after 443 and the appearance of an already established dynasty at Amaravati in 520 A.D. (Coedes, 1968:65-

66), I conjecture that the westward expansion was the result of a rapid growth and development under Indian tutelage and was perhaps related to the earlier expansion under Badravarman I at the end of the fourth century.

As with the other so-called expansion of the Chams, this early move was probably specifically for the purposes of controlling access to the riches of the interior, and establishing a land trade-route to Chen-la or Dvaravati, the latter whose existence has been pushed back in time by recent excavations (Coedes, 1968:63; Solheim, 1971, personal communication). Based on Wat-Phu and the existence of Kompong Cham Dau (Old Cham Citadel), along the lower Sa-San River in the Middle Mekong basin, some scholars have been led to believe that the entire region from the eastern coast to the Mekong had been under the hegemony of the Chams or Cham-speaking peoples, from even before historic periods (Spenser, 1954:239).

There is however a V-shaped distribution of Austronesian speakers splitting apart presumably more ancient Austroasiatic speaking highlanders. The wide base of the "V" is on the eastern coast, from which the only easy passage is via the Da-rang River in Phu-yen. The linguist Thomas has suggested this indicates some very early moves from the coast westward, perhaps the first few centuries A.D. (1964:398; see also Bourotte, 1955:27). Perhaps a thorough excavation of Kompong Cham Dau will answer this mystery. Certainly one is tempted to relate the V-shaped wedge of Austronesian speakers with the alleged expansion of Amaravati that I have suggested above.

All of this would seem to indicate some degree of conflict, probably stimulated over rival claims to certain regions containing valuable products, that continued throughout Champa's history and probably [back] into its prehistoric period. At first the conflict would have been directed northward toward the

territory held by the Lac-Viets and southward toward the empire of Fu-nan. Over the mountains there was probably some rivalry with the Austronesian speakers of Fu-nan and the Austroasiatic speakers of the present-day Thai plateau and Mekong River valley. As the Khmer empire coalesced out of the two Chen-la's and they began to desire their own hinterland from which to draw prestige goods and a supply of slaves, the rivalry with Champa would have gradually escalated.

It may have been a systematic attempt to organize supposedly anarchic highlanders that touched off the devastating wars between the Chams and Khmers during the twelfth century (see American University, 1966:869). Many bloody battles were fought in the mountains and from 1145 to 1149, and later from 1203 to 1220 the Khmers were able to almost completely occupy Champa. Causing the latter particularly hard domination was a surprise attack by water on the magnificent Angkor Wat in 1177, in which the Khmer capitol was ravaged by the Chams. The revenge was led by the great Jayavarman VII, building of Angkor Thom, and really was felt in Champa from 1192 on.<sup>♦</sup> There was no final victors in these century long wars, and after this series of struggles, the Cham never had to worry about the Khmers again (Coedes, 1968).

#### **SUMMARY**

All these conflicts, whether they were with one's neighbors in the next village or valley, or with rival international powers, they all took their toll on human and natural resources. No matter which scale, raids demanded revenge and revenge demanded counter revenge. If there in any general theme that has

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<sup>♦</sup> For some inextricable reason, "Angkor Thiem" was typed in the original thesis, when in it is obvious from my cited sources it was "Angkor Thom".

characterized the history of Champa and its internal economy, it can be summed up as construction, destruction, and reconstruction. In this chapter I have tried to show what components went into the ~~construction~~ [composition] of the core culture. I have also begun to approach the phenomena that tended to destroy or impair the existence of physical objects and human institutions. In the two succeeding chapters, I shall continue to examine the physical and cultural parameters that shaped the development and influenced the operations of techniques designed to exploit terrestrial and marine (or aquatic) food resources.

## CHAPTER III

### HABITAT AND PRODUCTION OF AGRICULTURAL RESOURCES

In the following two chapters, I reconstruct and describe the Cham's articulation with the biophysical environment in their quest for food. Such articulation or functional interrelationships are conceived in terms of adaptive strategies that the Cham used to direct the energy potentials in the total environment toward their own ends. In this chapter I suggest how the Chams settle the landscape from lowland plain to hilltop and used largely indigenous technology to moderate nature's inconstancy and destructiveness while fully exploiting her diversity of resources. In particular, I emphasize that all coastal and interior lowland valleys and some of the foothill slopes and plateaus were settled by the ancient Cham.

The Cham diet centered on wet rice or padi, was supplemented by other staples such as millet, dry rice, yams and taro, and was complemented by a variety of vegetables, fruits and nuts. The resultant array of plant resources and production techniques comprised an adaptive strategy that demanded energy subsidies in the form of irrigation and draft animals. I have arranged this chapter in four sections: first, I emphasize water availability along with edaphic factors in a discussion of biophysical parameters; second, I describe the production techniques and cropping systems and their demand for water; third, I discuss the origin and integration of irrigation facilities; and fourth, I discuss the provision and care of draft and other domesticated animals.

#### BIOPHYSICAL ENVIRONMENT

In this section I view parameters of the biophysical environment in terms of extremes or excesses which the Cham then sought to moderate or to exploit by conscious human adjustments in behavior and technology. For purposes of food production, these adjustments were articulated by soils and their limitations and by the availability of water. Because the single major crop in terms of total labor input was padi, a plant

essentially grown in a "culture medium", I emphasize water in all of my discussions here. I examine those portions of the water cycle that directly affect man's food production strategies such as rainfall, its surface-runoff in rivers, its excess accumulation as the result of flooding and its occurrence under the ground. Flooding is separated from river flow because in Central Vietnam, it is also a function of location, typhoons and tides. Throughout this section, I emphasize the function of interrelationships between man and the environment—in other words, I look at both man's capability of adjusting his way of life or *genre de vie* to the environment, and also his capability of modifying the environment.

Although padi and its adaptive technology of production was relatively independent of the natural fertility of soil and in some locations the topography of land, other staples such as dry-rice and millet, and vegetables, shrub- and tree-crops relied much more on a soil substratum.

### Soils

Late in the portion of history that was allotted for the Cham's active imprint on the landscape, the Chinese observed that "the soil is of white sand with but very little arable land" (Chau Ju-kua, citing Chou K'u fei, 1178, trans., Rockhill and Hirth, 1911:50, no. 6). I speculate that only the extreme coast was observed and that for reasons of fear the Chinese did not venture inland to where they would have seen more fertile soils.<sup>17</sup> Even present-day sources that comment on the poor state of soils and their unsuitability for cropping must be perceived as observation of a modern landscape which has undergone considerable natural and man-induced change. It is also possible that the Vietnamese maladaptation has distorted perceptions of soil fertility from the viewpoint of the Vietnamese narrower resources exploitative base.

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<sup>17</sup> Cady notes that the Chams "were not noted for their hospitality and generosity to strangers" (1964:107).

In general, both upland and lowland soils have been formed from ancient crystalline masses that were partially covered by basaltic flows in the later Tertiary and Quaternary periods (Dobby, 1967:288; U.S. Engineer Agency for Resources Inventories and Tennessee Valley Authority, 1968:15). The higher soils are products of in-situ weathering and/or decomposition. Ultimately these soils erode downslope and downstream to form alluvial soils. Most upland soils today are infertile and may have been relatively so in the past, but changes in vegetative cover and/or land-use may have increased that infertility. Such infertile upland soils are in contrast to the scattered occurrences of fertile and impermeable black alluvial soils which may form on the gradual sloping relief of basaltic outcroppings on the coast. In the soil there, naturally available volcanic stones and blocks have been used to build up terraces (Indochine, 1931:151), and both Gourou (1945:132-133) and Robequain (1944:59) have suggested that these terraces were the original work of the Chams. The black alluvial soils that form in the natural and artificial basins in the terraces are particularly enriched by plant nutrients suspended in the water after run over the basaltic soils above. Some large areas in the alluvial valleys of Quang-tri, Quang-ngai, Binh-dinh and especially the valleys of the Da-rang River and the hills above Tuy-hoa in Phu-yen, have benefitted from streams originating in or passing through basaltic regions (Indochine, 1931).

As streams meandered back and forth across valleys and pushed deltas out into the sea or upon marine terraces, alluvial and brown alluvial soils were deposited. The largest area of alluvial soils occur in the relatively broad river valleys from Binh-dinh to Khanh-hoa, but they also extend northward in the deltas and especially in the interior lowland valleys in the Truong-son foothills.

Along the coastal zone, swift-running and seasonally changing ocean currents have been sweeping back and forth for thousands of years between headland bars of sand. The tidal marshes and sand dunes that

have formed in the lower bays contain soils with quite porous substructure and in the lower areas of old lagoons and river beds [are] soils subject to hydromorphism and saline intrusion. The Panduranga plains south of Phan Rang are old marine terraces over which sandy alkaline soils have formed [where] in this arid climate, soils with sufficient water can be made quite fertile (Nguyen-thieu-Lau, 1941:198; Nguyen-hoai-Van, 1962:55-57; 76-77).

### Climate

For padi and other irrigated vegetables and fruits, climate is more important than soil as a limiting factor for the location, output and frequency of successful harvest.<sup>18</sup> More particularly is the uncertainty of rainfall incidence, the fluctuation of which along the Champa coast is greater than any other in Southeast Asia (Dobby, 1967:90). Within a range of precipitation extremes, a period of higher than normal wetness does not guarantee a greater availability of water to replenish ground water nor does it increase the amount of water for plant respiration and growth. These parameters are generally fixed by physical constants of topography, soil structure, plant physiology and the atmosphere. It is water runoff that increases with increased rainfall. Lower than average or absence of rainfall means that requirements of the constants are not met; hence it is said that effect is usually proportional to deficit, and any extended dry period may be accumulative in its total biophysical and cultural effects (Raikes, 1967:78-79).

The above parameters are some of those that determine whether a particular crop will successfully grow in a given habitat. When systematically structured in a water balance, they can measure the water

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<sup>18</sup> In the face of no satisfactory evidence to the contrary, I assume that no significant climatic change has occurred since 500 A.D. One source suggests that the first thirteen centuries A.D. were generally dry but trended toward more humidity in the fourteenth century (Tabuchi & Urushibara, in Yoshino, 1971:251-252). However, this conclusion is based on one indirect and speculative cultural phenomena, the abandonment of Angkor Wat.

deficit and water surplus for a theoretical vegetative cover and thus approximate the need and availability of water for irrigation (Figure 4). They may also aid in reconstructing cropping cycles and water-control systems. Fundamentally the water balance is computed from rainfall, soil moisture storage and potential evapotranspiration (Thornwaite, 1955).<sup>19</sup> Unfortunately I was able to rely only upon parameters in the lowlands and also those most applicable to crops watered by natural rainfall. Therefore the usefulness of the water balances is more as descriptive devices than as predictive ones.

Six of the seven stations show an overwhelming maximum of precipitation in the ninth and tenth lunar months (October and November) in the fall and a much lower precipitation in spring and summer.<sup>20</sup> The fall maxima are the consequences of the northeast or "winter" monsoon from the South China Sea being forced upward before the mass of the Truong-Son range and then releasing its accumulated moisture as orographic rainfall. The southwest or "summer" monsoon, which affects the bulk of the precipitation in Southeast Asia, is almost spent-out by the time it has crossed the Indochinese peninsula (see below for exceptions).

The total annual rainfall decreases south of Quang-ngai as the abrupt face of the Truong-Son changes from being broadside to the direction of the northeast monsoon to being parallel. This creates a reduction of the orographic effect and the appearance of localized dry

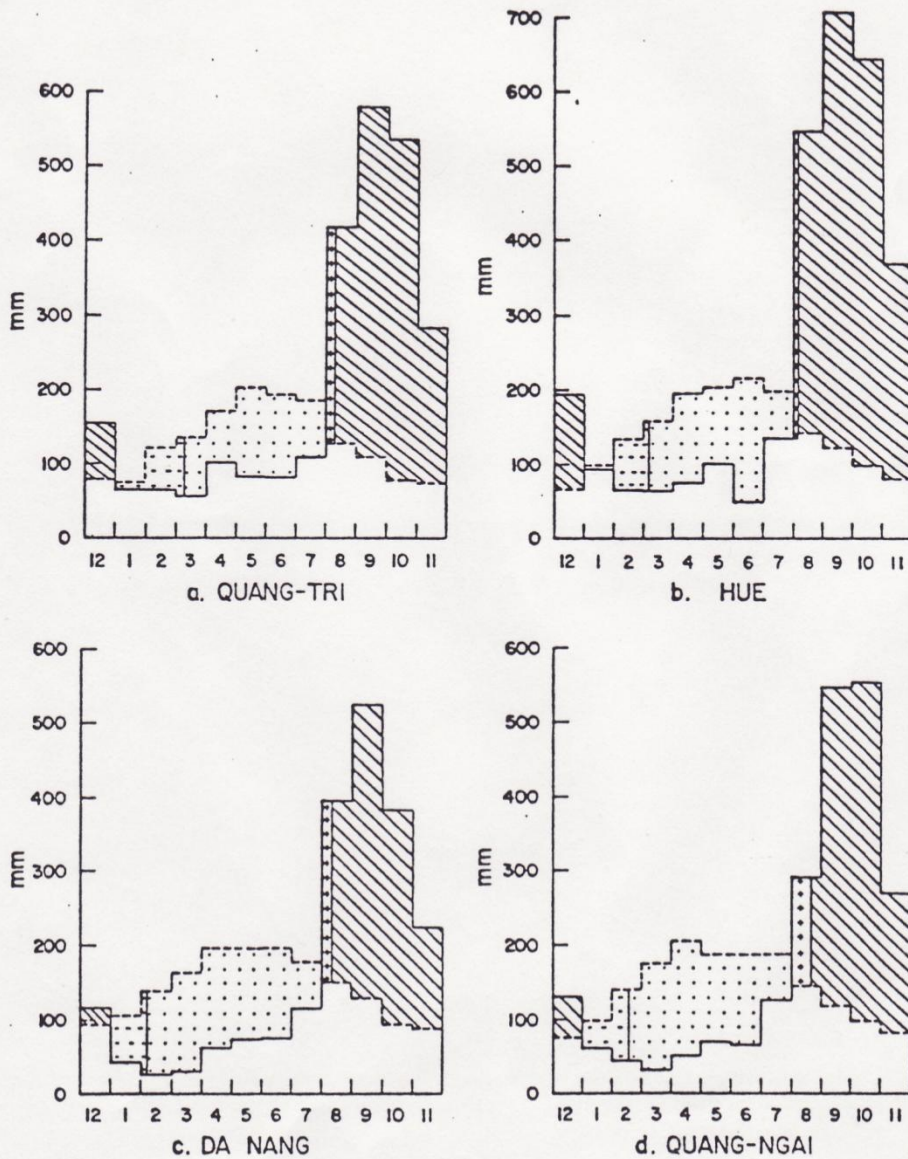
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<sup>19</sup> To avoid Thornwaite's short-comings in estimating evapotranspiration in the tropics, I have used Penman's aerodynamic and energy-budget model. This uses observations of solar radiation, temperature, wind speed and humidity (Chang, 1968:16 6-170). Because of data insufficiencies, solar radiation for Vietnam is only approximated and even that is not from one standard time period. Measurement of soil moisture is only an estimate and for a flooded padi-field may be virtually meaningless. Despite these shortcomings, the Penman method models reality better than the temperature-rainfall diagrams French and Vietnamese geographers commonly use, and for my general purposes it is entirely satisfactory.

<sup>20</sup> The designation of lunar months is related to the standard labeling of rice-cropping regimes according to the approximate lunar month in which they are harvested.

Figure 4. WATER BALANCE DIAGRAMS

- Water surplus
- Water deficit
- Rainfall
- Soil moisture used
- Potential evapotranspiration
- Recharge



zones in the deep valleys (see Claeys, 1939:42). An additional factor is the occurrence of typhoons. According to an 84 year record, the region of Quang-tri to Quang-ngai (Lin-yi to Amaravati) average 1.29 typhoons per year, Binh-dinh to Phu-yen (Vijaya to Da-rang) averaged 0.75 per year, and Khanh-hoa to Binh-thuan (Kauthara to Panduranga) averaged 0.11 per year (Michigan University, 1962). This indicates that a decreased incidence of the heavy rain-producing typhoons from north to south undoubtedly accounts for part of the decreasing mean monthly rainfall figures. In addition, it sheds light on the fluctuation of rainfall that is greatest in the north. South of Nha-trang, the wind blows parallel to the coast (Buttenson, 1968:10), and Lam-thanh-Liem describes an "upwelling of cold ocean currents from Phan-thiet to Phan-rang" (and probably north to Cape Varella) (in Nguyen Huy, 1969:96-97), which produces an eastern version of a "west-coast desert climate" (Strahler, 1970:156-157).

Southward from Phan-thiet, the water balance shows a somewhat more equitably distributed rainfall maximum, but also a virtually absolute minimum of precipitation for three or four months (see Figure 4, h.). The "west-coast desert climate" accounts for reduced rainfall in the rainy season and drought in the dry season, but the wet season is lengthened to about April-May to October by the southwest monsoon coming over the low mountains to the rear and through an open corridor on the southern coast (Nguyen Huy, 1969:93-94).

Although there is a higher frequency of droughts in the north than the south, the higher potential evapotranspiration in the lower latitudes causes water deficits to increase in magnitude and length. This periodic hazard is aggravated from July through August by a foehn wind, locally called a Lao wind (from Laos) that is created by local topography in combination with an absence of the northeast monsoon, which allows the summer monsoon winds from the southwest to fall over the abrupt eastern edge of the Truong-son range (Nuttonson, 1968:10). As the winds fall they heat up and dry out, provoking intense

evapotranspiration. According to one writer describing Phu-yen, the winds "are strong enough to blow away and collapse houses, dry up fields, and wilt the agricultural produce (Nguyen-dinh-Tu, 1965:57).

Fluctuation in rainfall in incidence of typhoons, and in durations of Lao winds and droughts (all of course interrelated) may be localized in occurrence and not necessarily felt by one's neighbors. I have already spoken of one consequence of this in terms of historical continuities. Another consequence was that water control was made imperative both to artificially reduce the probability and damage of drought and to moderate the damage of flood.

### River Regimes

Assuming adequate rainfall in any one year, it was the nature of Cham water utilization systems to rely less on direct precipitation or natural irrigation, and more on the capture of water from streams (or from springs). In the water balances I have computed, there does exist an association between variability of stream flow and a given season, and regional variation in rainfall and water surplus, yet it is only partially reflected in my data for the coast of Central Vietnam because of the inadequacies previously mentioned. More relevant is the amount and seasonal variation of stream flow which depends on the location of the catchment system, with respect to the distribution of rainfall and its principal regimes (Wikkramateleke, 1963:44). This was especially important for those subsystems of Cham irrigation that relied on the capture of low-order streams in the higher elevations or depended on strong and continuous stream currents through the dry season.

Most of the rivers are short, steep and swift and probably receive most of their direct runoff from the orographic effects of the northeast monsoon, which leaves its heaviest precipitation on the higher eastern slopes of the coastal mountains. Several long rivers such as the Vu-gia and Thu-bon in Quang-nam, the Tra-

Khuc in Quang-ngai, the Da-nang in Binh-dinh, the Da-rang in Phu-yen and the Song Giang above Nha-trang, all have their headwaters in zones that are wet when the eastern lowland zone may be simultaneously dry. The headwaters are subject to the earlier rain from the north-eastward passage of the summer monsoon before the heavy rains from the fall monsoon have hit the coast (see U.S. Air Force, 1965). At the initial "break" of the summer monsoon there is a minor off-season peak of rainfall in May or June along the eastern coast when the north-east winds have not yet started. This slight peaking is measured at all coastal stations except Da-nang, Quang-ngai and Qui-nhon (Figure 4). In terms of stream flow, these rainfall patterns mean that the long rivers have more uniform flow. Even the Joint Development Group [JDG]'s rough figures indicate a relatively large flow in the dry season that is sufficient to supply water year-around to the JDG's (ill-defined) irrigable lowland areas (1970:432, 437, 444, 498).

During the height of the rainy season, the approximations of the water balance diagrams give one a vivid picture of the large amounts of water that are swiftly drained off the steep slopes. In the drier northern region, Nguyen-Huy talks of standing on the Phan-ri plain and watching "dark clouds over the mountains pouring down rain from the top of the mountains to the plains" (1969:94). An old Cham ritual hymn is even more relevant:

The rain falls on the mountain; it falls with (an) uproar, pouring through the garments (the forests and the lands) of the king. It rains on Mount Rapat; the god and his wife are bathing. They are up to the mouth in water and the king cannot swim (quoted by Cabaton, 1910:343; edited).

### Flooding

I estimate that the rapid runoff that occurs today and results in innumerable flash-floods was less a millennium or two ago when I presume that more of the hills along the eastern slope were under soil-binding and moisture-airing vegetation. However major floods would have been unavoidable. These today are caused by the occasional passage of typhoons which have been known to dump over 150 to 300 mm. of rainfall in twenty-four hours (U.S. Air Force, 1965:50). Because of the sudden increase in rainfall, overland sheet flow and stream flow abruptly quicken often scouring everything before it — fields, dams, tanks, and habitation sites (U.S. Air Force, 1965:63).

If that is not bad enough, when the landward flooding is combined with high tides and aggravated by an already high water-storage (mean tide level) in winter (Dale, 1956:27), large areas of the coast, sometimes far inland, may be subject to disastrous flooding (Dobby, 1967:43). In this situation[,] ~~are~~ the coastal lowlands of Thua-thien, Quang-nam, Quang-tin and Binh-dinh ~~which~~ are, and presumably were, crisscrossed with natural and man-made waterways such as to provide avenues of approach up which seawater could be wind-driven (see Burton & Kates, 1964:379-380).

