FROM RICHES TO RAGS: A CRITIQUE OF THE TRANSFORMATION OF SHIFTING CULTIVATION SOCIETIES IN CONTACT WITH EXPANDING POLITICAL ECONOMIES OF NATION - STATES

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ABSTRACT

FROM RICHES TO RAGS: A CRITIQUE OF THE TRANSFORMATION OF SHIFTING CULTIVATION SOCIETIES IN CONTACT WITH EXPANDING POLITICAL ECONOMIES OF NATION-STATES

By

Marc Miller Hammond

Autonomous, small-scale societies continue to be, as they have long been, swept away by the advancing frontier of various forms of "civilization". Why might this consequence of contact between societies of such a vastly different nature be so unvarying? This thesis undertakes to suggest an answer to this question from the perspective of human ecology. To do so, it focuses upon those few remaining "stateless" societies which: (1) presently inhabit the tropical rain forest and exploit it by means of a food acquisition system known commonly as shifting cultivation; and (2) must contend increasingly with the implementations of "development" policies as they are generated by institutions, agencies, and socioeconomic classes of nationstates which surround them. While development policies often lead to the outright extermination of stateless societies, by means of murderous acts, to include the purposeful introduction of virulent diseases, this thesis is concerned more with those policies which work circuitously and subtly to undermine the internal order of the mode of production of such societies to thereby bring about their

Marc Miller Hammond

dissolution. As a consequence, the shifting cultivation system of such societies receives special attention herein so as to ascertain under what conditions it operates and does not operate satisfactorily. By establishing those conditions under which the shifting cultivation system becomes stressed and by relating the appearance of such conditions to the activities of the nation-state, it becomes possible to understand what national development programs actually hold in store for native populations and how contact between the two spells the end This thesis seeks to impart one understanding of the impact for one. of the national society on stateless societies, by modeling a complex structure of hypothetical relationships which may be created between the two following their contact. Such an understanding, it is hoped, might be useful in formulating a practical argument which runs counter to the largely unchecked plans of those who would pave the earth and make us all the same.

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By

Marc Miller Hammond

A THESIS

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To Marian and Robert, who gave me parents, and To Barbara, who gives me purpose.

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Paradoxically, the work-in-hand amounts to a final, yet impermanent accumulation of ideas, beliefs, and facts. This impermanent aspect can be attributed to the fact that the learning continuum of the author is ever-lengthening. To the extent that learning continua appear to be coterminous with the life-long experiences of individuals, it is especially difficult for me to establish who, more than anyone else, influenced the direction taken by the continuum represented here or, indeed, its present outcome. Yet certain individuals do stand-out. I take this opportunity to indulge in expressing to them my gratitude, for the time they devoted to me, and my regrets, should their interests have been proved by this thesis unwarranted.

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INTRODUCTION

This thesis analyzes a food acquisition system called *shifting cultivation* which exhibits: (1) a necessity for gradually and temporarily abandoning once-productive but progressively less-productive garden plots; and (2) a consequent necessity for selecting and cultivating anew once-abandoned yet slowly regenerated garden sites for continued crop production at accustomed yields. Such a regime has led Conklin (1963:1) to characterize shifting cultivation as ". . . any continuing agricultural system in which impermanent clearings are cropped for shorter periods than they are fallowed." Pelzer (1938: 126), on a contrasting note, adds, "Shifting-field agriculture may be defined as an agricultural system which is characterized by a rotation of fields rather than crops, by short periods of cropping (one to three years) alternating with long fallow periods (up to twenty or more years, but often as short as six to eight years) . . . "