A less dramatic flooding occurs in Thua-thien province (Lin-yi) when the Huong River overflows its banks in the fall and displaces salt-water from the lagoons into previously fresh-water padi fields. Similar salt-water flooding is also quite prevalent in Binh-dish and Phu-yen (Vijaya and Darang) but is reduced in the southernmost provinces. In Quang-nam and Quang-ngai (Amaravati), the rivers run swiftly through deep-cut channels with increased carrying capacity. These rivers reduce area-wide flooding and also the effects of salt-water intrusion (Joint Development Group, 1970: 429-496 passim).

Flooding is a consequence of direct rainfall river regimes and

levels of tides. My brief discussion of these physical parameters in addition to those concerned with drought or dry winds have all tended to be negative or limiting in their affect on man and culture.

### Ground-water Resources

Ground-water is created by a portion of the water surplus infiltrating deeply into the soil and percolating down through the parent material until it is blocked by an impermeable strata and trapped within a porous, permeable rock layer called an aquifer. When the aquifer is exposed to the surface, the water will emerge as a spring, but if the aquifer is still underground its water may be artificially allowed to rise or be brought up to the surface through a well.

In Central Vietnam there is generally plentiful potential groundwater that can be tapped at the contact zone between relatively porous basaltic rocks and relatively impermeable crystalline rock or heavy alluvial clay (see U.S. Engineer Agency, 1968:82, 84). Such occurrences are found in the basaltic hills of Phu-yen and at Vinh-linh to the north (Indochine 1931:152; Colani, 1940:24). They may also occur in pockets or interstices within the basaltic formations such as at Gio-linh and Cam-lo in Quang-tri (Colani, 1940:11, 44). A widespread distribution of potential resources exists in the hills as well as in the plains, "especially where well-drained sand dunes and sandy soils meet heavier and more impermeable clays (Great Britain, 1943:45). There are great untapped sources of such underground water beneath the dry and sandy plains of the former Panduranga and there is indication that it is relatively shallow and pure enough to drink, even by modern standards (League of Nations, 1937:68-69). One of the few recorded instances of these ubiquitous springs is one mentioned by Nguyen-thieu-Lau where "l'eau de résurgence" is fed into an old Cham irrigation system on the plains of Ninh-hoa (1943:13).

The Chams attached great sacred value to springs in the mountains and plains and constructed shrines and temples nearby or even enclosing them. Yet an equally important significance of springs and wells was the potential uniform supply of fresh water throughout the year despite the natural hazards of drought, dry winds, and salt-intruded streams and coast lands. I believe that a major factor that permitted continuity in the economic system was the technological capability of the Chams to ameliorate many oppressive physical parameters by means that included systematic utilization of ground-water resources.

### **SUMMARY**

In this introduction to physical parameters as they affect the ecology and production of terrestrial food resources I have tried to emphasize certain phenomena to which the Chams would have had to react successfully and continuously in order to maintain their mode of cultivation and ultimately their level of "civilization". The parameters may be summarized as follows:

1. In terms of soils, there were extremes of dryness caused by excessive drainage and extremes of wetness caused by insufficient drainage.
2. In terms of climate, there were extremes of aridity in the first part of the year and concentrated amounts of rainfall in the second part, in addition to variability of critical amounts of floods in the rainy season.
3. In terms of river regimes, unregulated streams produced inadequate base flow in the dry season and frequent and uncertain onsets of floods in the rainy season.
4. In terms of ground-water resources, there were potential supplies that if recognized could be tapped to assure either supplementary or year-around provisions of an otherwise seasonal resource

## **CROPPING SYSTEMS AND THEIR USE OF WATER**

It is my central argument in this second section that the Chams utilized mostly indigenous adaptive strategies to fully exploit the coastal landscape from salt marshes to mountain tops. I develop most of my arguments in the context of the availability of water, as I have just discussed, and also in terms of the demands laid upon that availability of water by the different crops, cropping regimes and adaptive levels of plant cultivation. I have divided the section into four crop production strategies as arranged according to importance of total labor input and capital investment (1) rice or padi agriculture, (2) permanent gardens and orchards, (3) permanent dry horticulture, and (4) shifting dry horticulture.

### **An Historical and Ethnographical Reconstruction of Rice-crop Regions**

The continuous cultivation of padi demanded large and reliable inputs of land, labor and capital equipment. Where and when these inputs had to be delivered to keep the system going and when the outputs could be expected, give valuable insight into the functioning of the Cham systems of livelihood.

The average crop of padi or wet-rice needs about 30 cm of rainfall spread relatively uniformly over the growth period (Economic Survey, 1957:39). There must also be water to prepare the field and grow seedlings for transplantation. The length of flooding for the padi-crop varies according to variety and cropping sequence, but after flowering water must be gradually drawn off until the field is dry for the harvest (Grist, 1965:02).<sup>5</sup>

A gross comparison of these requirements with the water balance diagrams (Figure 4) indicates that in periods before artificial irri-

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<sup>5</sup> The preceding figures are very approximate and may be used only with extreme caution particularly because it says nothing of padi that is watered by ether than natural rainfall.

gation only a fall crop of either padi or dry rice would have been possible. Irrigation offered a capability (but not a necessity) for double-cropping, the growing of a second crop in the dry season. In the historical record, the first mention of double-cropping capability was the *fei-wu* irrigated fields in fourth century Lin-yi (Wheatley, 1965a:132), but not until the Tang dynasty (618-907 A.D. in Amaravati is it positive that rice was cropped "twice in a year" (in Schafer, 1967:72). The second crop could have been harvested either in spring, providing the farmer had conserved water from the heavy precipitation of the northeast monsoon, or in late summer just before the rains, providing the farmer had captured the augmented current of long rivers whose headwaters had benefited from the late-spring "break" of the southwest monsoon.

These are generalities but for a more complete reconstruction, I argue that because rice varieties and the timing of sowing, transplanting and harvesting evolved in adaptation to relatively unchanging local habitats, they are conservative physical and cultural phenomena that persisted when the Vietnamese replaced the lowland Chams. For instance, in present-day central Vietnamese short-cycle (100-120 days) or long-cycle (over 120 days) varieties, there is nearly always at least one variety of non-Vietnamese origin, and thus very probably attributable to Cham origin (Thai-cong-Tung, 1965:61; Nguyen-dang-Liem, personal interview). Such an argument in its general form is strongly supported by Nguyen-thieu-Lau, who in talking about the Vietnamese move into Champa stated:

Dans toutes les régions des collines, les Annamites n'auraient donc fait que remplacer les première colons, en abandonnant leur travaux d'irrigations—il est vrai— mais en adoptant leur cultures, le site de leur habitat et aussi, peut-être, le style de leur village (1941:201).

Lau also made it clear that this behavior applied to the lower plains as well, at least in term of "les semes cultures que les Chams...anterieurement cultivées" (1941:200).

Based on modern Vietnamese cropping regions, the long-cycle wet season regimes are crops harvested about the tenth lunar-month and the twelfth lunar-month, both of which have varieties that can grow in either inundated or dry fields. The tenth-month crop predominates from Quang-binh to Quang-ngai, and is particularly important in the low hills above Tam-ky, Quang-tin (Thai-cong-Tung, 1965:59-61), [which is] the area where Nguyen-thieu-Lau virtually characterizes the population as Vietnamized Cham (1941:200). This crop is usually sown and cultivated in dry but significantly permanent unirrigable plots, a conclusion drawn from Tung's lack of the word *ray* to describe the field system. *Ray* normally designates shifting dry horticulture or swidden. The twelfth-month crop predominates from Quang-Ngai to Binh-thuan but always in banded fields where it is usually watered by inundation. It may also be grown in hilly terraces where irrigated (Thai-cong-Tung, 1965:60; Teulieres, 1966:135).

Beyond indirect historical and ethnographical evidence, vestiges of a tenth-month crop are not as observable in the landscape (Figure 5).<sup>6</sup>

Upland terraces required for the latter crop were described more than six hundred years ago on the basaltic hills of Phu-yen by Wang Ta-yuan:

The Mountains are lofty and square. Springs in the rocks flow babbling down. The soil is virgin, when broken for tillage it gives two crops in the year (in Rockhill, 1915:95).

And sixty years later Fei Hsin wrote:

There are streams which flow down and wind around it [the mountain] like a girdle (in 1915:96; my editorial comment).

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<sup>6</sup> Figure 5 visually associates probable padi regimes and their critical phases to the Cham Brahmin calendar and various agriculturally-oriented rituals and ceremonies drawn from modern nineteenth century ethnography and some old historical sources. The negative correlation to a fifth-month crop may be related to overwhelmingly southern derived evidence.

Admittedly whether Wang meant that double-cropping was being practiced on the terraces or below in the valley is not clear. There is also evidence of abandoned terraces on the upper plains above Muong-man, Phan-ri (Nguyen-thieu-Lau, 1942), and above Phan-rang (Mus, 1930:511), both which can surely be traced to Cham origin.

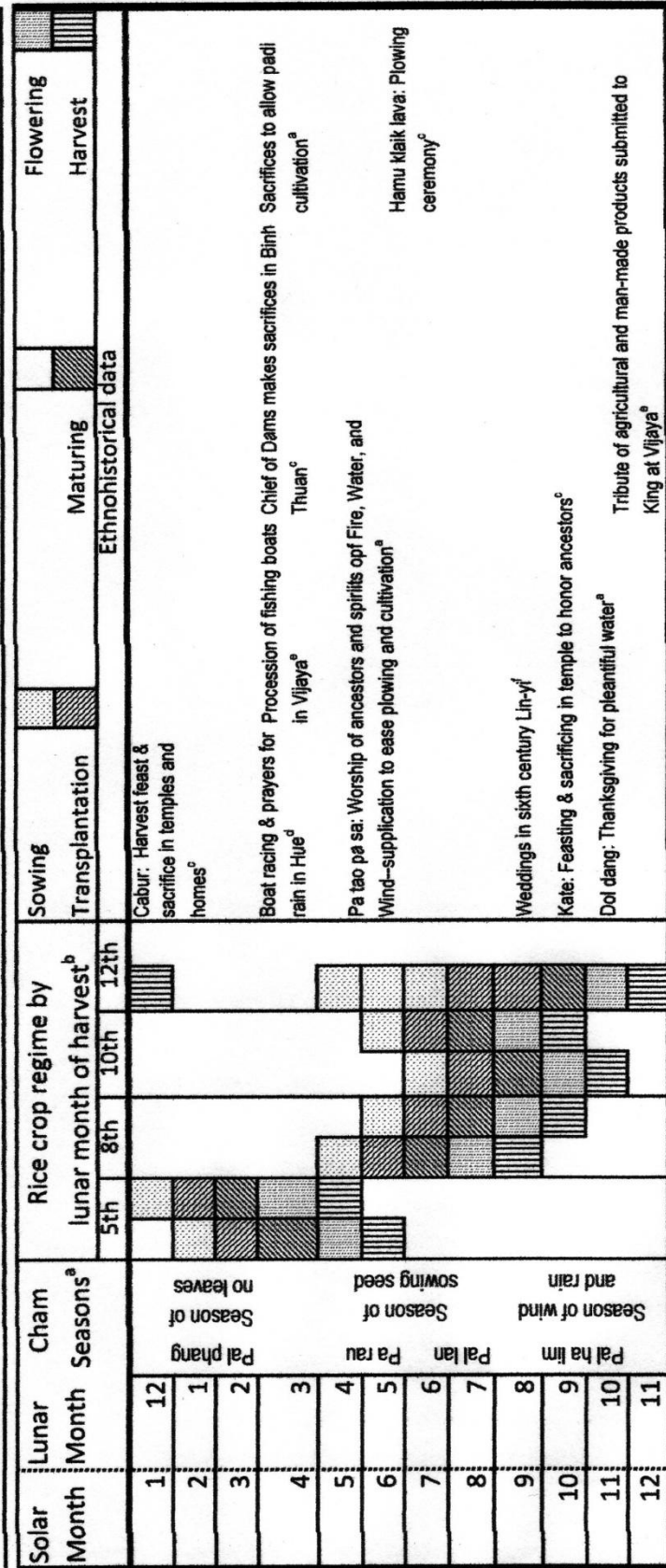
The short-cycle crops are of necessity irrigated dry-season ones, the third-month crop predominating from Quang-tri to Binh-dinh and the eighth-month crop from Phu-yan to Binh-thuan. For each of the regimes, there is considerable overlap so that actually minor amounts of either short-cycle crops are found at the extreme northern and southern ends of the coast. Both regimes involve varieties that are grown in lowland alluvial soils and require artificial irrigation (Tung, 1965:59-63). Existence of an eighth-month crop among the ancient Chams is more subject to question than Coedes pretends (see 1968:261, n.32) because Ma Tuan-lin's sixth century description of Lin-yi (or early Amaravati) mentions only marriage occurring in the eighth lunar month (in St. Denys, II, 1883:442-445). It is not always true that marriage coincides with harvest-time, and there is no confirmation of this in Cham records (but see Figure 5 and below).

There is also no historical corroboration for an irrigated bottom land third-month crop, but the Cham may have been previously cultivating a fifth-month crop. The latter is noted indirectly in Chinese history about 1012 A.D. as a drought resistant one-hundred day Champa-pura (City of Champa) or Chiem-thanh variety. ~~Imported~~ [Exported] from Champa, it was cultivated both in swiddens and irrigated terraces, but Ho Ping-ti believes that in Champa it was very possibly cultivated in bottom land padi form (1956:207-209; 1959:170).<sup>7</sup> The association with then ancient Mi-son or the City of Champa, comparison with water needs (Figure 4),

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<sup>7</sup> Nguyen-xuan-Hien (1963) concludes that the Chiem hot-season rice may never have come from Champa alone, based on the large number of varieties mentioned in Le-qui-Don's eighteenth century Van Dai Loai Ngu and also on the basis of physiological considerations and differing periodicities.

FIGURE 5. ETHNO-HISTORICAL RECONSTRUCTION OF RICE-CROPS REGIMES



- a. Nguyen-khac-Ngu, "Khao cuu lich Cham." Van-Hoa A-Chau, No. 5 (Aug, 1958): 63-64.
- b. Duong-van-An, O Chau Can Luc, 1553. Trans. By Bui Luong, (Saigon): Van-Hoa A-Chau, 1961:42-43. Ho Ping-ti, "Early Ripening Rice in China," Economic History Review II (Dec, 1956):207-209. Thai-cong-Tung, Hien-trang va Trien-vong trong Su Xu-dung Dat-dai tai Viet-Nam. (Saigon):Vietnam, Republic of. Bo Canh Nong, 1965:59-63.
- c. Cabaton, Antoine, "Chams," Encyclopedia of Religion and Ethics, 1910, III:343.
- d. Duong-Van-An, 1961:76.
- e. Chau Ju-kua, Chu-fan-chi. 1225. Chau Ju-kua: His Work on the Chinese and Arab Trade in the Twelfth and Thirteenth Centuries. Trans. and ed. By Frederick Firth and William W. Rockhill. St. Petersburg: Imperial Academy of Sciences, 1911, Reprint. New York, 1966:48.
- f. Ma Touan-lin, 1273. Ethnographie des peuple strangers a la Chine. Atsume gusa. Textes, 4. Trans. From the Chinese by d'Harvey de Saint Denys. Geneve" H. George, 1883:424.

and Gourou's statement that fifth-month padi was not grown south of Quang-nam (1945:321), all suggest that this cropping regime was found only in Lin-yi and Amaravati. It is not that simple however, because Coedes contends an eighth-Month crop was cultivated in Lin-yi or Amaravati, and Duong-van-An describes Vietnamese in recently conquered O-Chau or southern Lin-yi as cultivating an eighth-month crop, significantly called Chiem as their main crop of the year (1553, in 1961:42-43). Sometimes "Chiem" refers to eighth-month cycles such as among the Cham-influenced segment of the Hre minority people (Bui Dinh, 1956, cited in American University, 1966:189). Other times it refers to a crop harvested around the fifth lunar-month such as among the North Vietnamese and the highland Muong and Jarai, but each time it is grown in either bottom land or terraced padis with man-made irrigation (Lebar et. al., 1964:172, 252). All the short cycle dry-season rice varieties seem to be interchangeable for which Thai-cong-Tung has shown for at least the third and eighth-month crops (1965:61). For the fifth-month crop, it would seem that the Vietnamese could have pushed its harvest time back one or two months within its broad varietal phenotypic response to varying photo-period and latitude.

Likewise, if the Vietnamese were not as familiar as the Chams with water storage, distribution and drainage facilities [were] adapted for the coast, perhaps the Vietnamese were unable to direct enough water for a late-spring crop and had to rely on planting during the end of the winter monsoon for the third-month crop. If true, then the earlier Chams could have transplanted seedlings destined for an eighth lunar-month harvest into the just harvested fifth-month fields.

On the other hand, perhaps Ho-Ping-ti was correct in his hesitancy to definitely say that Champa-pura rice had originally been a lowland crop (1956: 207-209). The fifth-month crop may have been found in terraces on valley-sides and hill-sides, vestiges of which still exist in the north as well as the south. Terraces existed until recently at Gio-linh and Cam-lo in Quang-tri (see Colani, 1940), and there is a

possibility of similar [irrigation] works in old Khang-loc district (now Phong-loc and Phong-dang near Vinh-linh) and in the hills of old Kim-tra, a former district to the south and east of Hue (Duong-van-An, 1553, in 1961:11-13).

It must be admitted that the evidence is inconclusive for a total reconstruction of padi crop cycles and for a resolution of the mystery of the fifth lunar month crop. Yet padi was only one crop in the Cham agricultural land-use systems, systems which ranged from long-term fallow to a predominant multi-cropping.

### **Permanent Gardens and Orchards**

A combination of historical and ethnographic evidence points toward carefully tended and often irrigated gardens and orchards of fruits and nuts such as betel (from the areca palm), cinnamon, cassia, bananas, jackfruit, coconuts, oranges, plums, sugar-cane and sugar-cane, and probably mangoes, lychees and longans. Vegetables included wet-taro, melons, eggplant, cucumbers, beans and peas, in addition to mustard greens and other greens and tubers such as existed everywhere in Southeast Asia (Chau Ju-kua, mid-thirteenth century, trans., Hirth & Rockhill, 1911:48; Ma Huan, 1413, trans., Rockhill, 1915:91; Ma Huan, trans., Duyvendak, 1933:26; Leuba, 1923:116; Maspero, 1928:2; Nguyen-thieu-Lau, 1941:200; Dao-duy-Anh, 1963:23; and Spencer & Thomas, 1969: Table 4.1).

In the fourteenth century Fei Hsin observed that "vegetation is always green, now in flower, now in fruit..." (in Rockhill, 1915:93) and from this and other sources, Maspero concluded that Cham ate vegetables throughout the year (1928:2). Constant greenness could have meant swidden mixed-garden, but could also have meant irrigated permanent horticulture and arboriculture.

This was not the initial impression gained by French observers in the late nineteenth and early twentieth centuries. At that time, the Chams had been pushed out of the most fertile bottom lands into areas

the Vietnamese themselves would never have considered colonizing. Cham settlements were described as barren and shadowless landscapes (Cabaton, 1910:341, 347; Mus, 1930:510) yet that which Mus described was of an occupation of marginally fertile soils where irrigation was difficult if not impossible (1930:511). In fact Nguyen-thieu-Lau has stated: "Sur ces sols secs et brûlants, il n'était pas question de planter des arbres; pas de jardin, pas même de haie vive" (1943b:220). No wonder there was a general loss of incentive and a loss of previously advanced technology (Leuba, 1923:35-36; Sion, 1929:437).

In contrast, Cham villages in the more egalitarian Cambodia are under green tree cover with mixed gardens found interspersed among the houses (Ner, 1941:175). Similar settings are found among the Cham-Vietnamese settlements in the Tam-ky hills [in Quang-tin] (Nguyen-thieu-Lau, 1941:200) and Hre-Cham villages in the upper river valleys of Quang-ngai (Smith, 1965:48-49).

This is all summed up by the indignation of Lau:

Admettre qua les villages cham d'autrefois moient  
aussi dénude qua ceux d'aujourd'hui, c'est concevoir  
l'ancien Champa sans les canaux d'irrigation dan les  
villages, sans les arbes de jardin: c'est absurde  
(1943a :220 n.3).

Characteristic of Cham gardens and gardens of other Southeast Asians has been an enclosed mixture of trees, bushes, vines, and other vegetables and root crops around and near the dwelling (Terra, 1958:2). The mixture being emphasized is mixed sowing and a staggered harvest. Soil was worked by hoe and irrigation was probably done by furrow or hand sprinkling. Vestiges of manuring garden crops, dry rice, and also padi persist among strongly Chamized highland Churu (Ner, 1933:335) and lowland dwelling Hre, some of whom use dung as fertilizer, "a technique acquired from the Cham" (Bui Dinh, 1956, cited in American University, 1966:189). If indeed there was manuring of fields in ancient Champa, it would have represented a major advancement in the intensity of resource

utilization and permitted an additional energy subsidy to be channeled into the total production adaptive strategy.

### **Orchards**

There may also have been large gardens and orchards less diverse in species growing both subsistence and elite products such as mangoes, oranges, areca palm (with its betel nut), coconut, tea, latania, various species of bamboo and mulberry bushes (for silkworms) (Maspero, 1928:3; Leuba, 1923:118; Nguyen-thieu-Lau, 1941:200). Regions producing specialty crops are suggested by Vietnamese place names such as Vuon-trau, meaning "Betel-nut Garden" and Vuong-xoai, meaning "Mango Garden" in the basaltic hills of Phu-yen (Nguyen-dinh-Tu, 1965:176-177) and Lenghi, the former Cham village of Palei anok kayau, meaning "Village of Fruit" that is 70 meters [in elevation] above Phan-rang (Mus, 1930:511). In the latter village, the Vietnamese now cultivate dry rice, but Cham formerly grew wet rice in irrigated terraces (Mus, 1930:511). Were there once irrigated terraces and orchards there?

### **Prestige Crops**

Two of the many prestige crops, those destined for elite consumption, were cinnamon and cassia bark, which were mentioned by Diamaski as growing in Champa as early as the thirteenth century (trans., Ferrand, II, 1914:380).<sup>8</sup> Today cinnamon is found exclusively in the hills of Quang-nam, near Tra-my, Que-son (Cinnamon Mountain) and in Tra-bong valley (Robequain, 1944:236; Smith, 1965:43), all areas that are inhabited by Cham-Vietnamese mixtures (Nguyen-thieu-Lau, 1941:200) and sprinkled with Cham place-names. Today cinnamon and cassia are gathered wild or transplanted as young shoots into good soil of tended orchards, mainly by Cua tribesmen. Based on preliminary review of other facets of Cua resource-use systems, I judge them to have been strongly infiltrated by Cham after the fifteenth century, and therefore I

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<sup>8</sup> Maspero (1928) overlooks these products for some strange reason, perhaps his distrust of Arab sources, a distrust that Wheatley shares (1961:251).

speculate that the Cham also cultivated these crops in tended orchards (compare Hickey, 1967:159-161).

Diamaski's lengthy explanation of the processing of cassia leads me to speculate that production of this spice was a monopoly of Arab traders. It is quite strange that these valuable spices were never mentioned by the Chinese, one of whose missions overseas was often to gather commercial intelligence.

### **Permanent Dry Horticulture**

For many crops the difference between permanent wet and permanent dry horticulture was probably a function of variations in local habitats and technology. Such crops included cotton, mulberry bush (for silk works), kapok, coconut (husk fiber), True Latania, and possibly ramie (Le Marchant de Taignon, 1905:1268; Robequain, 1944:232; Langrand, 1946:49; Schafer, 1967:72; and Nuttonson, 1968:91). Food crops probably included yams, dry taro, millet, dry rice, and sesame (Hickey, 1967:99).

Depending on the circumstances, the crops were presumably cultivated in rotation from short fallow to multiple or continuous cropping on unirrigable fields or in dry padi-fields (Terra, 1958:157-158). Unirrigable fields were in soils elevated above and away from water sources and in many cases were just slightly higher than the padi fields and adjacent to them. Fields in the basaltic hills of Phu-yen and those above Tam-ky, Quang-tin, exemplify this mode of horticulture (Gourou, 1945:80-81; Nguyen-thieu-Lau, 1941:200-205) as do also the lands of the Churu around Dran (Hickey, 1967:99). Dry padi-fields that are those not put into rice that season were found in lowland and upland alluvial soils and also in basaltic regions. Again depending on the crop, the fields were either hoed or plowed and harrowed (thus really more agriculture than horticulture). In some particular cases, rotation involved the tenth-month rice with probably yams and millet, the latter two crops being predecessors to Western sweet potatoes and maize [from the Americas] (Thai-cong-Tung, 1965:74). Cotton was probably rotated with the twelfth-month padi to take advantage of the wet soil and so may

also have been found in artificially but seasonally irrigated padi fields such as those under the eighth-month crop (Indochine, 1931:151). On valley-side terraces the Cham also undoubtedly cultivated padi in rotation with millet, vegetables and/or sugar cane (Nguyen-dinh-Tu, 1965:164); Thai-cong-Tung, 1965:52-53). On the hills of Phu-yen, Gourou calls these "diversified dry crops" (1945:80-81), but it is known that irrigated fields existed too (Nguyen-dinh-Tu, 1965:164, 176); Wang Ta-yuan and Fei-Hsin in 1915:97-98).

### **Shifting Dry Horticulture**

Shifting dry horticulture or swidden played several roles in the resource-use systems of the Chams. First, it provided supplementary foods; second, it was probably the first form of cultivation in a newly colonized and (initially) marginal area; and third, it was a means by which the Cham contributed to the degradation of the foothill and highland environment.

In the early twentieth century, the Chams in Phan-rang were growing supplementary swidden crops of mountain rice (?), maize, tobacco, castor-oil plant, manioc, peanuts, legumes and fodder (Leuba, 1923:117). The rice crops was probably the twelfth-month crop because Leuba describes it as being red in color, the same as that rice described by Ma-Huan when he visited Vijaya in the winter season (Ma Huan, 1915:91; also in Duyvendak, 1933:24, 26). Maize was formerly millet (Hirth & Rockhill, 1911:50, no.6), and together with manioc and peanuts are all New World plants that have displaced analogous food crops indigenous to Southeast Asia, such as taro, yam, and various ground nuts.

I do not believe that the attention paid to swidden today among the Cham was matched in the ancient past. In a marginal habitat where a decreased population demanded less food and in turn supplied less labor for intensive uses, I contend the Cham turned more to shifting dry horticulture as an adaptive strategy better suited to their new situation (see Boserup, 1965). Swidden was still practiced by the

ancient Cham or for them by adjacent highlanders, but the main crops were non-food crops such as fodder for livestock and valuable wild animals, bamboos, latanias, rattans and perhaps certain timber used in shipbuilding. In many cases these semi-domesticated "crops" were produced from a deflected succession triggered by annual burning (Le Marchant de Taignon, 1905:1268; Leuba, 1923:118; Barry and Ngan, 1960:275). The relationship of this practice to environmental degradation is admittedly tenuous but I believe more so because of lack of evidence than lack of truth.

### **IRRIGATED SYSTEMS**

Based on my arguments in the first part of Chapter II, I contend that the village-oriented irrigation complexes as Gio-linh are representative of a general level of technological capability that most Chams along the coast exhibited before exposure to Chinese, Indian and Arab ideas. Both Ner and Colani feel that there was a great cultural and spatial gap between the Gio-linh works and what they conceived to be standard Cham irrigation technology—the canals and dams at Phan-rang (in Colani, 1940:57-61). On the other hand, I believe that elements of "Gio-linh" construction reappear in various degrees of regression (?) or readaptation in other settings along the coast. Foreign accretions were confined mainly to lifting devices, and there is reason to believe that a fully detailed knowledge of Indian components were transmitted within the various Indian treatises that Cham kings and presumably other members of the elite were required to memorize (Majumdar, II, 1927:232-234; see India, 1954:2-5).

To construct and maintain many of the structures and to keep them in functioning order, the water control subsystems as a whole required much expenditure of human, animal and plant energy. At this point male members of the society made their major energy input into the production of padi and garden crops, aside from the heavy tilling of the soil. Control of water and of the structures and organizations that

evolved to manage water distribution was one of the key elements underpinning the sacro-political power structure. In addition to irrigation by itself, the Chams attached great sacred value to springs in both the mountains and plains and constructed shrines and temples nearby or even enclosing them. The best example of such a temple was Champa's most sacred religious center at Mi-son in Amaravati (Parmentier, 1904:802). The Chams felt that it was here that the energies of the Soil God seeped out to water and fertilize human crops (Wales, 1961:202-204).

I have conceptually organized Cham irrigation into two sets of basic functional subsystems: (1) collection, capture and storage, and (2) distribution and drainage. Over viewing these arrangements are organizing principals of dichotomies of dry-season and wet-season, plains and hills.

#### **Subsystems of Collection, Capture and Storage**

The components involving collection, capture and storage of water overlap so much that devices for storage are included in the discussions of collection and capture. Collection includes wells and tanks, and capture involves the use of temporary and permanent barrages and the two lifting devices, the shaduf and the water-wheel.

##### Wells

In proportion to abundant ground-water resources along the central coast (see U.S. Engineer Agency, 1968:82, 84), wells have always been an ubiquitous feature of the landscape and very often overlooked. Besides the indeterminate dating of well-centered complexes at Gio-linh, the first historical allusion to a well or a spring was at the end of the fourth century, A.D. This inscription invoked respect for a *naga*, a Saivite symbol regard as guardian of springs or wells (Coedes, 1968:48). Based on modern cultural vestiges I speculate that there were two functions for wells, domestic-garden and padi irrigation, depending on the terrain.

In the lowlands where other irrigation systems were unfeasible, wells supplied virtually all the water for domestic [consumption] through padi irrigation. At the modern Vinh-linh, in Lin-yi, [there] are hundreds of small rock-lined and rather shallow wells that tap a high water-table at the foot of basaltic formations. Each complex consists of a receptacle or receiving tank and sometimes a washing and/or a bathing tank, both relatively small. Invariably however the chief use of water is to irrigate adjacent gardens and padi-fields. These systems are likely Cham but not as old as Gio-linh (Colani, 1940:48-55).

On valley and hilly slopes, wells had more restricted uses because padi and other irrigated fields used water captured from streams and rivers. In Cham-Hre or Cham-Hroi hillside villages, the highest settlement terrace had at least one deep, rock-lined well, one or two meters in diameter (Foglietta, personal informant).<sup>9</sup> From the wells or springs ran pipes of bamboo or open conduits or areca-palm trunks down to nearby terminal stone basins or tanks three meters in diameter on lower terraces. There were used for drinking, bathing, and laundering (Bui Dinh, 1956, cited in American University, 1966: 167-168). It seems likely that water taken directly from wells by sprinkling buckets or by conduits leading to fields could have irrigated long-house vegetables and fruit gardens as well. Likewise the use of large wells or small tanks for production of fish by the Cham is perhaps described by Duong-van-An in the hills of O-Chau (Southern Lin-yi) (1553, in 1961:11-13).

#### Tanks

Tanks or reservoirs seemed to have performed two functions: (1) they supplied water for human and domestic animal consumption and irrigated padi, garden and orchard terraces; and (2) they supplemented seasonal diversion canals in lowland irrigation locations. The few

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<sup>9</sup> Harry Foglietta was a U.S. Army infantry-man in the region of Kim-tra valley in Northern Binh-dinh Province in the late 1960s. [He was a student at University of Hawaii at the same time I studied there.]

[recorded] identifiable tanks seems all to be in hilly or upper plains locations, to take advantage of the natural topography for their water sources, construction and water distribution. Water was probably obtained by combinations of entrapment of rainfall, enclosure of a spring, diversion of a perennial or intermittent stream, or tapping of a well.

Colani has done the best description of the tank in a village setting (1940; see my Chapter II) but the integration achieved there in the prehistory of Champa may not be typical of the historical period. On the upper Muong-man plain overlooking Phan-ri, Nguyen-thieu-Lau has described a multi-village series of artificial ponds, the largest of which is about twelve hectares (1942:132). Because the tanks were arranged in tiers one above another, Lau felt that they were not fed by an underground aquifer but rather had been laid across intermittent surface streams and more perennial sub-surface base stream flows. The larger tanks supplemented the debit of the main stream by natural drainage and man-made canals. In turn, the streams were diverted further down and led down to the villages in the plains below. Small tanks containing only a few hectares seem to be for local use such as drinking, watering animals and irrigating gardens, the later which appeared to be on very broad terraces. Altogether it was called "un system d'irrigation ingenieux, très coherent avec lui-même qui utilisait a la fois l'eau de la rivère et l'eau du réservoir" (1942:133). There seems little doubt of the Cham origin of these works for the Vietnamese have abandoned them insofar as their original purpose.

To the north in Amaravati, an analogous system may [have] exist[ed] if a number of curious-looking ponds in the low foothills of Quang-nam are of pre-Vietnamese derivation (see U.S. Army Map Service, 1962:QGC-ND 49-1, Quang-ngai, 1:250,000). Until most recently personal informants have told me that there is virtually no irrigation there, but Claeys believes that the seventh century Cham capital Simhapura

(Tra-kieu) was set amidst "fertile and some cleverly irrigated rice-fields" (1931:104). The mystery may be answered by Parmentier:

Un autre vast excavation entre la montagne et le village de Mison est donné par les Annamites commes la fosse...mais elle pourrait être aussi, *comme il est frequent*, un réservoir Cham pour les cultures (1904:809; *italics are mine*).

Parmentier's casual remark that such reservoirs or tanks were common is quite significant because this great savant cataloged and/or excavated practically all the Cham settlements or temple emplacements, and thus would have been in a position to observe anything unusual in the landscape.

A special function of tanks was in association with temples where they may have supplied water for ritual plots of padi or other crops, but more likely were sources of lustral water for use in ceremonies (Leuba, 1923:52; Majumdar, II, 1927:250; Boisselier, 1963:95). The largest of these was at Indrapura (Dong-duong) enclosing five hectares within a wall (Parmentier, 1904:809), but the other known ones seemed to Leuba to be simple hollows and not paved with any rock (1923:52).

#### Barrages

The first barrages were probably a few rocks and foliage in a small stream use to trap fish, and [their] fish[ing] function remains. They were also designed to impede a flowing current and raise it sufficiently high to be diverted into perennial canals just upstream from the barrage. This was especially effective during the period of low discharge in the dry season when water was needed to irrigate eighth-month padi and other crops such as sugar cane.

Temporary barrages could be both large-scale multi-village affairs or little brush or bamboo/rattan wattlings put into secondary canals and the channeled bunds that divided actual padis (Broi Toplui, personal

informant).<sup>10</sup> They were temporary because they usually washed out late in the fall or early winter after the heavy fall rains. This impermanence and weak construction has been widely criticized (Ner in Colani, 1940:58; Nguyen-thieu-Lau, 1943; Pelzer, 1948:52), yet barrages remain an efficient adaptation to the environment and needs of the people. In Champa, the construction of temporary weirs is seen in the symbolic actions of the indigenous Cham Ong Banok or "Lord of the Dam", who plants three stakes in the river bed against which he leans three pieces of wood and add three stones, three bundles of liana and three mounds of sod and some leave (Cabaton, 1910:343). These were easily accessible materials of low replacement cost and oriented to the low capital accumulation of a local village society (Lewis, 1971:145, no.6). There was adequate labor from inter-village mutual-aid irrigation associations (Chapter 5) and that level of technology [theoretically] permitted barrages to be put into large rivers up to 1500 meters in width (Addiceam, 1966:365). Structurally, the barrages were designed to allow passages of some water and hopefully most of the silt so as to reduce the chance of being washed out by heavy surges clogged by siltation (Dobby, 1967:108). When Fei Hsin described the canalized Kinh River in fourteenth century Phan-rang as a "double-branched stream where waters are clear" perhaps then he was inadvertently signaling the failure of the barrage's design and the continual need for maintenance (in 1915:98).

Scholars originally thought dry-stone constructed permanent barrages showed more affinities with the Burmese Pailin hydraulic works than those at Gio-linh (cited in Colani, 1940:58), but Blanadet's study of Pailin shows them to date from only the late nineteenth century (1970:353-354). Certainly the basic technology was derived from Gio-linh but there must also have been awareness of Indian treatises which, for

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<sup>10</sup> Broi Toplui was a Cau Sre tribesman at University of Hawaii (1969-1972). Cau Sre are an Austroasiatic speaking people but have been strongly influenced by Cham and Chamized Churu, just south of Dalat.

instance, described the *anakket* as using natural anomalies in topography to serve as foundations for the diversion barrage. Rocks and coarse gravel were then topped by masonry or earth capped by a rock surface (Addiceam, 1966:366,375). This construction technique resembled the Cham temples and city walls (which were often four kilometers in circumference for which large sandstone blocks or large bricks were set in a bituminous concrete or *beton* that in turn lay over deep foundations of gravel and/or lateritic earth (Claeys, 1931:97-98). Nguyen-cong-Huan lists eleven such barrages from Vijaya (Binh-dinh) to southern Panaduranga (Binh-thuan), but most are not readily located (1960:34). Two, Cai Tuy-tinh and Sieng Giang are generally in bottom land deltas on relatively large streams. From other evidence of Cham place-names (see Nguyen-van-To, 1943; Rondot, 1950), I speculate the permanent dams were found in heavily populated areas and were probably associated with an important fortress or temple as a function of the need for a permanent and reliable structure and of the labor required to construct and maintain such a structure. I also speculate that nearby the barrages large-scale maps or field inspection will reveal tanks of an area much larger than the twelve hectares found on the upper Moun-g-man plain.

#### Lifting Devices

Lifting devices consisted of the *shaduf* and *noria*, both of which were either of Persian or Indian origin (Needham, 1954:240; Canter, 1967:15).

Nguyen-dinh-Tu's description of "a lever like that which draws water out of deep wells" (1965:166, my translation) as an anomalous feature in the Vietnamese landscape of Phu-yen suggested to me the *shaduf*, in light of Champa's long historical relations with Arab traders. Tu notes that it is used to lift water from one terrace to another on the basaltic hills of Phu-yen.

The more elaborate and costly *noria* is a water driven undershot wheel designed to lift water from rivers and large canals in which swift currents have eroded deep channels and made the conventional barrages

unworkable. Norias today are found singly or in series jutting across streams upon elaborate scaffolding. Where the current is sluggish barrages are constructed to quicken and direct the current toward the wheel. The total system required a large investment in time, labor and natural resources and a critical reading of Guilleminet's monograph on the subject (1926) suggests that there is a vestige of a mutual-aid association now with the sole purpose of constructing the noria. The leader is called a *Trum-xe*. The name has no meaning in Vietnamese and the role suggests that of the *Ong-Banok*.

According to Guilleminet, prior to the mid-eighteenth century, the noria's use was known only on the swift Lai-Giang and An-Lao rivers and some canals in Binh-dinh and on the Da-rang River in Phu-yen (1926:9-12). Thereafter it diffused northward into Quang-ngai, Quang-nam, and further northward. Among the Muong, who live in the mountains north of ancient Lin-yi, Cuisinier reports that the noria was originally borrowed from the Arabs in the fourteenth century (1948: 115). I suggest that the Cham were using the noria at least as early as the eighth or ninth century when Arab merchant enclaves were found from Amaravati to Panduranga (see Ravisse, 1922; Tasaka, 1952:3; compare Maspero, 1928:121; and Benedict, 1941). Thus when the noria supposedly moved northward during the Vietnamese period, I believe that it was actually ~~returning~~ [coming] from known Cham enclaves in Binh-dinh and Phu-yen (see Nguyen-dinh-To, 1943 and Nguyen-dinh-Tu, 1965:104) to regions in which the unusual environmental hazard of swift rivers made quick adaptation (and adoption of the noria) unlikely by the "mal-adapting" Vietnamese colonists.

Apropos this historical discussion [of irrigation systems] is the dearth of epigraphy from Quang-ngai in contrast to the Mison-Simhapura-Indrapura region of Amaravati (Quang-nam) to the north and Vijaya (Binh-dinh) to the south. The sole [Quang-ngai] example, the Chau-sa inscription dates from 893-903 A.D. as the earliest historical evidence of Cham occupation (Majumdar, III, 1927:110, no. 38). I doubt very much

it marks the earliest occupation in fact, but it falls within the period during which I suggest the noria may have been introduced to Champa. In fact the noria may have given this region the capability of irrigating dry season crops for the first time in the larger lower Tra-khuc delta, thus permitting greater concentration of population just as it later influenced Vietnamese settlement there. The likewise may have been true of Vijaya and Da-rang, and even of the Churu upland valley, where its use has been reported by Broi Toplui, although in each of these areas, I contend that barrage and canal systems had been used from prehistoric times.

### Water Distribution and Drainage

In truth it is analytically difficult to distinguish distributive functions [that] bringing the water to the field, and drainage functions [that] remove ~~ing~~ it, because the Cham must have used the same facilities. One set of fields or terraces was always below another so that drainage water from one system of irrigation works was used to supplement the basic water supply of an adjacent territory. I have distinguished them however because of particular translations of possible and positive Cham words, and because there seem to have existed definite waterways constructed to drain salt and/or flood water from low-lying areas adjacent to the coast.

#### Distributive Canals

Canals that bring water from springs, wells, and tanks tend to be found in hilly places and those from barrages in lowland places, but there is overlap in each case. Hill terraces along the upper courses of rivers and streams from at least Quang-tin to Binh-thuan are watered by simple ditches about 1.5 meters deep by 0.5 meters wide that tap underground water sources (springs and wells) or runoff water, and run diagonally down valley sides (Foglietta, personal informant; Hickey, 1967:156; Bertrand, 1952, cited in American University, 1966:412). I have already described such systems in Phu-yen and on the upper Muong-man plain. Of the former, Mang Ta-yuan wrote of "springs in the rocks

[that] flow babbling down" and Fei Hsin more graphically stated "there are streams which flow down and wind around it [the mountain] like a girdle" (trans., Rockhill, 1915:95-96, my italics and comments; compare Phan-dinh-Khiem, 1960:408; Dao-duy-Anh, 1963:27).

Water distribution on the bottom lands consisted mainly of that which seems to be perennially supplied by lateral canals transferring stream flow to dry portions of a valley or coastal plain. From the main lateral canals, temporary barrages were employed to raise the level of water enough to divert it into secondary canals and so on until the final padi field was reached. Construction of at least the large main line canals if not the smaller ones too resembled the construction of the permanent barrages. A ditch was excavated, lined with gravel and then lined with large bricks or dry set-stone (Ton-that-Trinh, 1970, personal interview).<sup>11</sup> According to Colani (1940:60), channels of the secondary canals were said to:

...serpente mollement au milieu de ces terres grasses...  
En réalité, ces courbes traversent une plus grande surface qu'un parcours rectiligne, ce qui est peut-être plus avantageux au point de vue des irrigations, et l'eau pénètre mieux les berges.

This may be true but Adiceam contends in an analogous situation in South India that the spiraling was probably done to avoid erosion by slowing the flow of the current (1966:377).