The thesis analyzes this particular food acquisition system, as it is currently employed by a sociocultural system called the stateless society to exploit an ecosystem called the tropical rain forest. The term "stateless" is used here in preference to such roughly equivalent terms as primitive, indigenous, aboriginal, preindustrial, and the like; the reasons for prefering this term, together with the implications of its use, are developed in Chapter I. The tropical rain forest, which stateless (or shifting cultivation) societies exploit, may be described briefly as: predominated by trees

of innumerable species (a majority of which are broadleaf evergreen in habit) which are arranged in roughly three layers, with the uppermost emerging in excess of forty meters and with the middle forming a dense and continuous canopy of merging tree crowns, in the shade of which grow younger and dormant trees, shrubs, and herbaceous plants of many species, and throughout which grow climbing lianas and stranglers, clinging epiphytes, semi-parasites, and saprophytes; such a habitat can exist only in the presence of perpetually warm temperatures and abundant precipitation in almost all months of the annual cycle (cf. Eyre 1968; Richards 1952). Nietschmann adds (1973:82 italics added):

The [tropical] rain forest, then, is a very generalized, highly diverse ecosystem, with a tremendous variety of biota. Energy and nutrient sources are stored in the forest biomass and circulation, recycling, and recovery rapidly occur within a *closed* cycle. The continuous dense storied canopy cover captures and stores energy and nutrients and protects the thin soils from erosion and excessive temperatures from solar radiation. Maximum capture and utilization of energy and nutrients is facilitated by the diversity of species of biota, each with different and overlapping requirements.

To this, Walter adds a comparison (1964:72):

This vegetation type [i.e. tropical rain forest] represents the purest form of development of the plant world under conditions most favorable to plant growth. All other plant communities are more or less depauperate: they are composed of much smaller numbers of species. Moreover, these species have become specialized in different ways so that they are capable of surviving either unfavorable water or temperature conditions.

With so much said for background purposes, it may now be stated that each of the above systems can be regarded, for analytical purposes, as a component in a larger, yet localized system of interactions between resident humans and their habitat, between the humans themselves, and within the habitat itself. While in the more distant past, it might have been possible to conceive of such a localized

system as isolated from external influences and to argue that such a system could maintain itself indefinitely following mutual adaptation of its components, such notions are now essentially academic. It is clear that, at the present time, such localized systems are increasingly being incorporated into yet a larger system. Unfortunately, it would appear that such incorporation does not occur until the localized system has become disarticulated. In real terms, this means that the lives of autonomous peoples are being disrupted, as are the places they inhabit. There is good reason to suspect that the current disarticulation of localized systems is the result of their contact and penetration by a globalized system which is embodied in the activities of institutions, agencies, and socioeconomic classes of contemporary nationstates.

Before considering the nature of activities which characterizes this globalized system, particularly as these activities are carriedout at the level of the localized system, attention will be devoted to a brief consideration of food acquisition systems in general.

A food acquisition system is, among many things, a recurring utilitarian interaction between a human population and its habitat. The basic human need for food results in the selective human interception of energy and nutrients that flow through, or are cyclically stored in, biotic forms within the habitat. A food acquisition system is thus not only highly complex, but is also a prerequisite to the survival and well-being of the human population which has come through its own efforts to depend upon it.

Some human populations focus their food acquisition activites mainly on animals, others mainly on plants, and still others on both. This focus is an indication of the familiarity of a human population

with the biota that occur within the local habitat, and of their subsequent determination of the biota that are suitable for exploitation. Whatever the focus, however, two levels of understanding are essential to the degree of success which may be anticipated by any human population in its interception of energy and nutrients. First, there is required a theoretical understanding of the specific biota regarding their physiological requirements and tolerances and their consequent behavior. Secondly, there is required a practical understanding of the specific biota regarding the means of their confrontation, capture, management, or alteration. This understanding, in both its theoretical and practical aspects, manifests itself in two activities: (1) harvesting - the ability of a human population to find and secure with some assurance naturally-occurring biotic forms to exploit thereby certain of their given characteristics; and (2) domestication - the ability to manipulate genetically and behaviorally naturally-occurring biotic forms to exploit thereby the enhancement of characteristics not naturally-occurring.

This understanding is not obtained, in most cases, in a short period of time, but rather over a span of generations within a human population; it is thus transmitted cumulatively from one generation to the next. Incorporated into this transmitted understanding are gradually accrued refinements in its theoretical (i.e. ethnoscience) and practical (i.e. tool-and-technique inventory) aspects. However, cautionary amendments regarding experimentation with proven procedures, become affixed to this transmitted understanding based on past experiences. The importance of these amendments is clearly seen in light of the pivotal *if-then* position which all food acquisition systems occupy in their larger sociocultural systems. *If* a food acquisition

system satisfactorily fulfils its function, then other activites of the human population may proceed. Expressed another way, to change what has been proven in the food acquisition system, in ways where the consequences are not known with certainty, is to cast a shadow of uncertainty on the continuation of all other human activities. Thus, a food acquisition system is treated conservatively by its human population. Despite observed constraints to the contrary, however, changes may occur in the food acquisition component, owing to changes in other components in the localized system.

Accepting for the moment that most sociocultural systems and ecosystems are themselves conservative, or at least tend to perpetuate themselves by their own reproduction, then the question may be raised as to why they may each change and thus ultimately change the food acquisition system. The answer may be found in the notion that, while each contributes to and operates within a field of influences that serve to check deviation and correct change, such influences are neither constant nor constantly observed. In this lack of constancy, there is the possibility that a deviation from the norm may occur and constitute a change that has far-reaching implications for all parts of the localized system. Assuming that the absence of deviation-checking influences is unusual and occasional, one may accept that if changes do follow in their absence then they are likely to only gradually affect the direction in which the localized system proceeds, thus giving ample time for readjustment and evolution. Yet, when changes occur within an otherwise conservatively-tended food acquisition system, and these changes are judged to develop at such a rate and in such magnitude as to afford an insufficient recovery time in either the local sociocultural system or ecosystem, then suspicion is thrown over

whether or not these changes have their origin in either of these larger systems, or in an alien system which has penetrated the local level.

This thesis analyzes a food acquisition system called shifting cultivation, as it is currently employed within a sociocultural system called the stateless society to exploit an ecosystem called the tropical rain forest. While not denying that changes of an evolutionary nature can be and have been internally generated within any of these systems, this thesis takes the position that changes which are now occurring in shifting cultivation systems run counter to the self-perpetuation goals of the larger systems and, consequently, must have their origin beyond those larger systems in what has been referred to as a "globalized system", which is embodied in the activities of institutions, agencies, and socioeconomic classes of contemporary nation-states. These activities will now be considered, particularly with respect to the manner in which they are carried-out in the milieu of the shifting cultivation societies.

The activities of institutions, agencies, and socioeconomic classes of contemporary nation-states are currently imposed on the localized system of the shifting cultivation society through the aegis of "development". Development is regarded here in a broad (rather than singularly economic) and short-term (rather than evolutionary) sense as referring to the purposeful importation of people, ideas and values, tools, techniques, or domesticates by external institutions and agencies: (1) to societies-in-place - to effect a change in their quality of life; or (2) to territories of such societies or to territories in proximity to them - to alter existing modes of land use. The institutions and agencies which bring about such importations may be found in the political economy of the "surrounding" nation-state or beyond in

the political economies of foreign nation-states. With respect to importation to societies-in-place, such institutions and agencies purport to seek improvement in the quality of life of such societies, but at the same time *assume* that their quality of life is in need of improvement. With regard to importation to territories, such institutions and agencies purport to seek modes of land use that are of value to the national political economy, but at the same time *assume* that what is of value to the national political economy is both strategically sound in the local environment and not disintegrative of the local population. What may actually be accomplished, in spite of what is purportedly sought (often on the basis of either naive or selfserving assumptions) has been placed in perspective by Sauer (1938:494):

Destructive exploitation [of people and place] has contributed so largely to the 'wealth' of the modern world, that it is accepted commonly as a 'stage' in economic 'development', which is supposed to give way in due time to balanced use and a permanently higher level of production.