The first and one of the rare mentions of irrigation in the inscriptions was in the mid-eighth century A.D. when a *pranali* (Skr) was donated to a temple near Nha-trang. The word *pranali* translates several different ways, of which I mention "aqueduct" and "irrigation canal" (Puri, 1968:385). The wording of Majumdar's English language translation of the inscription makes me think that this was a common occurrence and

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<sup>11</sup> Ton-that-Trinh was former Minister of Land Reform and Agriculture in the Republic of Vietnam and now directs the Quang-ngai Sugar Company. [He visited University of Hawaii at Manoa where I interviewed him ca. 1972.] He apparently had personal experience working in Phan-rang when the Vietnamese rebuilt the irrigation system there in the 1950's.

that this dedication was just an addition to an existing [irrigation] system (see Po Nogar Stelae of Vikrantavarman III, quoted in Majumdar, III, 1927:71, No. 290).

As one of the last refuges of Cham in a lowland area of Central Vietnam, the Phan-rang plain has best preserved a still partially functional irrigation system clearly attributable to Cham hydraulic genius. It has been estimated that the several canals at Phan-rang once watered over 7,000 hectares, ranging from the Porome tower in the south to the valley north of Dam-nai (Salt Lagoon) (in Colani, 1940:59). According to legend, the canals are attributed to King Jaya Paramesvaravarman I (1044-1060) who was deified as Po Klaung Garai, the "Leper King" (Maspero, 19218:137); Marrison, 1951:95, citing Aymonier, 1891). The first mention in epigraphy of this system was in 1235 A.D. when King Jaya Paramesvaravarman IV "improved the irrigation channels..." in fields which belonged to two gods or temples located near the mouth of the Kinh River, Phan-rang (Lomngoeu Stelae Inscription, quoted in Majumdar, III, 1927:209, No. 91). It is significant that an improvement would imply an on-going system just then repaired or extended. There is Chinese confirmation to these sources [repeated from above] in the observations of Mang Ta-yuan who in the mid-fourteenth century described "Pan-rang" as having "a stream with two branches which flows through it", and Fei Hsin who about a half century later notes "a double-branched stream whose waters are clear" (in 1915:97-98). The observations of the double-branched streams were the result of the barrage at Nha-trinh that diverted the flow of the Kinh River into one or two canals. I cannot but feel that these two Chinese writers should have been able to distinguish between streams and canals. Therefore, because they did not, I believe that this observation may be interpreted to mean that the Phan-rang canals were so old by the fourteenth centuries that they had taken on the characteristics of natural watercourses.

### Drainage

As I have discussed there are many flood problems, not only from fresh water runoff but also from high tides and typhoon-caused downpours. Therefore for continuously successful cultivation and protection from ordinary and extraordinary amounts of water, the drainage function of waterways was at least as important as the distributive function.

To drain off excess water in the padi-fields, the Cham dug a spiraling small channel called a *hava* (Cham) or *rigole* (Aymonier and Cabaton, 1904:464). And similar to the Jarai (Voth, n.d., in American University, 1966:683), they probably had bamboo piles in their padi bunds to maintain the fields at a given level of water. At a greater level of complexity is again the *pranali*, which according to Majumdar (III, 1927:70, No. 29C) is a "dam over the drain" and according to Boisselier (1968:67) is a cover to a drainage ditch. I speculate that the particular inscription was either describing a ceremonial cover over one small portion of an open-air channel to commemorate God's gift of water to man, or was describing a covering over a complete length of a waterway.

In support of the latter hypothesis in Nguyen-dinh-Tu's description of the valley of the Da-rang where a thirty-six kilometer long canal takes diverted water from above the Dong-cam barrage down along the southern side of the valley. The barrage is situated on or nearby an early Cham version. The lateral canal is described by Tu as "an underground sewer called by the local term *lu* and built by Thu-Bi" (1965:37, my translation).\* The word *lu* as used in this sense does not seem to belong to the Vietnamese language (Gouin, 1957) and the name Thu-Bi is not a recognizable Vietnamese name, though it does have a

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\* The original 1972 thesis is apparently missing a citation for Nguyen dinh-Tu, *Non Nuoc Phu Yen* (1965). I am adding it as a new Secondary Source reference to LITERATURE CITED at the end of the thesis.

meaning. Can there be a relationship between the *Ong-Banok* who builds dams, the *Trum-xe* who builds norias, and a *Thu-Bi* who builds "lu"?

The term *lu* appears elsewhere such as the Lu Siem Giang (Lu Siem River) which drains into the Dam Nuoc Ngot (Fresh-Water Lagoon) in Binh-dinh. On this lagoon is located the site of a former Cham port, Di-gi (Nguyen-van-To, 1943:321). The Lu "Siem" Giang must be the "Sieng" Giang on which Nguyen-cong-Huan has located a [Cham] dry-stone dam (1960:24). Another location of a "lu" is the Song Lu (Lu River), which drains the valley in which the Po-Rome temple stands, in southern Phan-rang. Large dry set-stone barrages seem to be associated with many of the locations of "lu" waterways along with populated area, further substantiating my speculations above.

Other drainage waterways seem to be located in the tidal strand which along the coast may extend inland considerable distance. A long diked canal in the vicinity of Tra-loc, Quang-tri (see U.S. Army Map Service, 1962:AGC-NE G8-16, Hue, 1:250,000) has been cited by the savant Cadiere as an imitation of previous embankments constructed there by the Chams (1905:190). He may be referring to the *dap* or dam that Duong-van-An mentions in 1553 (in 1861:16-17, 26), at a time when the Vietnamese perhaps had not been in O-Chau long enough to have constructed such a massive public work. There and in the other regions subject to salt-water flooding were located I believe numerous drainage canals which also served as transportation ways. They may have also contributed to the poldering of the extensive marshes and tidal flats into productive fishponds, salt pans, and brackish-water padi fields (see da Silva, 1970; see also Chapter IV below).

### CONCLUSIONS

In contrast to the impression that Ner and Colani wish to give regarding the relationship between the irrigation works at Gio-linh and their narrowly defined conception of Cham irrigation systems, I believe I have sufficient evidence to demonstrate that a variety of water-

control subsystems derived from the model of Gio-linh [are/were present] from Lin-yi to Panduranga [in historic Champa]. Common themes run through the components such as dry-stone construction, use of tanks and the sacro-economic orientation. Very few of the subsystems stand alone without dependence on another mode of water-control to provide supplementary water.

There is also evidence to warrant a full exploitation of habitats with capability to double-cropping from seaside to mountain top. It took French engineers to realize the genius of the Cham and open previously unexploitable land to Vietnamese colonization.

### **ANIMAL HUSBANDRY**

To reconstruct the processes and patterns of husbandry in this last section, I concentrate on cattle, water buffalo and elephants as those animals contributed the most motive energy and ritual value to the economy and cultural institutions of ancient Champa. The human diet derived more from the smaller animals, but even the total contribution of terrestrial animals was considerably less than from aquatic ones.

Motive, food and ritual values were also attached to horses, the feral banteng, swine, goats, chickens, dogs, ducks, geese, pheasants and peacocks among the kept animals, and deer, hare, and other birds among the wild ones (Ma Huan, 1416, trans. Rockhill, 1915:87, 91; Ma Huan, trans., Duyvendak, 1933:25-29; Wheatley, 1965b:587; Landes, 1887). There is not much mention of making food out of the kept animals, but after their ritual use had been acted out, they may have provided food for the functionaries of the temples.

### **Cattle**

Cattle were first mentioned in the historical record in the sixth century A.D. when a breed of dwarf cattle was observed by the Chinese in Lin-yi (Wheatley, 1965b:587). It is possible that these were related to Zebu cattle (Epstein, 1955, in Wagner & Mikesell, 1962:295) such as Solheim has mentioned having been found in the third millennium B.C. of

Thailand (personal communication). The function of cattle in Champa was four fold: First, cattle provided motive power for transportation of goods and men by pulling carts, which Leuba described as quite ingeniously adapted to the alternating dry-wet conditions of the early coastal roadways. Second, cattle pulled ~~cultivated~~ [cultivation] equipment for light and dry soils (Ma Huan, in 1915:87; Leuba, 1923:120-121). Third, cattle may have powered machines such as cane-sugar or sesame seed oil mills (Nuttonson, 1968:87; Schafer, 1967:193). Fourth, cows may have provided milk to feed royal babies and perhaps other elite Indianized Cham, and also provided for the manufacture of butter or ghee, which was used for ritual purposes (Marrison, 1951:92; Wheatley, 1965b:580-586; Bang-An inscription of Bhadravarman III, in Boisselier, 1963:229).

#### Water buffalo

The water buffalo was undoubtedly utilized as a draft animals or beast of burden for several millennia before the historic period. It was considered indispensable to the Cham in order to till the heavy clayey soil in the wet river bottomlands (Leuba, 1923:114). It is possible that water buffalo also gave milk products in addition to Zebu or yellow cattle, as in the case in India.

#### Elephants

The semi-domesticated elephant was probably utilized by the Cham as a work animal for as long as the ox (Riply, 1964:161-163). By the early seventh century, the Cham already had a standing army which contained an elephant corps and during the Indrapura dynasty (875-954 A.D.), the king was able to mobilize 1,000 of the powerful beasts for a war (Schafer, 1967:71-72). The mundane and everyday work to which elephants were more commonly utilized included construction, clearing forests for settlement and cropping, the collecting of forest products such as heavy logs, and for transportation.

### Forage

The demand for forage by kept animals is viewed as a competition between man and beast for the same arable land (Gourou, 1945:236-237). The Vietnamese have opted for grain, but the Cham seem to have opted for more animals in their economy. The resultant demand for forage was solved in the short run, but there were long-run disadvantages to their total environment. I believe there were four components in the subsystem for animal feeding. First, water buffalo, as their very name suggests, took advantage of the abundant dry-season ponds in the streams, the oxbow lakes, and shallow lagoons to forage for aquatic weeds, reeds and rushes (Economic Survey Mission, 1959:100). This practice may have been limited in the past when there were more crocodiles in these waters (Ma Huan, in Duyvendak, 1933:28; Duong-van-An, 1553, in Luong, 1961:36; Thien nam tu chi do thu, 1471, in Hong Duc Ban Do, 1962:100). Second, all the ruminants and perhaps the captured elephants were fed forage consisting of rice-straw or grasses purposely grown in periodically fired fields (Leuba, 1923:116-118); see previous section). It is possible that the grass grown for fodder was not *Imperata cylindrica* because in another context, Ma Huan, according to Duyvendak's translation, distinguished between "grass" and "fodder" for the diet of the rhinoceros (1933:25). A new translation however does not make the distinction (see Mills, 1971:81). Third, the grass or forage was fed to animals within corrals, which in the case of the village that Leuba studied, were located at either end of a linear settlement (Leuba, 1923:106). As an enclosure, the corral had several advantages: (1) it concentrated the animal for protection against the large numbers of predators in the wild countryside, (2) it permitted more efficient and controlled feeding, (3) it made collection of manure for garden and padi fertilizer more easy, and (4) it could have permitted more controlled breeding, all marks of an advanced state of animal husbandry. Such an expertise is recognized today among the Chams in Cambodia who are known as professional livestock tenders (Steinberg, 1959:46).

Above the village level, Majumdar cites (without a source) Chinese writers who told of "vast courtyards outside the palaces, presumably for the accommodation of horses, chariots and elephants (II, 1927:261). There is some substantiation of this in the early landscape as reported in the first Vietnamese maps of the region after the capture of Vijaya in 1471 A.D. The maps show large enclosures, perhaps elephant pens or corrals that were feeding pastures for use by temples or royal palaces. One such pen is at Hue, and there is also the place-name of *Muc-duong* or "Feed Pasture" between Simhapura (Tra-kieu and Mi-son in modern Quang-nam) (in Thien nam tu chi do thu, 1471, in 1962:91-95).

A fourth component was some limited degree of nomadic herding or seasonal pasturage that occurred in Panduranga and Da-rang as it does today. This is related to the local daily movement of livestock both of which could only have been practiced where the pressure of population on the land was low. In such areas, grass was readily available in clearings in the surrounding forest, in grassy uplands or on the sparsely vegetated sand dunes. Barry & Ngan report that the red sand dunes between Phan-rang and Phan-thiet have for centuries been subject to wandering herds of goats and sheep led by the Cham. The Chams assure themselves of adequate supplies of grass by modifying the natural succession with seasonal burning during the dry season (1960:275). When or where goats and sheep came to Champa is not known but they were known to have existed in North China several millennia before Christ (Tuan, 1969:47). In Lin-yi there is a legend of Fan Wen, the usurper, who tended goats as a child in the hills (R. Stein, 1947:242). North of Panduranga and Kauthara in the deep valleys of the Da-rang and Da-nang rivers another seasonal migration of livestock probably occurred. In Phu-yen, Thai-cong-Tung writes that the six months of dry season forced cattle to move up into the Cheo-reo valley, where a higher water table in the water absorbing basaltic soil permits a heavy growth of grass (1965:65). Cheo-reo is also the site of several old Cham temple and fortress emplacements, and was on the main trading route over the

mountains into the Mekong Valley (Claeys, 1939:42-43). It is probable that short-range daily or long-range seasonal movements were taking place everywhere along the coast of Champa, but with obviously different intensities.

The demand for cultivated fodder in shifting or permanent dry plots or for grazing land may have seemed to the Cham as the best use of the available resources. Perhaps it was in the short-run, but over centuries of burning, the lost vegetation also deprived the Chams of alternate resources such as bamboo and rattan (but only after such repeated burning), oils and resins from dipterocarp forests, and timber for building houses and boats. The reduction of vegetation also increased the silt-load of [on] the irrigation works so that more maintenance was needed. When natural or man-made disaster struck, and the systems were neglected for only short periods, the damage was cumulative and the investment required for reconstruction even greater. In effect there existed a competition between domesticated and semi-domesticated animals on the one hand, and grain and other food crops and raw materials on the other hand. Such a competition was detrimental to the long-range stability of the resource ecosystem however ingeniously the Cham may have tried to integrate animal husbandry into the other systems of energy production and management. There was however another habitat over which man had much less control, yet still was able to reap rich rewards. That was the aquatic environment.

## CHAPTER IV

### CAPTURE AND PRODUCTION OF AQUATIC RESOURCES

Production of terrestrial food resources was integrated with capture of aquatic foods. The latter provided the bulk of animal protein and minerals needed to balance a diet of cereals, vegetables and fruit from the land. Fishing was an adaptive strategy largely derived from indigenous pre-horticultural techniques that became refined over time, and perhaps with borrowing evolved into production of fish, crustacean and mollusks in artificial fresh-water and marine environments. Salt was mainly produced from solar ponds for the preservation of food and for trade with mountain tribes.

To reiterate my comments in Chapter I, almost all evidence for reconstruction of past Cham exploitation of aquatic resources is either found in remnants of Cham vocabulary or uniquely regional anomalies of present-day central Vietnamese fishery technology. According to Leuba, the Cham of Vietnam have today been pushed into marginal regions where the exploitation of the marine environment is no longer possible (1923:118).<sup>21</sup> At the same time, Cham blood still runs in the veins of Vietnamese fishermen.

I have divided this chapter into five sections: first, I show why the coast is such a potentially productive fishery and discuss the role of mangrove forests as a vital resource to both fisheries and agriculture; second, I try to determine the origin, give a brief description, and discuss the function and integral role of boats and capture implements; third, I give a short account of hypothetical fishing seasons; fourth, I

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<sup>21</sup> There may be Cham fishermen in Binh-tuy province but to my knowledge they have not yet been described.

speculate on production of marine and fresh-water organisms; and fifth, I reconstruct the role of salt in the internal economy.

Again, as in the previous chapter, the emphasis is on articulation of man and environment and how the articulations were manifested as adaptive strategies for exploiting the energy potentials in the environment. The technology and the effect of seasonal variation must at all times be viewed from the standpoint of costs--investment costs in capital, resources and labor-time.

### **PHYSICAL BASIS OF AQUATIC RESOURCES**

This section concentrates on marine and estuarine environments rather than on the fresh-water habitats, mainly because of no ready data on biophysical parameters applicable to the central coast.

#### **The Richness of Fish[eries]**

Offshore where the continental shelf grows narrower between Quang-ngai and Phan-rang (Figure 1), there is a region of much ecological diversity that supports a large fish population. In distinctive contrast to the gulfs of Tonkin and Siam, which are comparatively shallow for hundreds of kilometers out, the approximate 100-meter "edge" of the continental shelf is scarcely 15 kilometers offshore Nha-trang, and the isobaths of 60 meters that normally delimits the zone of very active fishing, ranges from about 2 kilometers off Point Varella to 20 kilometers off Hoi-an (Quang-nam) in the north and about the same distance off Nha-trang in the south. Many small rocky islands dot the coast often with fringing barrier reefs, all of which contribute diversity of habitat and food resources to a wealth of neritic fish, crustacean and mollusks (Morechand, 1955:279; Odum, 1971:340-345). An accompanying population of pelagic animals is supported by an upwelling of nutrient-rich cold waters similar to that occurring off the coast of Peru.

Such a phenomenon has been hypothesized by the Vietnamese geographer Lam-thanh-Liem as one causative factor for the aridity of the land between Phan-thiet and Phan-rang (in Nguyen-Huy, 1969:96). And if Dufeil is correct that the continental shelf falls abruptly 1,000 meters about 5.5 kilometers off the coast of Point Varella (1957:91), then I conjecture that from the ocean depths off Quang-ngai to Phan-rang there may be cold currents upwelling minerals and organic nutrients toward the warmer waters of the eastern shoals. Seasonally changing north-south trending ocean currents may be distributing the enriched water up and down the coast along with huge amounts of plankton, herbivores and small carnivores. Perhaps it is this which brings about the so-called migration of the "top" carnivorous *Scombroidae* such as the mackerel and tuna families (Khuong & Serene, 1952).

I also contend that it was this latter movement of certain species following the enriched waters that amazed early Chinese travelers. They claimed to have seen "shoals of green flying fish" off the coast of Lin-yi in 608 A.D., where they also passed for days through "a strip of yellowish, foul-smelling water, which it was said, was the dung of a great fish" (Chang T'sun & Wang Kun, cited in Hirth & Rockhill, 1911:8). Is it possible that the "foul-smelling water referred to the zone of upwelling, which was supporting a bloom of algae?

From the mountains and plains, irregular but seasonal rains bring terrestrial nutrients down to where they are mixed with even more such nutrients from the sea (Odum, 1971:359). These are concentrated and cycled through shallow water detritus-feeding benthic organisms such as shrimp, prawns, crabs, crayfish and mollusks which live in the estuarine waters. Such waters include those found in river mouths, lagoons, tidal marshes and sometimes mangrove forests, places where there is a

mixture of marine and fresh water. These organisms, the small carnivores that feed on them, other herbivores and even the raw materials are "outwelled" to adjacent neritic waters. There they are included in the food-nutrient cycle of more well-developed communities of phytoplankton, benthic microflora and large attached [marine] plants all of which are or support the large populations of potential food sources that man finds there (Odum, 1963:114; Odum, 1971:359-360). The bottom surfaces of sand, mud, rocks and coral that exist along the coast encourage different species and families of organisms, but also demand of man different adjustments in his technology of capture.

### **The Mangrove Forest**

The interface between terrestrial and aquatic environments is the strand, which strictly speaking is the zone between the highest and lowest normal tide. Here, one biotype in particular, the mangrove forest serves as a major articulation node in the maritime systems of resource exploitation (Figure 6). The highly productive and easily accessible mangrove forests ~~is~~ [are] located where tidal currents are absent or slight such as in river deltas, certain estuaries and in protected marshy lagoons. In fact, one very important function of the forest is the extension of the coastline (Dobby, 1967:63-64). Today these forests are located from Phan-rang to Ninh-hoa, but in past centuries, before the Vietnamese had either removed the forest[s] completely or reduced ~~it~~ [them] to the point of ~~its~~ [their] present dwarfed state (Thai-cong-Tung, 1965:30), the ecological tolerance of most of its species would have allowed the biotype a much further northward extension (Yu-van-Cuong, in Aubreville and Tardieu-Blot, 1969:213).

**FIGURE 6. UTILIZATION OF THE MANGROVE FOREST**

User	Uses
Farmer	Fire-wood, charcoal, house-building materials, tools
Metallurgist, Lime-maker	Charcoal
Boat-maker	Fiber (cordage), leaves (sails) resin and bark (caulking materials)
Fisherman	Fiber (lines), wood (floats and stakes), tannins (net-preservers)
Marine (or estuaries) fish, crustacean, mammals	Shelter for eggs, fry, young and adults; leaves as energy input to food chain

Sources: Eugene Odum, Fundamentals of Ecology, 3<sup>rd</sup> Ed. Philadelphia: Saunders, 1972; David Sopher, The Sea Nomads: a Study of the Literature of the Maritime Boat People of South East Asia, Singapore: Government Printers, 1965; Thai-van-Kiem, Viet-Nam, Past and Present, Tangiers: Commercial Transworld, 1957.

The physical factors which I have discussed above contributed to make the estuarine and neritic waters of the coast of Champa potentially one of the most productive of all aquatic resources regions in Southeast Asia. Surely that is to what the Arab geographer Edrisi referred when he said:

The sea of Campa feeds a huge variety of large and small fish and produces strange and different substances, beneficial and harmful (1154 A.D., in Ferrand, I, 1913:189).

To fully exploit this environment, man needed to go beyond the confines of the shore.

#### **TECHNOLOGY OF FRESH-WATER AND MARINE FISHERIES**

In this major section, I describe and determine the origins and functions of boats and capture implements, the strategic adaptation of which allowed the ancient Cham to extend their resource base beyond dry land and shallow waters. Analogous to the irrigation works in terrestrial food production, certain

large boats and capture implements required considerable investment for initial construction and continual maintenance. Common to my analyses of both boats and capture implements is an emphasis on capabilities or technological capacities for accomplishing certain tasks. Precise historical evidence does not exist for fishery activities as it does for terrestrial production, so that my reconstruction here is more conjectural than the previous chapter (see also Chapter I).

### The Boat

From the standpoint of the prehistory as I have reconstructed it for greater Southeast Asia and especially for the people who became the Chams, there can be little doubt that boats have been a part of the indigenous technology at least since the third or fourth millennium B.C.