Beyond its purported intentions and accomplished effects at the local level, "development" reflects certain broader goals that give impetus to local level penetration. These goals are largely mutuallyreinforcing. In the first instance, these goals involve resource exploitation in and regional integration of the hinterland: the former aims at extracting, harvesting, or harnessing immediately- and potentially-useful materials and energy sources; the latter aims at creating the engineering structures (e.g. roadworks, fabrication plants, communication facilities) and a less tangible structure of obligations that work in unison to bring labor to materials and energy sources and to bring labor-enhanced materials and energy sources to a market system. To the extent that this market system extends beyond the nation-state, an intensification of international trade may be viewed in the final

instance as furthering resource exploitation and regional integration within the nation-state and as further cementing that nation-state into the structure of global affairs.

Coupled to the "planned" development of the national political economy, by its representative institutions and agencies, are often desperate attempts by certain socioeconomic classes within the nation-state to rectify the impoverishment condition of their own lives by their own devices. These attempts may be based upon spontaneous actions which involve the "opening", occupation, and cultivation of "new" lands. Insofar as such colonization efforts may proceed (with the tacit approval of decision-makers in the national political economy) to thereby initiate contact with stateless societies, such socioeconomic classes participate in the process of "development" as it is experienced in the localized system outlined above.

Conceptualized thus far is a penetrated localized system which involves the following components: (1) the contacted shifting cultivation society; (2) the contacted tropical rain forest; (3) contacting "development" institutions and agencies; and (4) contacting socioeconomic classes in search of their own development. The interrelations among these components promise an unmanageable complexity which defies analysis in a work such as this. Consequently, the present work has chosen to restrict its focus to remain manageable. This should not prove too severe a restriction, however, for it focuses directly upon the shifting cultivation system itself. For reasons which have been suggested, food acquisition systems, such as shifting cultivation, are centrally involved in contact situations and materially reflect, both directly and indirectly, the impact of processes by which contact ensues among the components of contact. Apart from this

analytically convenient restriction, however, there remains the practical need to know the extent to which these processes work to diminish the capacity of the shifting cultivation system to meet the needs of the people who depend upon it. In broader terms, there is the need to know how disarticulation of the localized system develops so to encourage its incorporation into the larger globalized system.

To meet these needs, this thesis is specifically concerned with: (1) analyzing how shifting cultivation systems work [chpater III]; (2) analyzing how shifting cultivation systems break down [Chapter IV]; and (3) tentatively explaining the variety of processes that initiate breakdown in the shifting cultivation system [Chapter IV]. It should be noted here that the tentative explanation of breakdown-initiating processes that are presented in the final chapter might more appropriately be regarded as a series of hypotheses which will require acceptance or rejection through field investigation; if this chapter is to be so regarded, then it may more appropriately be regarded as a beginning, rather than an end, to yet a larger research undertaking. To some extent, however, many of these hypotheses are tenable. Their tenability is suggested not only by existing field investigations, but also by certain coherent sociocultural and ecological theories which are based on those investigations. To insure that these hypotheses are viewed as tenable, the present work will attempt to develop a conceptual framework which is founded on such theories as the basis for subsequent analysis [Chapter II]. The need for such analysis, while already suggested, will be more fully developed as a response to two controversial questions which commence Chapter I.

CHAPTER I

ETHICAL CONFRONTATION WITH NON-ETHICAL REALITY:

A NEW GEOGRAPHY

Two Initial Questions

How are "stateless" societies¹ likely to respond to policies, which are currently in-force among certain nation-states, which, when implemented, may both directly and indirectly affect those societies, *but* when formulated, neither directly nor indirectly benefit from their participation?

What should be the policy of nation-states toward those few stateless societies that have managed to survive intact on lands which they have exploited autonomously since time immemorial, *but* on lands which have come to be regarded as an integral part of the national domain?

Partial Answers to the First Question

In light of the recent historical record of contact between stateless and national societies, the consequence of their contact would appear, in general, to be nothing less than a *fait accompli*. Between stateless and national societies there exists a vast disparity (e.g. in respective levels of sociocultural integration or technoeconomic capability) and this disparity is considered by most observers as a central factor in any explanation of the general consequences of contact between them.

In observing such situations, Fried (1962[1952]:303) concludes, "Where such disparity exists and there is an aggressive meeting of societies the result tends to fall within one of three categories: total destruction of native culture, transformation of native culture, or incorporation of native culture." Sauer (1938:495) similarly concludes that, in general, the consequences of contact between stateless and national societies has been an ". . . extinction, hybridization, or sub-ordination of native stocks and cultures. . . . [and with it] . . . the permanent productive capacity of the land has been diminished." Kaplan(1969:88) has gone so far as to argue that there is in operation in such contact situations a "Law of Cultural Dominance", wherein ". . . an advanced cultural system can marshall a greater and more powerfully equipped military force, enabling it to take, and hold against encroachment or revolt, areas where its exploitative techniques are more effective than rival systems."²

Similar conclusions regarding the consequence of such contact situations have been reached by others who have sought to understand the significance of vast differences between societies in contact; these need not be considered here. However, one conclusion does merit further consideration, principally because of the tone in which it is presented and because of the perspective it employs to obtain its understanding. This particular conclusion, embodied in a document entitled *The Declaration of Barbados*, can best be appreciated in the context of how it was obtained.

In 1971, a Symposium on Inter-Ethnic Conflict in South America was convened in Bridgetown, Barbados. Formal reports were presented concerning the prevailing conditions among Amerindian populations (see Dostal 1972). After reflecting upon the substance of the symposium,

a number of participating Third World (principally Latin American) anthropologists were moved to issue the *Declaration of Barbados* (IWGIA 1971).

The Declaration of Barbados bears witness to the irreparable disruption of Amerindian cultures and, in many cases, to the outright extermination of the peoples who bear them.³ In unequivocal terms, it attributes the blame for the "ethnocide" and "genocide" of stateless societies to those Latin American nation-states that have recently been created around them.⁴ In the manner of their internally-expansionistic policies, these nation-states are claimed to both actively and passively sanction the subjugation of stateless societies, both for their labor and the resources of the land they occupy. These policies are viewed to be colonial in nature (IWGIA 1971:3):

Colonial domination of aboriginal groups, however is only a reflection of the more generalized system of Latin American states' external dependence upon the imperialist metropolitan powers. The internal order of our dependent countries leads them to act as colonizing powers in their relations with the indigenous peoples. This places the several nations in the dual role of the exploited and exploiters, and this in turn projects not only a false image of Indian society and its historical development, but also a distorted vision of what constitutes the present national society.⁵

These policies are said to be achieved through a process of "evangelization" which, in the beginning, ties stateless societies to religious missions (IWGIA 1971:5):

The inherent ethnocentric aspect of the evangelization process is also a component of the colonialist ideology and is based on the following characteristics:

- its essentially discriminatory nature implicit in the hostile relationship to Indian culture conceived as pagan and heretical;
- (2) its vicarial aspect, implying the reidentification of the Indian and his consequent submission in exchange for future supernatural compensations;
- (3) its spurious quality given the common situation of missionaries seeking some form of personal salvation,

material or spiritual;

(4) the fact that the missions have become a great land and labor enterprise, in conjunction with the dominant imperioal interests.⁶

There are several noteworthy aspects of the Declaration of Barbados that set it apart from otherwise similar conclusions about the consequence of contact between stateless and national societies. First, the Declaration bases its appraisal on current and on-going events, whereas most other conclusions reflect upon events which are far removed from the time at which analyses leading to those conclusions have been undertaken. Second, whereas other conclusions have been afforded some measure of detached objectivity in their reflections (as there is little that can be done about events that have already run their course or about the agents that are responsible for initiating those events), the Declaration takes on an accusatory, if not outright polemical tone, in view of the alarming fact that the cultural and biological lives of certain groups of people continue at present to be threatened with extinction and that there is little or nothing being done to stop that threat. And third, the Declaration suggests that, while national societies must ultimately bear the blame for the actions that they initiate to involve the stateless societies which they surround, national societies by virtue of their own political and economic histories are aubject to pressures that are extraterritorial in origin which condition actions that those societies undertake within their own borders. By suggesting a global structure of political, economic, and cultural dominance and dependence, the Declaration introduces the likelihood that certain nation-states with foreign, if not global interests may contribute, through actions by which those interests are indicated, in the extinctionary threat to stateless societies beyond their own borders.⁷

This last aspect is a significant departure from other conclusions that refer to past temporal contexts, if only because in those past contexts the global structure of dominance and dependence was not to firmly established with so sure a purpose.