The outrigger canoe that is usually associated with Austronesian speaking peoples is not found on the mainland, except for the Malay Peninsula. However from past millennia the [outrigger] boat is remembered in the Cham word *ka-jo*, which refers to the double-float used to stabilize the boat (Aymonier & Cabaton, 1904:46-47). The naval ethnographer Paris has noted that the boat engraved on a rock near Phan-rang resembles those ships found on the wall-reliefs at the mid-ninth century Borobourdur temple in Java, the latter which also carry such double-float accessories (1955:65). Thus the outrigger canoe was probably either once used by the Chams or was a common visitor there.

The earliest possible mention of Cham-like ships comes from a Chinese text published in 817 A.D. but relating information from hundreds of years earlier. This text in part describes *kun-lun* ships as having bulwarks of sewn planks, a quarter-deck of bamboo, and a hull caulked with a dammar resin. The word "*kun-lun*" is thought to refer to people from within the Malay world

(in Pelliot, 1925:259-261). The hull in this case is only described as being caulked, but later in the tenth century there is a detailed description of small round boats with bamboo hulls that are "varnished" with resin. The sighting and subsequent reproduction of these boats was made by a Vietnamese general attacking to the south in Champa (Dumontier, 1910:, cited in Thai-van-Kiem, 1957:120).

Among modern Vietnamese boats from Dong-hoi to Vung-tau, virtually the territorial extensions of Champa, distinctly regional traits such as hulls made from varnished bamboo lattice, retractable drop-keels in stem-posts and sliding rudders in stern-posts survive as vestiges of former Cham use (Morechand, 1955:312-313). In addition, there is a local use of sewn-plank hulls in the Hue region, but apparently little caulking is used. In previous centuries, this latter ship may have been the now disappeared "sinja" or *thuyen-gia* that Thomas Bowyear in 1695 and Pierre Poivre in 1750 described as plying the seas between Champa and Siam, and as weighing between 100-150 tons (Paris, 1955:10). Perhaps the best description of the Cham boats was by an American naval lieutenant in 1819, at a time when Cham construction techniques were still much in evidence and perhaps even by the hands of Chams themselves (see Langrand, 1945:46). John White, the lieutenant, closely examined one vessel he estimated to be above fifty tons:

...(the) bottoms were composed of basket work.....the timbers...are so contrived as to be taken apart, and replaced again, with very little trouble, and no injury;...they are taken to pieces, and secured from the vicissitudes of the weather...Their bottoms...are covered outside to the thickness of half an inch with gulgui, which is a mixture of dammer, or pitch, oil and chunam, or lime, and when properly amalgamated, is very tenacious and elastic...They possess a great degree of stability, bearing a great press of sail, and are most excellent sea boats; they carry from one to three, very

well cut, and neatly made, lateen sails, with the exception of a few from the north, which carrying lug-sails...Their sails are of matting...Their shrouds and cables are mostly of rattan, and their running rigging, or coair, the well known cordage, made from the husk of the cocoa nut...(White, 1823:56-57).

I have summarized pertinent information describing these boats, which I guess were most typical of the ones that existed in old Champa (Figure 7).<sup>22</sup>

Ranging from the ubiquitous round basket boat to ships the size of the one mentioned above, I can fully imagine that the Chams once had even bigger ships. Judging from Vietnamese maladaptation in the maritime sector, from de-evolution through time and also from the previous existence of Sinhalese ships over 40-50 meters long in the 3<sup>rd</sup> century A.D. (cited in Pelliot, 1925:256) and the mention of Fu-nanese dugouts up to 24 meters long also in the third century (1925:252-253), I would argue that the largest Cham ships may have ranged up to 40 meters long with a payload of 200 tons.

One of the main objectives of Figure 7 is to relate the size and seaworthiness of Cham vessels to the capability of capturing large amounts of fish that were found further out at sea. As I shall subsequently show, certain nets could have been used several tens of kilometers offshore in order to catch the large schools of pelagic fish that feed in the enriched waters there. To preserve the catch on such extended fishing trips, the fish were probably put into the bottom of the basket hull where they could be preserved with salt (Nha-trang, 1952:47) or kept alive in large towed live-traps such as are found today on the Mekong River (Bardach, 1959:37). Some of the nets would have

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<sup>22</sup> I prepared a hand-drawn table in 1972 that had illustrations of the different boat types, but the 1972 technology of typing did not permit me to include the illustrations in the original thesis. Figure 7 now includes the illustrations made possible by the electronic technology of the computer age, but formatting is still horrendously difficult..

FIGURE 7. BOAT TYPES AND USES<sup>a</sup>

BOAT NAME	DESCRIPTION <sup>b</sup>	LENGTH <sup>c</sup>	BEAM	CARGO	PROPULSION	REGION-RANGE	USE	PHOTO (NOT TO SCALE)
Thúng chài	Circular basket w/ rigid ribs	1-2 m. diam.		Passengers & Fisherfolk	Oars	Throughout Vietnam: streams, lagoons, open sea near mother ship	Fishing: setting out and attending nets & traps	
Cali Sông	Bamboo gunwales w stringers	6-8 m.	1 – 2 m	1 - 1.5 tons	1 – 2 lugsails	Phu-yen to Hue, esp. Quang-ngai: in estuaries; often not operating in winter	Fishing all yr. w/ hooks & lines, drift gill nets for scad, tuna, mackerel, 10-200 kg. daily catch	
Ghe Xuồng	Simple wooden gunwales w/ reinforcing stringers, ribs & thwarts	10-12 m.	1 – 2 m	1.5 - 4 tons	2 lateen sails	Phan-rang and Qui-nhon: up to 10 mi. from shore; not active in winter	Fishing w/ hooks & lines & gill nets. Sets out beach seines. Up to 100 kg. catch	
Sông Vành	Hard-chine, sewn planks; weak construction; no retractable rudder or stem-board	10-12 m.	1 – 2 m	5 - 6 tons	Poles and sweep; 1 -2 lugsails.	Hue to Quang-tri: mostly streams and lagoons but some up to 10 mi. offshore	Fishing yr. around w/ X- and V-frame dip nets. Cargo, ferrying, & houseboats	
Ghe Nang	Similar to Ghe Xuong w/ longer higher gunwales, topside planking	10-12 m.	1 – 3 m	2 - 8 tons	1 – 2 lugsails	Phan-thiet to Quang-tri: 10-20 mi. offshore up to 5 days; active yr. around inshore water in northeast; monsoon use	Fishing w/ hooks & lines and encircling gill nets & lift nets. 40-300 kg. catch	
Ghe Cầu & Ghe-Bầu	Arched canopy of thatched bamboo	12-20 m.	2.5 – 5.5 m	30 tons	3 lateen sails	From Da Nang up to 50 mil offshore up to two weeks. Between Hue and Nha-trang along the coast.	Fishing yr. around w/ all equipment. Carries salt to preserve catch up to 1000 kg. daily. Cargo carrier of rice.	
Ghe Mành	Deep, almost entirely wooden hull except bamboo woven bottom; no stem-board	10-12 m.	2.5 – 5.5 m	35 to 120 tons	3 lugsails	From Phu-yen along the entire eastern coast even down to Mekong R. up to Cambodia up to 7 weeks	Cargo: rice from Quang-nam south; salt from Khanh-hoa north	

<sup>a</sup>. Battelle Memorial Institute, Columbus, Ohio. Renote Area Conflict Information Center, Blue Book of Coastal Vessels of South Vietnam. Columbus: Battelle, 1967. Pietri, Les Voiliers d'Indochine. Nouvelle ed., Saigon: Société des Imprimés et Librairies Indochinoises, 1st Ed. 1943, 2<sup>nd</sup> Ed. 1949.

<sup>b</sup> All boats have elongated bamboo basket hulls, retractable rudders, and bow stem boards unless otherwise noted. Descriptions are generally cumulative toward the larger boats for regions, range, and uses.

<sup>c</sup> Measurements represent only ranges.

required on extra-personal energy sources to drag through the water, energy that could be obtained by one or more sails catching the wind and by working in conjunction with the tides. It was usually tides that determined when the fishermen could clear the shallow straits at the mouths of rivers and lagoons. Not only was the fisherman subject to the movements of the tides, but also the winds, the latter which could not be trusted to be steady. Nuttonson has called the northeast monsoon wind "pulsating", partly because the configuration of the land that often makes it possible for local sea-land breezes to reverse the prevailing direction of the monsoon. Such reversals most often came during the summer southwest monsoon, when the "Lao" winds are blowing (Nuttonson, 1968:10-11). This period corresponds approximately to the periods of greatest off-shore fishing activity. Because of this danger, and the chance of being caught off-shore with a full load of fish—some boats were too small to be carrying salt along or perhaps too under-powered to tow live-cages—there may have been some encouragement to fish closer to shore.

The Chams had devised in the construction of the hull of their boats a uniquely strong, pliable, tough and lightweight lattice. When treated with a resin binder it became a resourceful adjustment to the tropical teredo wood worms, small bivalves and other marine organisms that commonly attacked the hulls of untreated wood. Perhaps more importantly, it was also adjustment to the abrasion caused by beach landings through the pounding surf or by hovering over reef surfaces. An anonymous author has said:

The basket bottom is flexible to allow easy passage-way over the treacherous sand bars at the entrance to small river mouths or lagoon, where rigid, all wooden hulls would become dangerously embedded in the sand upon contact (Viet-My, 1961).

In this context it is easy to see the advantage of retractable keels and rudders too.

At the local villages, boats up to the size of the *Ghe-Nang* (Figure 7) would probably have been constructed by the farmer-fishermen themselves from locally procured materials. Easily replaced woven hulls and sails were built and repaired from *Tre la-nga* (giant bamboo) and *Tre gai* (prickly bamboo), which are both apparently cultivated by the Vietnamese (Le Marchant de Taignon, 1905:1278). Timber for the upper wooden hull, planking, the mast, and other uses such as the oils and resins to make the caulking binder were all found in the then readily available dense tropical evergreen forests on the ocean side of the mountain slopes and upper plains (Battelle Memorial Institute, 1967:73; Cobban, 1968:3-4).

For ships such as the *Ghe Cau*, *Ghe Manh* and presumably the large ones, much man labor would have been needed for the procurement of raw materials, the original construction and the periodic repairs (Battelle, 1967:364-469, passim). I suspect that there were boat construction sodalities at this more complex level, if not at the lower one as well, whose leaders would have corresponded to the *Ong-Banok* and *Trum-Xe* in the construction of irrigation works (see Langrand, 1946:46). However, with the construction of larger ships, the objective may have also changed from strict acquisition of food to supplementary activities of internal and external trade, piracy and warfare (see Majumdar, II, 1927:224; Maspero, 1928:33, 42; see also [my] Chapter II). In the development of ships, such "supplementary activities" centered around the transportation of men and goods over the relatively easier routes by the quickest means. For the small boats, the primary objective was much more mundane: the boat was a vehicle by which man extended his

exploitation of aquatic resources from shore to water. Yet to acquire the aquatic resources he needed more tools than those of his own two hands.

### Capture Implements

It is highly likely that with the development of plant cultivation the proto-Cham along the strand were inventing or borrowing the basic capture tools of the spear, harpoon dart-gun, scooping basket, basket-trap, restraining weir, hand throw-net, hook-and-line, and the use of natural poisons (Spencer and Thomas, 1969:351; Solheim, 1969:7). North Vietnamese archaeologists say that as early as [the] Phung-nguyen culture (approximately the third millennium B.C.), seine-nets like the present-day *Tru* were being used in streams of the Red River valley.

I have generally arranged the capture implements in terms of passive and active deployment, the former requiring less optimal input of energy than the latter.

#### **Passive Capture**

Passive capture implements include[d] the blowgun, hand basket or creel, stream seine or *Tru*, individual rattan/bamboo traps (like a lobster pot), barrage and weir (with the addition of other specific implements), the stationary trawl or *Day* [zay], staked trap or *No* or *Sao* and the tunny-net (Aymonier & Cabaton, 1904; Colani, 1935; Colani, 1936; see below). Nearly all passive traps rely on the energy of river flow, tidal movements, [or] the north-south seasonally changing ocean currents to bring the prey to its capture. In the rivers, barrages act in several functions, one of which is the impoundment of fish as was observed by Duong-van-An (1553, in 1961:16-17, 26). When the water ran high, baskets were put behind a *holum* or hole in a barrage (Aymonier & Cabaton, 1904:519) and when the streams were low the fish were scooped up

with baskets or dip-nets. A peculiar adjustment of the net to the configurations of a staked trap is the *day* [zay]. The *day*'s location in Cambodia along the Mekong River in Kampong Cham and along a stretch of the Tonle-Sap River around Phnom-penh, corresponds exactly to the sector that is fished almost exclusively by the Chams (Chevey & Poulain, 1940:71; Rasalan, 1953:87; Bardach, 1959:16-17). This direct association is confirmed by Chikamori in a study about Chams who make fishpaste or "prahoc" for the Khmer (1967:6-7, French summary).

In estuarine waters and just off-shore in the shallow four to five meter water[s] are set the stationary V-shaped weirs. They are often over 1,000 meters long and 500 meters wide, and may be comprised of thousands of bamboo and wooden sticks. Inshore they were subject to strong winter river flooding and both inshore and offshore to the periodic typhoons that swept in, not to mention willful human damage in the course of war (Dutriel de Rhins, 1879:195). It was in winter that de Rhins saw the traps being repaired. At those times of repair and reconstruction, there must have been tremendous concentrations of labor input into the system.

Weirs of this sort take advantage of the feeding and spawning habitats of fish, crustacean and nektonic mollusks as they feed near shore and in estuaries when the meeting of the high tides with fresh-water currents stir-up nutrients and plankton. When the tide goes out and most of these organisms with it, they are swept right into the "welcoming arms of the traps" (see Sopher, 1965:233). In past periods then, it is reasonable that the traps set offshore could have taken in migrating carnivorous fish as well, less in numbers but much larger in individual size and variety of species.

The tunny-net is a cross between a stationary trap and a seine, [and] is a large improvement over the stake-trap. It is

used exclusively in Southeast Asia off the coast of Nha-trang and in the Philippines. Its use is not known in North Vietnam and there is no resemblance between the tunny-net of Europe and that of Vietnam (Nguyen-thuy-Anh, 1966:273). If it was used by the Chams, the tunny-net would have offered a more positive but stationary method of capturing the "top" carnivorous Scobroidae mackerels and tunas that passed by the shore from the first to the seventh lunar months (Khuong & Serene, 1952:31-39).

Historical evidence pointing to such a stationary device is in a sixteenth century map of Phan-ri (in Giap Ngo Nien Binh Nam Do, ca. 1568) when Champa still enjoyed sovereign rights there. Three fish in the sea are pointed toward a tower, which is probably the Cham temple of Pho-hai at Binh-thien. An accompanying caption translates: "Each year at the fifth lunar month groups of fish (come with?) the tide to the Tower" (in Hong Duc Ban Do, 1962: 164).<sup>2</sup> No net is depicted but I suggest that it may symbolize the annual harvest of migrating fish carried by the tide or current toward a stationary trap or net of some kind.

### **Active Capture**

Active capture involves taking the implement to the prey and thus even more [than] in passive capture, requires the supplementary energy sources of wind-power beyond the use of human muscle. Active capture implements include the long-line or trolling line, the *Vong-ngao* (a herding net-like device used with stationary traps), beach seines, lift or square nets, drift and encircling gill nets (Aymonier & Cabaton, 1904: passim; Colani, 1936:236).

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<sup>2</sup> The Vietnamese text is as follows: "Mỗi niên ngũ nguyệt nhật, chúng ngư triều tháp." [My apologies: I missed the two underlined words and had one wrong one in 1972.]

The use of nets inshore and offshore cannot be doubted in historical Champa, but there remains the question how far from shore fishing boats took their trolling lines and nets. Beside the questionable evidence from modern vocabulary, the only historic evidence of nets specifically associated with Chams is the observation of Wang Ta-yan (1349) and Fei Hsin (1409) who both talk of the Cham as gaining their livelihood (in Phu-yen) by fishing with nets (in Rockhill, 1915:93, 95). A Japanese translation of Fei Hsin however is more specific in noting that the boats went out from shore and the people fished by "putting a net together" (in Kani, 1960:53).<sup>26</sup> Such an action could have referred to the closing of a beach seine, a dip-and-lift net, or a gill net, all of which I project the ancient Cham used (Duong-van-An, 1553, in 1961:45; Aymonier & Cabaton, 1904:11, 24, 413; Ner, 1941:177).

#### **Capabilities of Aquatic Technology**

A review of modern Cham vocabulary in Aymonier & Cabaton (1904) concerning fish and other water organisms reveals far more fresh-water and estuarine species than marine (neritic and pelagic). This may be a consequence of both the abandonment of marine fishing activities in Vietnam and reliance by Aymonier and Cabaton on vocabulary from the still active community of Cambodian Cham. Yet I argue that the Cham formerly had both sufficient boating and fishing technology and the historical inclination or cultural heritage that would have allowed them to fully exploit fresh-water and marine environments (see Majumdar, II, 1927:224). Movable nets would have had the advantage of allowing the fisherman to carry out active search for schools of pelagic fish. The boat-type[s] which I contend the Cham used, had permitted local village fishermen, using a *ghe-nang* for

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<sup>26</sup> Translated into English by a colleague of mine, Shinzo Shimabukuro.

instance, to range over thirty kilometers offshore and to tow heavy nets or long lines with the suspended hooks and traps. Depending on the implement used and the procedure followed, there should have been nondiscriminatory capture of species beyond that which the meager vocabulary implies, assuming of course that the capturers were not subject to broad and all inclusive food taboos such as existed for cetaceans (Claeys, 1959).

The crux of my argument lies in my basic presupposition that much if not all present-day simple [Vietnamese] fishing-boating technology and lore is ultimately derived from the previous Cham inhabitants of the coast. The Vietnamese do go out far at sea as is indicated in the capabilities of the Vietnamese boats that have originally Cham characteristics (Figure 7). Did the Chams also venture far out to sea, as their ancient reputation signals?

### **Seasonal Sequence of Capture**

Reconstruction of the seasonal sequence of ancient Cham fishermen is based on current but inadequate knowledge of Vietnamese practices. In general, offshore neritic and especially pelagic fishing would have been limited to periods when the sea was relatively calm, from about the twelfth to the eighth lunar months (January to September). For instance, the pelagic flying fish and Scombroidae (tunas and makerels) seem to have a most highly productive period for three to five months starting about January *off the former Amaravati* and becoming progressively later down the coast to the former *Kauthara* where the season starts in April (Khuong & Serene, 1952:31-39; Nhatrang, 1952:42-49). For Scombroidae caught in the tunny-net, the season is from the first through the seventh lunar months. On the other hand, inshore estuarine and close-shore neritic

fishing was most active during the rainy season. Not only did rough seas and uncontrollable winds discourage offshore boating, but the force of the rain, wind-driven waves, higher water stowage and outflowing river floods contributed to a churning of detritus materials and thus a source of food to increased crustacean and in turn, increased numbers of fish (Nguyen-Chau and Tran-De, 1964). By inference, through common capture practices, the capture of shrimp should have also collected considerable amounts of fish. The perpetuity of this sequence of dry, calm season offshore fishing and rainy, rough inshore fishing is "strengthened" by strategies in Quang-nam, which see the first lunar month as the beginning of the pelagic fish season and the seventh to eighth lunar month as the end of the open-sea season and the beginning of the estuarine and neritic seasons. Suggesting a possible relationship to ancient Cham practices are "Whale" ceremonies that are celebrated twice a year to mark these phase-changes (Donoghue, 1962:77). According to the Cham scholar Claeys, evidence points overwhelmingly to a Cham origin of the anomalous worship of the whale in Central Vietnam (1959:1177; see Chapter V).

### **Conclusions**

The techniques and strategies of capturing aquatic food resources are contrasted with techniques of culture or management. It might be argued that capture is more irregular and/or more seasonal. For any one species this argument would have strong support. And for some regions such as that of the Champa-like coast of eastern Malaya, the onset of the northeast monsoon announces either a turn to part-time farming or a migration to the more sheltered waters on the west coast (Dobby, 1967:106). However for the coast of Champa, and here for the moment ignoring the place of the farmer-fisherman in Cham society, the onset of the monsoon signaled only an intensification of inshore capture of fish and increased capture of shellfish both in and

offshore.<sup>27</sup> It was both an availability of aquatic animals due to the unique physical parameters involved, but also the Cham's resourceful adjustments to the exploitation of these aquatic riches that made "capture" seem more like "harvest", and blunted seasonality into regularity.

### **SPECULATIONS ON MARICULTURE AND AQUACULTURE**

Based on vocabulary items, an early exaggerated Westerner's account, and admittedly circumstantial evidence, I propose that ancient, and perhaps even prehistoric Chams practiced forms of aquaculture in fresh-water tanks, canals and padi-fields and mariculture in brackish-water lagoons and/or solar-salt pans. If this were possible, it would have meant partial escape from the seasonality of spawning fish, mollusks and crustacean coming up rivers and migrating schools of fish passing by the coast.

In the context of such a country as ancient Champa where tillable land was scarce and the population density was high, often men have resorted to the conscious cultivation of fish and shellfish in managed but semi-natural bodies of fresh and salt-water (Odum, 1963:122). Such an adaptive strategy involves manipulation of the ecology of a plant or animal in order to direct its value as a source of energy ultimately to the use of man alone. One way of doing this is to reproduce an already existing natural system, but eliminate as much of the uncertainty and competition to the desired thing as feasible. This is the process that takes place in terrestrial domestication of plants as noted by Geertz in relation to dry shift horticulture and padi cultivation (1963:16-17). In reference to marine animals, one such natural system is the enclosed intertidal marsh and lagoon. There, man may obstruct the channel from the enclosed portion into the sea or other water course so as to control the outward passage of desired

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<sup>27</sup> Gruvel points out, however, that in the northeast monsoon fishermen from the coast of Annam, especially Phan-ri, go south to Cochinchina (the Mekong delta) to fish in the Gulf of Siam (1925:170). This may be a local phenomena in Panduranga where the opportunities for inshore fishing are rather limited and may also represent a reaction to a de-evolution of earlier known inshore cultivation techniques.

aquatic animals that may have entered with the tides or flood. The fresh-water analogue of this would involve the draining of a natural or artificial impoundment such as a padi-field or irrigation tank in order to reap what animals had been living there.

It is about the first such system that I believed moved Friar Odoric de Pordonne to say of Sri Banoy (Qui-nhon) ~~that~~ early in the fourteenth century:

For every *species* of fish that is in the sea visited that country in such vast numbers that at the time of their coming, the sea seems to consist of nothing but fish...near the shore they leap ashore and the folk come and gather them... These fish continue to come ashore for two or three days together. And then a second *species* of fishes come...and so on...until the last; and this they do but once a year (trans. Yule, 1866:95; my italics).<sup>28</sup>

There are several hypotheses to explain such a cryptic phenomenon. First, Boisselier outright dismisses the story as "naïve" relating it – in a way that seems rather incredulous itself – to the Cham funerary customs of putting royal bodies to sea (1963:351, 403). Second, one could argue that Friar Odoric was confused with the annual drainage of the Great Lake of the Tonle Sap in Cambodia, where after flooding upstream from the spate of the Mekong River flood, the lakes drains out leaving huge amounts of fish to be trapped or caught (Dobby, 1967:301, 363). Odoric's mention of the ancient export product of turtles later in the passage does not however fit the inland lake. Third, Odoric might have been talking of flying fish but these do not approach land and the Friar told of several species. Similarly, fourth, he may have referred to the *Krawk* fish, a Cham name referring to the "walking fish" climbing perch (*Annabas sennel*), which occupied both fresh- and brackish-water mangrove and estuarine environments. Yet these air-breathing fish extend their walking activities much beyond a mere three days every year (Riply, 1964:96).

There is also the cryptic remark about the hills of O-Chau that may refer to the fresh-water analogue of the phenomena at Odoric observed:

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<sup>28</sup> Another translation uses the word "kinds" for Yule's "species" (Kern, 1811:411), and the Latin original is "generation" (in Hakluyt, 1904:388), meaning generation.

There are wells with fresh and clear water. In the wells are fish swimming free and easy (Duong-van-An, 1553, in 1961:13).

Whether it was wells, irrigation tanks, or padi terraces, this must be viewed as *de facto* evidence for aquiculture of some sort.<sup>29</sup>

The legend of the Kim-tra hills and their fish-filled wells seems to point to some sort of raising fresh-water of fish that was occurring in the pre-Vietnamese past, but about the Friar's account there remains doubt. There seem to be two possibilities: first, there was systematic culture of fish, or second, there was systematic impoundment of captured fish that were fattened for later consumption. I argue that the Cham applied one or both modes of production in fresh- and salt-water habitats. A third mode of production that combines the cultivation of rice (or taro) and fish does not leave any acknowledged trace, except that it is a mode that is apparently indigenous to Indonesia, Vietnam, and Japan, and is also found on Taiwan and in Hongkong. This distribution has suggested to Murton that it "could well be indigenous to Southeast Asia" (1964:28-29), a distribution that by itself demands that the Chams would have also practiced this mode of padi-fish cultivation. And of course, this would be in keeping with the model of their prehistory, which suggests a farmer-fisherman duality (see Chapter II).

According to Schuster, the first two modes of production, aquiculture and mariculture, have been practiced in greater Southeast Asia (including southern China) from pre-Christian times, and as I contend, could be two more of the resource regional dichotomies that separated the Austro-Thai from the Austronesian speaking peoples. In insular Southeast Asia, mariculture is highly developed in the Philippines and in Java, and in the latter, the *tambak* system is found on the lowland coast where it is thought to have been introduced from southern China at least prior to the fourteenth century (Schuster,

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<sup>29</sup> It is curious however that in the present-day, Colani (1940) made no mention of fish in the tank systems she described at Gio-linh, Vinh-linh, or Cam-lo [that comprise the modern areas within O-Chau or former Lin-yi].

1952:2). I would not presume to make a deterministic judgment, but there is a disputed legend that Islam was propagated from Champa via a Cham princess about this time (Aymonier, 1911:10), and from the eighth to ninth century, there had been close and often friendly state relations between the two territories [Java and Champa] (Coedes, 1968:95, 123). Therefore it is not unreasonable that the idea of the tambak system could have been diffused southward through Champa from Southern China, if again, it was not already a part of the Cham cultural tradition from prehistoric times. The analogous practice of aquiculture is now employed in Cambodia by those whom are called Vietnamese and Chinese, but it was introduced "by people from neighboring Vietnam who had had contacts with China for a long period of time" (Murton, 1964:25, citing Lafont and Savoien, 1952). I suggest that because many of the fishermen in Cambodia are really Cham (Chikamori, 1967) and are often termed Vietnamese or Malay (Steinberg, 1959:45-47), then it is reasonable to conjecture that indeed it was the Chams who may have introduced fish-pond cultivation into Cambodia when they migrated there between the fifteenth and nineteenth centuries.

In today's landscape in Central Vietnam, the ethnic Vietnamese do practice aquiculture in ponds and bunded padi-fields (Economic Survey Commission, 1959:150). In mangrove swamps near Ba-ngoi, Cam-ranh Bay and at Ninh-hoa - both areas where the Chams still live - various species of brackish-water fish and crustacean are grown, but it is not known whether this practice was introduced by the French, as they say, or whether it is indigenous (League of Nations, 1937:99; Thai-cong-Tung, 1967:58-59).

Returning to Odoric's account, he wrote of fish leaping ashore and of different kinds each coming for several days in succession. If this was some sort of fish pond cultivation or impoundment, then I hypothesize that the Friar could have been describing the drainage of one or a series of ponds, such as suggested by the action of the Cham word *thac*: "to drain a pond of water to catch fish" (Aymonier & Cabaton, 1904:204). The leaping fish might have those fish deprived of their watery habitat, and if the pond were large enough, such as a

whole lagoon, then the successive kinds or even sizes could refer to different responses of the fish to their own ecological thresholds such as water depth. Alternatively, it has been suggested to me by Dr. Eward Jones (personal interview, 1972) that the Friar was describing an annual spawning run, a phenomena not at all uncommon for the Vietnamese coast (see Nguyen Chau & Tran De, 1964), and one which is suggested by the sixteenth century map of the Cham tower and three fish (see above).<sup>30</sup> Because the Friar's account was taken down from memory ten years after the momentous journey (Kern, 1811:392), the detail was undoubtedly confused. The Friar could just as well been describing the harvest of several different sizes or even kinds of fish that had been capture in fixed stake trap. Odoric's fantastic story must remain a mystery, but my general argument for marine aquiculture is not impaired without it.

A practice analogous of the tambak system of Java has been observed in low-lying areas near deltas, estuaries and seashores [in Hong Kong] where villagers dug ponds in which they trapped fish, crabs, shrimps, and other animals that where carried up at high tide (Mak, 1964:147). Such an activity is practiced today along the shore of the South China Sea and also occurred in sixteenth century O-Chau (old Lin-yi) where Duong-van-An reported villagers who dug a pond to trap shrimp and fish during a drought (1553, in 1961:45). Molluscs could have been raised or grown in a similar fashion as they have been in China (Mak, 1964) and as they are in abundant number up and down the Central Vietnamese coast in lagoon (Bao-La, 1960:1617-1618). According to Mak, the shells are collected and burned for lime (1964:150), the same practice that Fei-Hsin had reported much earlier in Vijaya: "Shell-fish give lime for spicing betel nut wrapped in sirih leaves, which they are never without...in their mouths" (in Rockhill, 1915:93). Because it was wood and charcoal from mangrove forests which was used to burn the shells into lime, this prehistoric and widespread custom must have cause the Cham to seriously deplete

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<sup>30</sup> Dr. Jones is a fishery biologist at the National Marine Fisheries Service Hawaii Laboratory, Honolulu, Hawaii.

their shoreline forests. Yet as de Silva points out (1970), lime has also been used traditionally along the South China Sea to aid in reclaiming tidelands to make padi fields.

### **Production and Utilization of Salt**

...Throughout the coast of Central Vietnam, everywhere, from Sa-huynh to De-gi and from Hon-khoi to Ca-na, everywhere are found salt fields, exactly in the places where the Chams formerly exploited them, for daily use and to exchange for merchandise with the people of the Highlands and of Laos (Thai-van-Kiem, 1958:25).

The reported use of solar salt fields scattered up and down the coast in ancient Champa requires some clarification. Both Wang Ta-yuan and Fei-Hsin have been translated by Rockhill to report that the Chams "...boil seawater to make salt (in Rockhill, 1915:86, 93). Kani's translation however uses the word "evaporation" instead of "boil" and continues to note that this method of solar salt production was spread through the Archipelago. Boiling of seawater actually did occur in Southeast Asia, but it was rather the burning of roots such as from the Nipa palm, to make ash, which was then boiled with brine to product a course, bitter salt (Sopher, 1965:236). Similar to this is DOUNG-van-An's reporting of salt being produced from cicada excrement in the mountains of Quang-tri in the sixteenth century (1553, in 1961:25). Despite this, the solar or evaporation method is substantiated from centuries before the Christian era in solar ponds excavated in Northeast Thailand (Higham & Parker, 1971:6-16). In Champa, the existence of coastal salt-works is supported in part by analysis of place-names.

Thai-van-Kiem notes that the Chinese formerly called the estuary of *Sri-Binoy* or *Qui-nhon* by the name of *Thi-Nai* ( ) or "Market of Salt" (1960:513). Yet the Chinese character Kiem uses, , does not mean salt, . Another place-name is *Ke Moi*, which existed at the Cua Tung estuary in Quang-tri from at least 1680 A.D. Cadiere suggest that "Ke Moi" is a dialectical form of "Ke Muoi", which means "those of salt". This indicated to him that the port was an ancient salt-

works, sitting on the terminal end of a trade route that ran through Gio-linh, Cam-lo, and into Laos (Cadiere, in Colani, 1940:135).

There can be no doubt that solar salt works were found along the coast, and that every river valley running back into the hinterland had its own supply of salt that the inhabitants and especially the fishermen used to preserve their foods, and the elite used to trade for exotic goods from the interior. Salt was probably used only rarely as a condiment in its pure state. The preferred use was ~~as a source of protein and~~ as a preservative for meats, vegetables and particularly fish and shrimp. Both fish sauce, which Gourou has aptly called "fish cheese" (1945:406), and fish paste or the Khmer *pra-hoc*, are both found in modern Cham vocabulary (Aymonier & Cabaton, 1904:373) and I have already mentioned the Cham *pra-hoc* industry in Cambodia (Chikamori, 1967). Salt in fish sauce and fish paste was also a way of adjusting to a varying seasonal supply of animal protein, which while never ceasing to exist during the year, certainly showed sign of glut and periods of want.

This dietary use of salt was of course the basis for its value in trade. To the mountain highlanders in the relatively inaccessible interior, salt was a necessity for the addition of iodine into their systems. To the salt-controlling lowlanders, salt was leverage in economic and even political dealings (Mus, 1936:750; Bourotte, 1955:34).

### **Conclusions**

As a level of subsistence adaptation, the capture technology of fishing can perhaps be seen as an order below cultivation of terrestrial crops and the impoundment production of aquatic resources. However even capture technology was improved to the point at which the passive use of huge staked traps was able to supply large amounts of animal protein with minimum continuous input of labor. Thus it acted a supplement to simultaneous cultivation and raising of land-oriented food sources by the same peoples. It is how this integration of terrestrial and aquatic exploitation system was imprinted on the landscape and how it functioned that now occupies my attention.

## CHAPTER V

### ORGANIZATION OF RESOURCES MANAGEMENT

In this chapter, I briefly describe the cultural landscape of ancient Champa as it might have appeared in a hypothetical transect from seashore to hillside. My main concern, though, is to integrate certain institutions of resource management with the adaptive strategies that I have outlined in the last two chapters. I emphasize resource management over control because of my greater concern for the functioning, operational economic system. "Resources management" in this case is concerned with the direction of specific exploitative strategies. "Resource control" on the other hand may be defined as the power to allocate rights of usufruct, and in the matrilineage of Champa, the maintenance of title to property.

I propose that control of resources was manifested through the lineage or clan system, but that the operational management of resources was affected through special purpose sodalities. Lineage control lay in the hand of the women but sodality management was a male-dominated system. Underlying both structures was the legitimization of authority and emotional focus that the temple provided. The latter sacro-economic institution is examined in detail in an Appendix.

#### **The Cultural Landscape of Ancient Champa<sup>31</sup>**

Historical Champa was inhabited by a people who largely by themselves evolved a broad range of adaptive subsistence strategies that spanned from the lucrative capture and production of aquatic life to drought-defying cultivation of green produce and heavy-laden fields of golden padi. Seaward-

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<sup>31</sup> For an early, generalized and almost literary description of the former Cham landscape, see Jeanne Leuba's Les Chams et leur art (1923).

facing fishing settlements were most often found where fresh water stream debouched or where man could tap the abundant ground water. Likewise quiet bays or lagoons afforded shelter to sea going craft in rough weather, provided a measure of fresh water, and because of ease of transportation, provided access to a greater variety of plant resources. Where there was a navigable river leading inland, forts and trading ports were established at the entrance to the inland water body. On broad sand dunes were full-time maritime fishing villages which devoted nearly all their labor and time to offshore neretic and pelagic fishing, done with predominately active capture implements. People located on the inshore side of lagoons and bays probably devoted more time to farming where dependence on passive traps required less continuous labor input.

Inland saw a narrower band of potentially arable land mainly because of the reduced gross amount of earth transported down from the mountains, but in comparison to the pre-1930's Vietnamese coast land, there was more irrigated land relative to the reduced land area. Settlements were linearly arranged along streams and canals and in the hills were more randomly dispersed where wells and springs predominated. Here and there among the natural forests and clumps of orchards, raised the heads of temple towers, certainly hundreds of them in the centuries now long past. Along the waterways and in the lower foothill valleys, large fortresses, cities, and temple complexes could be found. The biggest cities were enclosed by high and thick brick walls over four kilometers in circumference.

A double complex of dry-field and wet-field terracing systems formed a series that made possible the agricultural occupation of the hill country. A look at the hill land-use patterns might have seen pasturages in the uplands followed in

descending zonation by some degree of shifting dry horticulture blending into permanent dry horticulture. Irrigated orchards and gardens were found below the water source, which if a tank, would have supplied water by seepage or by conduit. The tank also acted to supplement diverted stream-canal irrigation of mountain terraces and valley-floor padi fields. Settlements were both on hillside terraces and on the valley floor. [I believe] the past is preserved in the interior valleys of Quang-ngai to Phu-yen where

It is not rare to encounter many well-kept terraces of rice fields presenting a beautiful sight. Everywhere the *mois* [Da-Vach Cham?] have captured little streams and have canalized them so as to irrigate every cultivable part of the valley. All these rice fields easily produce two harvests in a year (Le Marchant de Taignon, 1905:115; my comments and translation).

Padi landscapes assume considerable modification of the environment and demand long-term and continuous inputs of energy to permit the perpetual operation of their efficient production-oriented ecosystems. All these reflections of human activities on the landscapes which were redirecting energy potentials in the habitat toward the service of man required definite institutional arrangements to assure repetitive performance. Such performance was motivated by awe of the spirits, by coercion by an elite, and by cooperation among one's fellow men.

## **RESOURCE MANAGEMENT AND ADAPTIVE STRATEGIES**

### **Introduction**

To integrate institutions of resource management with adaptive strategies for exploiting the energy potentials in the habitat, I identify five points of energy exploitation that seem to be fundamental toward understanding the functioning of the resource-use system. The five points are 1) control of seed and

disposal of harvest; 2) expansion of and colonization into new land resources; 3) construction, maintenance and administration of irrigation systems; 4) construction, maintenance and operation of boating and fishing activities; and 5) control of animals both as motive power and sources of milk products. It is the last topic that best suggests that the function of the temple went beyond that of a pure ecclesiastical institution (see Appendix: The Temple in Ancient Champa). As a matter of introduction I first very briefly describe lineage control, the sodality and the temple, all of which I have given only passing mention before.

### **Matrilineage Control**

The kut, or cemetery of the matrilineage, designates the clan, which in turn is divided into sublineages or prok. The kut (clan) and prok (clan branch) are circumscribed permanently within established territories, and if the prok is large or important enough, it may be installed in one or more neighboring villages. If not, it may be localized to only a part of a village, but then its stilted houses are grouped together to preserve the cohesiveness of the lineage, and as I contend, the memory of the longhouse (Lafont, 1964:58-159). Although the prok among the Chams today averages only forty to fifty members, which would be about the population of a longhouse, I believe that the longhouse is [or was] subordinate to the prok because the latter's equivalent among the longhouse dwelling Rhade consists of several settlements (Maurice & Proux, 1954:207 and accompanying map). These elements are all held in common by the Mdhur and Bih Rhade, Jarai, Churu, Raglai, some Koho and the Kil, all Chamized or Cham-related highlanders who also share the religious and feudal institution of the po-lan or po-phum, "proprietaire (du) sol" (1954:207 and n.35, citing Ner).

Until recently matriarchal control of eminent domain over the prok territory and its resources lay in the hands of the *po-lan*, who held title to the land, trees, grass, ponds and streams as well as the longhouse(s) and the group's jars, cattle and grain stores (Sabatier, 1940:279-286; Lebar, 1964:253). The *po-lan* matriarch also granted usufruct and could demand in reciprocation tribute in kind and in labor (Maurice & Proux, 1954:209, 211). The *po-lan* traditionally was also high priestess of the Cult of the Soil (1954:209-211), whose Soil or Earth spirit found its expression in a tree, or in a sacred stone placed under the tree where the divinity was concentrated (Mus, 1933: 376). The Chams utilized both symbols (Colani, 1940:137-186; Cabaton, 1911:343), but the menhir (megalith) or stone is also the kut, which symbolized the bond between the specific lineage ancestress with the local Spirit of the Soil by which the lineage unit "garnered the usufruct of the land" (Wales, 1961:67-68; Wheatley, 1965a:36). I contend the *po-lan's* religious role maintained and legitimized her authority as matriarch and controller of the title to the proks's property and total resources.

I suggest that the *po-lan* may be related to the [Cham] rank of *pu-lyang\_* (*pulyan*) which was awarded to both men and women, but more often the latter (see Majumdar, III, 1927:103, No, 36, 161, No. 61, 213, No. 97). For instance, in about 899 A.D., the maternal aunt through whom the line of descent flowed (Lafont, 1964) of the king Jayasimhavarman was named Pu Svang Rajakula. It was said that she

makes the best use of her wealth according to religious precepts and her inborn qualities, she constantly makes gifts to Brahmanas, ascetics (yati) and virtuous people in the world (in Majumdar, III, 1927:103, No, 36).

Perhaps this action is analogous to the manner in which the rights of the *po-lan* could be utilized (see above).

However, I must make the distinction between control and management of resources. Maurice and Proux are careful to note that many, if not most of the matriarch's rights and obligations are delegated to her husband, who then assumes the role of the functioning *po-lan*, though the lineage property is still passed from mother to daughter (1954:207). These powers that were delegated and even the ones which were not must have still been strongly asserted in the hands of longhouse *prok* and *kut* chieftains not to mention the king!

### Sodalities

Most briefly, sodalities or voluntary associations are [found] worldwide, but in Bali, whose old Hindu-Javanese culture is not too dissimilar to ancient Champa, Geertz has defined them as

A set of overlapping and intersecting corporate associations, formed on the basis of a single criterion of membership and dedicated to some narrowly specified social [or economic] end (Geertz, 1962, in Dalton, 1967: 383; my comments).

I believe that the duality of fisherman-farmer, which I have contended reflects the prehistoric origin of the Chams, met the conflicting demands of labor input upon an individual by the sodality concept as exemplified in Bali. Existing information permits me only to suggest that sodalities or cooperatives may have existed for fishing, irrigation and other economic activities. In the case of Champa, it is suggested that sodalities were centered about a sacro-economic core and remained functionally outside the lineage and political systems though perhaps were geographically congruent with them.

### The Temple

Based on detailed studies (see Appendix), I believe the temple served as an institution for motivating political and economic organization among the local population and for effecting economic control by the elite. Depending on the political circumstances, important and rich temples may have oscillated between royal, private and independent (?) patronage. Brahmanic temples were income-producing organizations, while Buddhist monasteries were more inwardly turned and offered no material return on an investment or endowment. Income was in part derived from permanent revenue-earning endowments of land and livestock, the temporary and permanent use of labor to manufacture goods for sale, the investment of such revenues and other donations in interest-earning economic development projects, and the offering of services for required rites and ceremonies. The temple system may also have served for the elite to concentrate the territory's resources and on occasion to redistribute them to the people.

### The Control of Seed and the Padi Harvest

The control of rice seed and the disposition of the harvest is today and was in the past at the heart of land tenancy (Jacoby, 1961). How controls were exercised can be established by asking where the padi seed and harvest were stored, how the surplus was appropriated, and who controlled the storage and movement of padi.

Among the present day Cham and Raglai, a granary is built into the single-family dwelling, but among the more traditional Chamized clans of the Rhade people, each longhouse has a separate square-shaped building for a granary, just as do the single-family dwelling Churu (American University, 1966:578, 660, 873; Ner, 1930:Plate LXVI). Evidence of the existence of a

separate granary is strengthened by a fifteenth century Cham vocabulary list which shows san brah to mean "house of rice" (Edwards & Blagden, 1940-42:69). If the *po-lan*, as landlord and high priestess, held title to the *prok's* grains stores (Sabatier, 1940:179), then presumably every longhouse's granary was under a tribute relationship with the leading family of the *prok*. Analogous to the Vietnamese ceremonial dinh which administered communal land and stored communal grains, I believe the *po-lan's* granary and even the individual longhouse granaries took on the function of minor temples. This would have served to legitimize the elitist demand for tribute, which at this level meant both the temporal and spiritual share. In fact religious significance of a granary is widespread and in South and East Asia, it is related to the cult of the Rice Spirit. Among the Cau Sre, entry to the village granary is forbidden without first offering a sacrifice. I suggest that in addition to it being an act of respect made to the Rice Spirit, this may also represent a ritualized vestige of an earlier payment to temple officials, i.e., the high priestess *po-lan*, before rice for seed and ceremonial uses could be withdrawn (Broi Toplui, personal informant).

The identity of temple granaries with lineage granaries is further implied in the inscriptions by the endowments of granaries to temples, if one keeps in mind Maspero's criterion for distinguishing between the administrative *pramana* districts and the feudal *vijaya* districts (Maspero, 1928:26, n.1). For instance in 653 A.D, the king Prakasadharmā, an unusually traditional king, endowed to several gods (or temples) in Amaravati

the store-house of Lon, with the district of Caum, and the store-house of Havaun, Karnauy, Cau Pitau, Xraun, Najoc and Vasauy at Midit "(in Majumdar, III, 1927:26, No.14).

The word "district" in this inscription is "vijaya" in Sanskrit, which Maspero suggests signifies an appanage belonging to a feudal lord. By analyzing just the English translation, admittedly a dangerous practice, it would seem that "Lon" is subordinate to "Caum" and the storehouses of the rest are subordinated within a place. Perhaps then Lon is a *prok* leader subordinate to Caum, the clan chieftain, and Havaun through Vagauy are *prok* leaders within the chiefdom called Midit. If these granaries or shares of them can be endowed to a temple by the king, then what does this say about the strength of local control over the disposition of local resources? Is the granary of Lon for instance, just one building, a share, Lon's share of that one granary building, or is it something out of the total shares or granaries the Lon may hold title to?

Dao-duy-Anh cites the History of Tang that "nobles" in Champa lent out one measure of padi seed expecting a repayment of 100 measures, a rate which Anh himself feels was exaggerated by the Chinese. The nobles were supposedly the ones whom the king appointed to fill administrative positions and which were expected to sustain themselves by living off the bounty of the land. This they did, Anh contends, by managing, or in the parlance I am employing, controlling the padi fields but entrusting to everybody in their locality their individual rights of managership (1963:23)<sup>32</sup>. Although Maspero feels that there is a difference between the administrative appointees and the feudal lords, I believe that the fragmentation and particularism which characterized the Cham state meant that most

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<sup>32</sup> I use Dao-duy-Anh's sense of his words in this passage.

of these provincial posts were filled by the actual local leaders themselves, as I argue in the following section.

Therefore the Chinese were probably describing the onerous exactions by local leaders who, following this argument, would have been able to control important parts of the administrative, feudal and religious channels through which the produce of the land moved.

### **The Expansion and Development of Land Resources**

I believe that both the king and the temple were active agents of economic development and served to further land expansion and general reconstruction.

In contemporary Kambujadesa, the king or a powerful priest would grant to a private individual possession of a piece of virgin forest. That individual would uproot trees, establish a village and dig a small reservoir, and there build a temple (Pym, 1968:65). Land grants by the king served the promotion of national expansion into new areas or the restoration of older areas deserted or damaged by natural and human disaster (Rickleffs, 1967:12). Royal awards also served to exhibit the king's right to rule, asserting his authority over rival claimants to the land (1967:12, n.13). In Champa, Indravarman III's Nhan-Bieu Inscription (911 A.D.) recounts such an award of land to a favorite minister who after several successful diplomatic missions to Yavadvipa (Borneo) was able to obtain fields in the two villages of Sudan and Kumuvél in southern Lin-yi. Because his own and mother's residence was apparently elsewhere at Cikir (unlocated)--probably his lineage territory--he felt obliged to establish some temples in the newly acquired land.

This wealth, although very great, is unsubstantial; though accumulated with care it is liable to be destroyed in a moment. It is most useless in this world, ... Having thought thus, he, the intelligent man and desirous of fame, resolved to install gods in the two places... as both the movable [alienable] and immovable [inalienable] things in the world become fixed by the support of the mountains, so this region would find a stable support in the two sanctuaries of Siva [a temple] and Avalokitesvara [a monastery] (in Majumdar, III, 1927:136-137, No. 43; my editorial comments).

Prevalent fragmentation of political authority suggests that this grant of land may have been enfeoffment of lands and rights already in the lineage, or already acquired by the minister's own hand. In addition, this inscription talks of establishing the control of non-lineage (alienable) and lineage (inalienable) resources around the two villages by the establishment of religious institutions, thus implying that lineage authority in particular, was legitimized or "fixed" by the support of the two sanctuaries. To what extent that support went beyond legitimization into active economic development is purely speculative. In the primary evidence based on inscriptions, it appears that the temple did not play as direct a role in the expansion of land and development of the economy as did the king and private individuals; yet on the other hand, who was it that authored the often chauvinistic-sounding inscriptions? The king or members of the royal family and circle of officials did. Thus it is not surprising to hear that after a war with the Khmers in Amaravati, a younger brother of King Harivarman IV:

embellished and enriched [the temple] Srisanabhadresvara; he increased the riches and the lands of the gods (or temples); he acted with energy and resolution... and he has given the domain of Svon Tralaun to different temples... again repairing the lands of Svon Tralaun... he has established various kinds of trees... (in Majumdar, III, 1927:156-157, No. 59; my editorial comments).

Again the same person:

re-erected the temples in the various provinces of the kingdom of Champa...He re-established the salas, the cells, and the hermitages in the various provinces. He gave water and food to the different temples to last as long as eternity. But this is only briefly told (1927:161, No. 61).

How was the work accomplished? In the first case, the Khmers were defeated within the confines of Amaravati and given to the temples as slaves (in Majumdar, 1927:155, No. 59). In the second case, the crown prince had directed the city of Simhapura (the former capitol and then a major port) to:

construct the temples, to build the houses, to make perpetual sacrifices, to re-erect the chapels and to reconstruct the roads all as before (in 1927:164, No. 62).

This was evidently the labor-service which a king or prince could demand as his traditional right. What about the more mundane aspects of the economy such as systems of irrigation, fishing and clearing of new lands? It is presumed that when more of the Cham language portions of the inscriptions are translated, these economic activities and their relationships to the feudal structure and the temple will be clearer. For now scholars must be satisfied with speculation and inference.

### **Management of Irrigation Systems**

Control of water for the year-around irrigation of padi and other crops demanded institutions that could coordinate the totality of individual actions so as to assure repetitive performance by the cultivators and procure a stable, reliable supply of water. The sodality as I have defined it provided such complete organization and there are descriptions of two such irrigation-oriented sodalities in Bali and northern Luzon, whose peoples and livelihoods are analogous to these of ancient Champa. In Bali, the *subak* is at least a thousand years old

(Swellengrebel, 1960:10-11) where it is formed to construct, maintain, and administer an irrigation system which derives its water from one common source, usually a diversion dam (Geertz, 1962, in Potter, 1967:261). The *subak* apportions water among its members, establishes a schedule of planting, and levies fines for infractions of rules, among many other functions. In maintaining and supporting one or more specialized temples, the cooperative carries out a whole sequence of ritual activities connected with the agricultural cycle as well as fishing, fodder gathering, duck herding, and other secondary activities (Geertz, in 1967:261). Geertz does not elaborate, but apropos to the situation in Champa, he should have determined whether the *subak* actually did carry on these other activities or were there separate sodalities for each specific function, as the definition of sodality suggests.

To my knowledge there is never a direct mention of sodalities in the Cham inscriptions. However in modern Vietnam, there are a number of anomalies that suggest Cham origins. First, within an irrigation system believed to be Cham in origin and located at Ninh-hoa just north of Nha-trang:

les paysans barrent-ils en plusieurs endroits les cours d'eau: l'eau ainsi retenue est distribuée par des canaux aux rizières situées de part et d'autre. L'eau de résurgence des dunes est également captée aux fins de d'irrigation. Des villages s'associent pour entretenir en commun barrages et canaux, et une organisation de l'eau-basée sur les contrats--se surimpose à l'organisation villageoise véritable (Nguyen-thieu-Lau, 1944:13).

Standard works such as Dumont (1935), Gourou (1936) and Hickey (1964) reveal no such cooperation between Vietnamese villages except that which was coerced as *corvée*, and they never mention any organizations based on contracts. Second, there is also inter-village cooperation for irrigation maintenance among

the strongly Chamized Churu. Each village appoints a "Water Chief" who before the annual planting begins, organizes the villagers into work details which clear and repair the canals affecting their fields (Hickey, 1967:156-157). Third, institutionalized relationships such as those existing in the *subak* survive in the oral traditions of the (Cham-)Bahnar who have irrigation laws providing recompense for the establishment of a canal on another man's property. Recompense was available on various grounds by filing suit, obtaining an equivalent to the cash-value of the additional crops, or by receiving a share of the newly irrigated land (Guilleminet, 1952:484-485). These laws may derive from either Indian or indigenous law but in any case the institution of the sodality through which the laws may have been administered is now lost or goes unrecognized.

According to definition, the sodality is supposed to be outside the lineage/feudal structure. This is the rule among the *pasayak* of northern Luzon, which are similar to the *subak*, but there is an exception which I believe may be an anachronism of the standard form in pre-Spanish times (Lewis, 1971:144, N. 2). The feudalistic Cumangao cooperative in Ilocos Norte owns its own land and controls the water rights to which individual members own only inheritable (immovable) usufruct. There are also two small communally worked plots set aside for a cooperative treasury and for the headman (1971:133-134). The origins of this *pasayak* derive from one local family from whom the headman is chosen (1971:129). Whether the feudalistic *pasayak's* territory was congruent with the ancient chieftain's territory and was operationally feudalistic I do not know. In contrast, the Balinese *subak* chief is now elected and was formerly administratively subordinate to royally appointed officials (Geertz, 1959, in Potter 1967:261) as in the past were also the Chinese "dam chiefs or water elders" (Eberhard, 1965:86-87).

Although control of the hypothetical irrigation sodality among the Chams is impossible to determine, there do exist the two irrigation officials among the Cham (see Chapter III). The *Ong Banok* or 'Lord of the Dam. (Cabaton, 1910:343) is called the "religious chief of dams and irrigation" (1910:346). In addition to personally overseeing the work of repairing the dams and canals, he also conducts various ceremonies to assure sturdy construction and success of the harvest. He ritually constructs one portion of the dam, perhaps as a vestige of former times when he held the function of an "irrigation engineer". As priest he conducts propitiatory rites against drought by sacrificing as many as five valuable water buffalo and in the sixteenth century was reported to be still conducting human sacrifice (1910:343-345).

Quite similar in duties and responsibilities is the supposedly Vietnamese *Trum-xe*, whose role I contend is based on Cham origins. The *Trum-xe* also oversees construction of an irrigation device, the *noria*, and conducts ceremonies in connection with its construction and rites in relation to success of the harvest (Guilleminet, 1926:130, 177-178). In the case of the *Trum-xe* and the *noria*, Guilleminet's exhaustive study provides us with far more detail than [other] studies of dams and canals. In the early twentieth century, it is known that the *Trum-xe* led a group of professional *noria* builders (1926:130). Is (or was) this also true for the *Ong Banok*? Does this not suggest a formal organization dealing with irrigation? In the Philippines dam and canal constructing sodalities exist (Lewis, 1971: 129) and on Bali there is often a "water body" within a *subak* who are professional well or *tunnel* diggers (Geertz, 1959, in Potter 1967:261).

In predominately Hindu Bali, the temple serves as a strong sacro-economic focus about which irrigation activities center

(Geertz, 1962 in Dalton, 1967:383), but in the Catholic Ilocos Norte, this focus remains only a vestige (Lewis, 1971:134). In Champa, great sacred value was attached to springs, wells and other water sources as it was there that the Cham believed the energies of the Soil God seeped out to fertilize and sustain human crops (Wales, 1961:202-204). Nearby or even enclosing such places were constructed shrines and temples, the most famous of which was Champa's sacred religious center at Mi-son in Amaravati (Parmentier, 1904:802). Thus it was not at all unusual, I contend, despite the paucity of such records, that at Po-Sah in 1301 a prince applied himself with

zèle pour toutes bonnes oeuvres, pieusses fondations et travaux religieuse tels que ponts, avenues, canaux, étangs, puits etc... (Aymonier, 1910:8).

Given this religious significance of water-works, how did it manifest itself in terms of water control or sodality management?

Other than the above, there are only two inscriptions explicitly mentioning irrigation works or water being endowed to a temple, a fact I insist must be due to inadequate translation of existing inscriptions (see Boisselier, 1963:405). There was an endowment of an aqueduct in the ninth century (see Chapter III) and in the eleventh century "water and food [were endowed] to the different temples to last as long as eternity" (in Majumdar, III, 1927:161, No. 61, my editorial comments). In the latter case, the gift of a nominally "free" resource--free from the sky--suggests to me in actuality the grant of the right to take water from a given source. (See my reasoning concerning usufruct and the temple in the Appendix.) Thus the water source belonged to someone outside the temple system who then granted usufruct of the source in this case. This fact is perhaps then

reflected in the *po-lan* or landlord's control of the title to the ponds and the streams of her lineage territory.

The point I am trying to make is that the temple did not of itself control the title to water sources and it may have not even managed the operations of irrigation systems. I propose that the title to water was controlled through the lineage structure, at whatever level. The operation of the irrigation subsystems of collection, capture, storage, distribution and drainage were all managed by a functionally separate sodality administration. The temple would have provided ritual assurance and perhaps some of the motivation for cooperative labor, in addition to being a focus in the lives of these people who all too often felt the oppressive exploitation of the elite. Coordinating both elements--the temple and the sodality was the elitist *Ong Banok*, the *Trum-xe* and the *po-lan*.

#### **The Organization of the Marine Subsistence Economy**

If sodalities existed among the agriculturalists then there was even greater motivation for them to form among fishermen who daily faced more hazardous conditions. Moreover the nature of most of the capture implements such as long and heavy lines and nets, traps that spanned rivers or stretched for over a kilometer in length, and boats which simply could not be sailed alone--all of this was reason enough to make cooperation among fishermen a very earlier and continuing necessity.

Donoghue reports that "a type of indigenous **cooperative**" called a *vạn*, exists today among fishermen in Quang-nam. Not at all restricted to that region, this organization defines the relationships between boat owner and crewmen, establishes mutual assistance among fishermen in times of need, settle disputes, participates in religious festivals, and serves cooperatively both to buy simple equipment and to sell the catch (Donoghue,

1962:43-47). Nguyen Thuy Ánh (1966: 221-228) reports similar such organizations for the Khanh-hoa region. Neither Gravel (1925) nor Gourou (1936) report any analogous organization in North Vietnam.

In the construction of boats, there is preliminary evidence which points to a sodality in the existence of five to six man, traveling teams of boat-building specialists. Langrand takes note of two sets of teams from the villages of Hôn Cát and Lai-Cam, the latter which is on Nguyn-vân-Tô's list of Cham Villages (1943:235) and which literally means "those of mixed Cham (-Vietnamese) blood." These specialists conduct the necessary ritual ceremonies, know the best woods, and act as middlemen to acquire the necessary resources (Langrand, 1946: 46-47).

It would seem that in the marine subsistence economy, control would have laid with those who held title to the primary energy- converting devices such as sailing boats, large active-capture nets, and the large passive-capture *days* and staked traps. This seems especially true for the sail-boats larger than *Ghe-nang* which were able to extend the resource base of the fishermen. That too, the resource region, or rich fishing spots were probably lineage controlled territories to which the fishermen in that *prok* or clan held usufructory rights. There is some primary epigraphic evidence which suggests such an arrangement.

In Nha-trang, the king Indravarman III enjoyed "all the land up to the ocean (lit. which has got as its dress the water of the ocean)" (in Majumdar, III, 1927:139, No. 45). Another inscription also from Nha-trang states more explicitly that a king enjoyed "the pleasures of sovereignty extending over the entire surface of the land as far as the sea..." (1927:195, No. 76). These two examples reinforce my argument in the Appendix

that the king, as titular supreme head of all lineages, together with the chiefs subordinate to him, "enjoyed" the usufruct to the lands and the seas.

I have little doubt that the same argument that I applied to irrigation regarding elitist control and management of resources and the role of the temple also applies to the maritime economy too. Although I have no direct evidence to that effect, I believe I can show how the temple served as a sacro-economic institution.

As in agricultural activities, the construction of energy converters such as boats entailed numerous rituals accompanying each step of its manufacture, all requiring sacrifices and donations to priests and temples (Claeys, 1953:75-76). Religious activity by fishing communities was also very high as the fishermen were always conducting regular ceremonies and spur-of-the-moment rites to ensure good catches and fine weather, especially at the passages between inshore and offshore fishing (Donoghue, 1962:77). Today the basically animist religion of the Vietnamese [who live on the central coast] centered about the Cult of the Whale, the geographical extent of which matches old Champa. Mention of the cult of the whale also appears in old Cham hymns invoking Po Rayak or the God of the Whale (Claeys, 1959:1182; Cabaton, 1910:342). Wherever the "Goddess of the Sea" or "Guardian of the fisherman's life" washes ashore, she is given full honorary burial, the elaborate parades, music, feasts and sacrifices for which makes the cult's celebration a major drain on the economy (Claeys, 1959: 1180-1183).

#### **Animal Husbandry: A Key to the Temple Economy?**

It would seem reasonable that if sodalities existed for agriculture and for maritime activities then they would be found also in the husbandry of domesticated animals. Yet there is no

evidence, even indirect, to support such an idea. Instead I suggest that a discussion of the control and management of animals may provide an important key to further appreciation of the function of the temple, beyond it merely offering a focus and motivation for the community. The element of control, as I have defined it, is best approached by determining how provision of forage was made and to what needs the animals were put.

Elephants for military and transportation purposes were the most expensive animals to maintain in captivity, suggesting that their control was centralized but their management, here in the sense of care, might have had to be dispersed. Cattle provided motive power for pulling cultivating equipment in light soils and pulling carts in transportation, as likewise water buffalo were indispensable in cultivating the heavy clayey soils of the bottomland, yet also provided the richest milk. From the viewpoint of the agriculturalist, dispersed control and management might have been desirable and necessary, respectively. From the viewpoint of an elite, centralized control of transportation and of the supply of milk-products (milk for royal babies and ghee for lustration of idols) might have been both desirable, but for management a dispersion of responsibility would have been permissible.

With this in mind, [you may] recall that I identified four systems for feeding the larger animals, which either required much land and labor to devote to the production of fodder or required right of access to extensive areas for grazing purposes. Dispersed management, such as a longhouse caring for cattle, water buffalo and even elephants would seem to have been unfeasible. Thus the two communal corrals Leuba found in her study village may have corresponded to the number of *prok* sub-clans in the village. Does each *prok*'s livestock have access to

sufficient territory for grazing or if not, does the *prok* then have to devote more land area to swidden plots of grass fodder? Certainly there is recognition of the concept of property rights over range land for there is an oral tradition among the Rhade that "he who appropriates the grazing lands of rhinoceros and elephants...is a guilty man" (Sabatier, 1940:285). This was a fear of tampering with the supply of valuable products and services that these animals provided, thus reflecting the value that certain areas of range would have had and the respect that the law paid this value, concepts which I believe could be applied to grazing land for the indispensable oxen and water buffalo.

Both control and management of livestock is further illuminated in early Western primary source material. Friar Odoric de Pordenone reported in the fourteenth century that the king of Champa (in Vijaya) had "14,000 tame elephants" (trans., Yule, 1866:95), and Tome Pires (undoubtedly using secondary sources) stated that by the end of the fifteenth century the Cham king (in Phu-yen?) "is rich and lives by husbandry" (1512-1515, trans., Corteso, 1944:113). A Cham folktale first recorded about 1887 recounts how the king had over 300,000-- obviously exaggerated--"royal carabou" or water buffalo, which were grazed in the hilly scrub country and returned to the palace corral at night (Landes, 1887). The herdsmen involved however are not termed slaves or servants in the tale and the hero hires himself out in the king's service. The argument that the tale recorded in 1887 may not reflect circumstances of centuries in the past may be possibly refuted in Odoric's description of the king's elephants being "kept and tended by his boors as here oxen and various other animals are kept in partnership" (in Yule, 1966:95). The "here" seems to refer to Europe and Yule notes that the original Latin "sicut...tenature

ad Socedam" refers to "cattle being tended for the owner on division of profits" (1866:95, n.3).

All this suggests to me that usufructory control of livestock was held by the king (and I presume his nominally subordinate chieftains) who rented the usufruct to farmers and herdsmen. The latter probably paid rent in the form of goods in kind that ~~he himself~~ [they themselves] produced, or received for barter or sale of ~~his~~ [their] animals or their products. This system is not at all unusual for Southeast Asia and elsewhere so that I would imagine that it also extended to padi and fishing. There is elaboration on this subject in the context of the temple economy (in the Appendix).

From as early as the fifth century A.D. in Burma, Malaya and especially old Cambodia, thousands of cattle were endowed to temples for the purpose of supplying them with milk and ghee (Wheatley, 1965b:580-586). Although Cham inscriptions from the eighth and ninth centuries mention donations of cattle (and water buffalos), it is only after the fall of Vijaya in 1471 that there is any mention of milk products. Then a folktale tells of a hero suckled on milk from a brindled cow that had been milked by his father the king. Another king Po-Klaung-Garai was "keeper of the royal cattle at the age of seven" (Aymonier, 1890 cited in Wheatley, 1965b:589). There seems to be a relationship between the sacred associations of milk in Cham folklore and the use of milk in lustration ceremonies found in the cult of Sivalinga (1965b:588). Yet Wheatley overlooked a possible reference to ghee in a Cham inscription which dates from the mid-eleventh century:

Reverence to Sivas...Seeing him shine with unbroken splendour, like a smokeless fire, nourished by clarified butter...(in Majumdar, III, 1927:125, No, 41).

Although the language is in Sanskrit and appears in the first part of the inscription where is usually found flowering references to Indian alliterations, it may also be descriptive of such a lustration ceremony and point to the existence of an important economic activity.

For instance, in contemporary India of the ninth to eleventh century, assigning donated livestock to the care of particular herdsmen was an investment by the temple authorities in the prosperity of the agrarian community. By this act, the recipient was placed in a service relationship to the temple by providing, among other things, ghee or clarified butter for the maintenance of one temple lamp. Sometimes the king donated the buffalo, other times private donors did and often the temple would buy the animals with money (or kind) previously donated to the temple treasury (Spenser, 1968:278-281). Did such a relationship exist in Champa? Was this the reason for a tympanum over the doorway of the temple at Khuong-My (on the seaward edge of the Amaravati plain) with a scene that "represents Krisna as holding aloft mount Govardhana in order to afford protection to the cows and cowherds" (Majumdar, II, 1927:266)? Is then investment in the prosperity of the agrarian community that which is inferred in an inscription concerning the (God) temple called Bhadradhipatistara? Referring to the temple in the third person it states:

for a long time, having enjoyed treasures...became, by his own prowess, the cause of the prosperity of the entire world (Majumdar, III, 1927:50, No, 23).

In the same inscription there is an echo of the return to the king of the "division of profits" implied in Yule's translation of Friar Oderic. After mention of an endowment of oxen and buffalo to the temple, the inscription says:

The king Indravarman, who is honoured by good men; who is foremost among those who regard sacrifice as their principal treasure; who is celebrated in this world on account of the efficacy of these sacrifices, as Nahendra is in heaven(,) by obtaining only a portion of them...(in Majumdar, 1927:48).

Is this saying that this king is so great because he does not demand the normal return on his "investment"?

### CONCLUSIONS

In ancient Cambodia where religion was "Indianized" somewhat as Champa, Wheatley has claimed that "it is scarcely an exaggeration to regard the economy of the country in its entirety as one great oblation organized for the appeasement of the gods of the Indian pantheon" (1965b:579-580). One might come to the same conclusion upon cursory examination of historical materials from Champa, but such a viewpoint fails to determine how the "gods" were appeased by this "great oblation". In other words, to what ends was the surplus of energy directed? Was it merely transformed into creative art and religious structures? Was it dissipated into an expanding opulence in life style for the elite? Or was it also invested in the prosperity of the agrarian and maritime communities?

Whatever end predominated it would have been a function of the level of socio-economic complexity at which this mobilization of resources had occurred--village, chiefdom or state, for instance, and of the particular demands on the society at that time. The important thing is that these ends were only three faces of the same related whole. I have suggested that the unit of resource management which actually made and implemented the decision necessary for exploitation of energy potentials in the habitat was the sodality or mutual-aid association. Interpreting for a naive common man the interface between a powerful nature and a seemingly frail human creature

was the priestess-intermediary and the temple structure that evolved from her role. The temple's distinguishing feature was "its capacity to motivate its human agents to willingly perform the practices" of transforming nature into a functioning resource-use system (adapted from Firey, 1960:74). Both mutual-aid associations and temple shared the same set of leaders, who also as members of the elite, used those institutions to effect management and control of all resources.

This model is most appropriate at the local rural level of society, for instance the prok or sub-clan. At higher levels, institutions such as the temple may have become more specialized as independent entities. Yet these specialized functions and the suggested redistribution of endowments or "oblation" to the community in the form of investment seem only to be extensions of the activities that were expected of the local longhouse and prok temples.

## CHAPTER VI

### SUMMARY AND CONCLUSIONS

Seeking broadly how man in a particular place directed the energy potentials in the habitat toward maintaining his sustenance, I have sought to reconstruct the origins, operations, and control and management of systems of food capture and production for the people of ancient Champa.

In spite of present-day dominance of Vietnamese in the [former] territory of the Chams, I initially concluded from the research of others and myself that distinct Vietnamese adaptations and mal-adaptations to the landscape and cultural practices of the ancient Cham may be identified and used to reconstruct the past. In particular, Vietnamese mal-adaptations to the [land and] sea and to the control of water provide insight into the nature of Cham exploitative systems such as crop cycles, irrigation subsystems, boating, fishing, and in certain cases economic organization.

Until now these exploitative systems had in large part been thought to derive from "Malayan" or "Indian" sources, but I proposed that in fact most Cham technology and basic organization were of indigenous creation traceable to centuries if not millennia before historical contact with Han Chinese or Indian civilization. My analysis of recent archaeological data and reexamination of pertinent ethnographic materials shows that by historical times the Chams most probably had already developed skills and basic organization for year-around irrigated plow agriculture and fresh-water to pelagic maritime capture and production of aquatic resources.

With this exploitative capability in addition to pre-existing forms of simpler cultivating techniques, I further

proposed that the Cham had been able to exploit their coastal habitat from open seas to mountain slopes. Primary, contemporary and modern data sources reveal a cultural landscape that saw seagoing fishing ships coming home by huge stationary traps in shallow waters and salt pans gleaming in the hot sun. Finally adapted systems of water control permitted irrigated padi-fields, gardens, and orchards to march right up the mountain slopes side-by-side with permanent and shifting fields of dry crops. Pasture-lands were set aside for domesticated and wild animals, which also fed on cut-rice straw and cultivated fodder.

To manage and control these resources and their exploitative strategies I suggested that there existed an integrated set of clan-feudal systems, sacro-economic temples, and mutual-aid associations. Comparing modern ethnography with the virtually untouched Cham inscriptions, I argued that as matriarchs, women exercised domain over lineage resources and as chief priestesses they both legitimized the elitist position and through temples motivated and focused mutual-aid work activities. These activities were in turn coordinated by male elite counterparts to the matriarchs, the chieftains. At all levels of social complexity, the multi-faceted temple played a unique role in redistributing material and human resources back into the society as a form of economic development.

## APPENDIX A

### THE TEMPLE IN ANCIENT CHAMPA

The temple in Champa as anything beyond a piece of architecture has scarcely been mentioned.<sup>33</sup> The most complete description of the temple is by Maspero:

Each temple, in addition to the sanctuary itself, comprised a large domain, the revenues from which were used for the upkeep of the temple: it was a donation in perpetuity whereby the land with its inhabitants, its storehouses and even villages was devoted to God. It also possessed an entire population of servants: priests first of all...then scores of slaves of both sexes, musicians and female dancers; there was even a gynaeceum full of "charming" women with their servants, whose revenue it collected. This was all in addition to the treasures themselves-- gold, silver, jewels and decorations for the image of the god; then too, there were the animals: elephants, oxen and buffalo for work (Maspero, 1928:16, trans., in Embree & Dotson, V. 1949:19-20).

In terms of economic control and the movements of resources, it is pertinent to wonder whether the temple "owned" its domain and whether the inhabitants [of its domain] were slaves or not. There is a differentiation between, on the one

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<sup>33</sup> The word "temple" herein subsumes, if otherwise not noted, the Brahmanical connotation, the Buddhist monestary (*galao*), which was a rest-house of charity for use by pilgrims (Briggs, 1951:235); the hermitage (*asram*) that may have acted in part as a school (1951:89, n.1); the cell which was a shrine or small sanctuary, containing the image of local spirits (Webster, 1969:30, 1590); and chapels, which following the custom in KambuJadesa, "contained images which were replicas of famous idols worshipped in the provincial sanctuaries (Briggs, 1951:224; Majumdar, III, 1927: 159-161, No. 61) .

hand, inhabitants who go along with donated fields and villages, and on the other hand, the slaves, but how can inhabitants be donated for perpetuity? Was the economic objective of the temple only self-maintenance? What use were the slaves, the prostitutes and all the animals?

The first temple seems to have been established by [King] Bhadravarman I about 400 A.D. at Amaravati, in the foothill valley of Mison [M̄y-son]. To that temple the king made a perpetual endowment of a large tract of land together with its inhabitants. According to Majumdar, the king promised the inhabitants a reduction in tribute from the 17% (1/6) of their *annual* produce normally (?) paid to the "Lord" to 10% (1/10), the latter was to be given to the "God" or temple (III, 1927:7, No. 4). However in a translation that Maspero cites:

Le revenu des confins de ce domaine qui, sur le sixieme, est retenu par le seigneur pour un dixieme, doit etre donne au dieu (1928:29, n.5).

In this translation, the Lord or "seigneur" seems to keep either one-tenth of the sixth taken in tribute, one-tenth of the total produce taken out of the one-sixth tribute, or just an indefinite part, using the general term "tax" for "tithe". Because interpretation of the French version is inconclusive, I have accepted Majumdar's own translation of the Sanskrit original.

The reduction was made in the name of the "Lord" whom Majumdar queries might have been the king himself instead of a second party. I believe that the "Lord" was the king acting in the role of supreme chieftain at the head of a collection of Cham clans.

By taking the role of the "Lord", the king was legitimizing a reduction of his own Lord's share according to indigenous Cham

traditions. Thus at its establishment the temple domain did not necessarily consist of a domain of property to which the temple was granted usufruct, but was a collection of perpetually guaranteed rights to demand a given share of produce from the donated territory. This interpretation is similar to that in South India where one of the permanent earning resources of the temple was its major share of the harvest from fields and whole villages which had been endowed to that temple. Those were permanent shares but in "temple villages" the land and irrigation systems still remained under the management of the cultivators and whatever organization for labor that existed there (Stein, 1961:182). According to Spenser's interpretation, as far as the temple authorities were concerned, physical possession of resources was relatively unimportant compared with the guarantee of certain kinds of daily services for the temple, so that it could sustain its ritual activities (1968:282). Shedding light on this may be a Cham inscription that records attacking Vietnamese taking "possession of all the royal property and the wealth of the gods" in Amaravati (in Majumdar, III, 1927:159, No. 61).

Does this mean that there was a dichotomy between the ownership of land and rights to shares in the lands production? Or is wealth meant to be gold and jewels? The inscription associates horses, elephants, oxen, buffaloes and crops with the religious institutions that were pillaged. These are real material things but are they wealth?

The same system of rights to the share of produce was also applied to the rights to demand labor service. Such is the case in India where Gopal reports that the obligated service due one's lord was transferred to a "manorial tenure in connection with the estates of religious establishments" (1963:306). In

Champa such labor is suggested in the inscriptions on the Banlanh stelae by Jaya Simhavarman I in 898 A.D.:

At the end of four years...for the use of divine  
Guru (Siva... the goods of men belong to the  
temple...(in Majumdar, III, 1927:97, No. 35).

This suggests an obligated or voluntary service of four years without pay, a custom similar to the temporary monkhood of the modern Burmese (and Thai and Khmer) (Burling, 1965:88-89).<sup>34</sup> The same inscription continues later, also in the Cham language as above and following an enumeration of field granted to the temple (but untranslated):

The men who would protect this good work...who  
would conduct their sons and daughters to the temple  
for living there as its property (enumeration of  
fields) (in Majumdar, III, 1927:98, No. 35:  
parentheses are Majumdar's).

This suggests even stronger the Indian example but does not specify the length of service and seems to be couched in a neutral tone. From reading of other inscriptions, I get the impression that those who donate their children to the temple would have gained merit.

In addition to this passive acquisition of labor for the temple, there was also debt-labor of some sort, possibly even permanent. Maspero cites Finot (1902):

Ceux qui payent les taxes au dieu ne doivent pas  
etre astreints aux travaux:...le service de la maison  
royale doit etre accompli (in 1928:29, n.4)

What is meant by "la maison royale" is not made clear, but I suspect it does not mean the royal household so much as a

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<sup>34</sup> It could also mean that "these goods of men" will belong to the temple only after a period of four years.

general obligation to fulfill one's duty to the supreme chieftain. Until recently in fact, among the Rhade, tradition demanded such actual physical labor to serve the land-lord *Po-lan* (Sabatier, 1940:279-286).

What were these slaves and commoners in temporary service doing? A comparative look at temples in other settings reveals that in ancient Persia, temples served as "innovative centers for the production of crafts that depended on expensive raw materials", such as metallurgy, stone sculpture, carpentry and even weaving (Adams, 1966:126). Adams feels that while the gross proportion of slaves was relatively small--as it must have been in Champa despite rumors to the contrary--their distribution throughout the economy was uneven. Often they engaged in the production of consumer goods, which may have "not only played an important part in the local redistributive economy but presumably also served as a basis for long distance trade" (1966:102). In Burma, temples and monasteries used specially trained servants, who were sometimes given slaves [such] as artisans, craftsmen, smiths, wrights, spinners and weavers, canal diggers and boatmen (Cady, 1964:120).

This function of the temple is not so clear-cut in Champa, where Dao-duy-Anh uses the example of King Fan Wen of Lin-yi to suggest that trusted servants of the king were used as business and trading agents (1963:27). That may be true, but was the king also the "someone" whom Wang Gung-wu contended was processing, reworking or fabricating gold, silver and copper goods and bullion, tortoise shells, cowries, eagle-wood, grass-mats, cotton cloth, rhinoceros horns and ivory in sixth century Champa (1958:52-53)? Centuries later these activities included the production of

indigenous silken goods, multi-colored cloth, figure cotton stuffs, damasked cotton gauzes, white muslins and so on (Chau Ju-kua, c. 1225 A.D., trans., Hirth & Rockhill, 1910:48). Christie, echoing other modern historians, would have us believe that the king sponsored manufacturing (1960). On the other hand, I suggest that it was the temples that were producing these goods for export and for sale to pilgrims. It is possible to directly prove this aside from the circumstantial evidence above. ~~but~~ Indirectly I believe I can show that the Brahmanical temples sought a permanent income over and above that which was necessary to support itself.

In 875 Indravarman II founded the Indrapura dynasty as one that practiced Buddhism but still maintained allegiance to the old Sivaite and other Indian gods. In an inscription founding the large monastery at Indrapura (Dong-duong) ~~or~~ the king stated:

For the sake of Dharma and not for revenue, a monastery has been founded for the community of monks...This monastery has been founded for the perpetual enjoyment of the community of monks, and not for the enjoyment of the king, nor as a permanent source of revenue (in Majumdar, III, 1927:87, No. 31).

I draw attention to the conflict between "dharma" or righteousness and "revenue" not as though subsistence production for the "upkeep of the temple" was in question, but instead the morality of surplus production for the purposes of creating excess revenue or profit. The identity of "enjoyment" for the monks but not for the king suggests that previous Brahmanical temples had been—and I presume were to be in the future--established for the "enjoyment" of the king—in other words, for his support, or his chief's share. Is it possible that one of the initial objectives of establishing temples was to divert their revenues to the support of the endower or as interest

payment to a donor? Why else then would the traditional warnings against upsetting the system be issued so many times and in such details?

Those who will protect all these riches of the monks, the learned Brahmanas, ascetics, relations of the king will, with their friends and kindred, attain the Buddhist Nirvana. Those who take or destroy go to the hell-called "Rudra"... Those who see or hear about persons taking away those goods, and yet do not report to the king, go to the hell... Ksatriyas, kings or Brahmana...kings, Brahmanas, and wealthy men-go to all the eight hells with their father, mother and other relations... Those kings, Ksatriyas... Brahmanas, ministers...merchants who take away or destroy, they should go to Maharaurava...(in 1927:87-88, No. 31).

All this seems to comment on the internal economic and political dislocation caused by the exclusion of such a large and attractive economic institution and its domain from the realm of opportunity for profitable investment by the wealthy elite. That such investment did come from the "urban" sector is suggested by another inscription from Dong-duong, talking of the temples at Mi-son:

This city called Champa (is) decorated with the wealth of Indrapura (the secular capital) (in Majumdar, III, 1927: 102, No. 36; parenthetical comments are mine).

At the close of nearly all of the inscriptions such as above, there was found an imprecation to those who would interfere with the permanence of resource flow in and out of the temple system. And to those who upheld the established endowment there was a benediction. One finds that an individual's action were motivated by a concern for gaining or losing *karma* or merit, which Pfanner and Ingersoll say in the context of Thailand, was "the basic role value for both priest and laymen" (1962:352). Thus in Bhadravarman's first

establishment of a temple in Amaravati, he sought "to atone for all evil deeds and to perform good and virtuous work". To those cultivators included in the endowed territory Bhadravarman wrote:

If what is written above is not done for the God by anybody, the fruit of merits acquired by him since his very birth, belong to Bhadravarman (in Majumdar, III, 1927, No, 4).

Such a concern for merit was demonstrated by the chauvinistic tone of donors in India, where Spenser termed it a concern for "conspicuous gift-giving" (1968:289). In Champa such an inference is even more appropriate in reference to the reciprocity and redistribution in economic and social relations that are exhibited in the Polynesian [or Austronesian] world (see Sahlin, 1968:92-95).

Royal endowments that were permanently inscribed on stone for all to see and for history to record must not overshadow the spiritual revenue from the laity for performance of rituals and for assurances of their intended objectives. These were associated with annual holy-days that often occurred at the passing of one season into another or at a critical period in the cropping cycle and fishing season. Rituals were also associated with personal events such as the passing from bachelorhood into marriage. There is no record of ancient village life in Champa, but in the sixteenth century, Duong-van-An noted that at Chiem-an village (lit. pacified Champa) in Quang-nam province, "Everywhere...there are offerings as gifts dedicated to the Gods" (1553, trans., Bui Luong, 1961:56). In this regard it is known that Cham rituals today are very numerous and are introduced into all phases of existence. All of these involve offerings of food (meat, rice, alcohol and masticatories), prayers to the spirits, and a feast for the

participants (American University, 1966:891). Offerings may cost anything from a chicken to a goat or even a buffalo, and for collective sacrifices such as when there is a drought, four or five buffaloes may be sacrificed, in addition to all the rest of the components. Cham men may also spend up to three or four months on pilgrimages (Nguyen-thieu-Lau, 1943a:201), at least today, but such religious activity is suggested in past times as well by Leuba's contention that at Mi-son—and one would expect at the other temples—there were numerous *sala* or pilgrim's rest-houses to take care of the large numbers who presumably came there for the annual ceremonies (1923:50).<sup>35</sup> All this would seem to clarify why the Cham spend two-thirds of their income on ritual and are forever in debt (Malleret, 1937:28).

Perhaps all this can be brought into modern-day perspective by looking at the village of Tabanan on Bali, which still simmers in the old Hindu-Javanese culture world, one not unlike Champa [in my opinion] (Geertz, 1962, in Dalton, 1967:383). In Tabanan, there is an obligation to worship in a given temple, make elaborate ritual offerings of food and give financial support. The latter is more often met however by collective economic activity than by monetary assessments. Such traditional assessments include making joint harvests, contributing the harvester's tenth share to the temple, working in the padi-field consecrated to the temple, or lending support and participating in dance and drama performances for the temple's benefit.

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<sup>35</sup> In post 1972, these "pilgrimages probably refer to Muslim men traveling to Mecca.

### Conclusions

The temple was one of the chief institutions motivating political and economic organization among the rural population and offered opportunities for investment by the elite. Such investment, or more correctly endowment, provided permanent revenue-earning shares in the produce of lands, livestock and fishing ground[s], the temporary and permanent use of labor to manufacture goods for sale to pilgrims and the elite, perhaps the loan of money or kind for interest, and the offering of services for required and requested rites and ceremonies. The temple acted to concentrate willing and unwilling donations which it redistributed into the economy for a charge. Sometimes that charge or interest accrued to the endower in the form of material return, and other times the endower was satisfied with the accrual of merit to his soul.

## APPENDIX B

### GLOSSARY

This glossary is alphabetized according to English spelling without reference to particular arrangements used by other languages. For simplicity only romanized scripts are used. Beside each word is an abbreviation identifying the language according to the following formulas Arabic (Ar), Cham (C), Chinese (Ch)» Ilocano (I), Indonesian (In), Khmer (K), Rhade (R), Sanskrit (Sk) and Vietnamese (Vn).

anakkāt	(Sk)	pranāli	(Sk)
aśrama	(Sk)	prok	(C)
cái sồng	(Vn)	po-lyan	(Ch)
cái thùng	(Vn)	rãy	(Vn)
dây	(Vn)	sāla	(Sk)
fei-wu t'ien	(Ch)	sao	(Vn)
ghe câu	(Vn)	shādūf	(Ar)
ghee	(Sk)	song vánh	(Vn)
ghe mảnh	(Vn)	subāk	(In)
ghe nan	(Vn)	tambāk	(In)
ghe vánh	(Vn)	thạc	(C)
ghe xuồng	(Vn)	thừ-bi	(Vn?)
hāva	(C)	thuyền-gia	(Vn)
H <sup>1</sup> / <sub>2</sub> lum	(C)	tre gai	(Vn)
kaj <sup>1</sup> / <sub>2</sub>	(C)	tre lá-nga	(Vn)
krak	(C)	trùm-xe	(Vn)
kun-lun	(Ch transliteration)	vạn	(Vn)
kut	(C)	vijaya	(Sk)
lù	(C ?)	vòng-ngao	(Yn)
no	(Vn)	ong banok	(Vn/C)
noria	(Ar)		
pasayāk	(I)		
po-lan	(R)		
prahoc	(K)		
pramāna	(Sk)		

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