In light of the historical record and in the face of current events, it would not distort the facts too greatly to assert that contact with national societies would inevitably imperil the future that stateless societies might otherwise pursue if the design of the future was theirs to determine. This inevitability would appear to derive from the unresolved contradiction that is contained in the first question. Simply, stateless societies are subject to implemented policies of nation-states, but have nothing to do with the formulation of those policies. As such, the design of the future of stateless societies is in hands other than their own. Thus, stateless societies are likely to respond to contact with national societies in much the same general way as they have in the past: this means nothing less than submission to "total destruction", "extinction", genocide", "ethnocide", "transformation", "hybridization", "incorporation", "subordination"; or, in more encompassing terms, to the "Law of Cultural Dominance".

Partial Answers to the Second Question

If remaining stateless societies are to continue to survive in a manner that they themselves deem fit, then there is a clear and compelling need to alter those existing policies which may both directly and indirectly, but inevitably threaten them. However, the direction that changes in those policies *should* take is extremely problematical.

At least three problems cloud the direction in which policy should proceed. First, there are the complicated implications of the

contradiction regarding sovereignty and the basis for its justification which is contained in the second question. Second, there is the thorny question of who should inquire and work for change in existing national policies, and by means of what forum. And third, only sketchy ideas are to be had of the complex processes by which existing national policies ultimately impact at the local level of the stateless society, with the net effect that no *clear* understanding is to be had with respect to the impact of policies, whether existing or contemplated. Hence, it is difficult to design appropriate policy.

Underlying the difficulty of designing appropriate policy is an air of prejudice (at worst) or misunderstanding (at best) about the nature of the stateless society. This, in turn, contributes imperceptibly to an air of cynicism regarding either the need or the likelihood for the continuation of the stateless society as an alternative arrangement of human beings.⁸ Consequently, the very attempt at designing appropriate policy is hindered at the onset and would appear destined to fail. Should attempts at designing appropriate policy in fact be shrouded in a fatalistic attitude, it is timely to outline here some fundamental aspects of the stateless society as a means to counter the reasons for such an attitude.

The Stateless Society - What Is it?

The term "stateless" refers to two important conditions of a society so named. The first condition is that of its *internal organization*, the second is that of its *geopolitical situation*.

By way of a useful contrast with the nation-state and the society which comprises it, Flannery provides a partial understanding of the internal organization of the stateless society. He observes

(1972:403-404):

The state is a type of very strong, usually highly centralized government, with a professional ruling class, largely divorced from the bonds of kinship which characterize simpler [stateless] societies. It is highly stratified and extremely diversified internally, with residential patterns often based on occupational specialization rather than blood or affinal relationship. The state attempts to maintain a monopoly of force, and is characterized by true law; almost any crime is a crime against the state, in which case punishment is meted-out by the state according to codefied procedures, rather than being the responsibility of the offended party of kin, as in simpler [stateless] societies.

Cohen (1968:55) adds, "Statelessness does not refer only to an absence of a set of unifying political institutions in a society, it constitutes a set of limiting conditions for technological advance because there is no stimulus for production of gross deployable resources . . ." Again, in contrast to the stateless society, Flannery notes (1972:404):

States have a powerful economic structure; they are characterized by both reciprocal and redistributive exchange, and often by markets as well. The economy is largely controlled by an elite (usually hereditary) with preferential access to strategic goods and services; . . . States usually have populations numbering into hundreds of thousands (and often millions), only a certain percentage of whom are engaged in actual production of food; . .

In reference to an evident lack of stimulus for producing surpluses in the stateless society, Nietschmann (1971:167) argues that such an absence is the "substance of subsistence"; he cautions that *subsistence* should not be equated with ". . . a hard marginal life, continuous work just to survive, inability to produce surplus, low return from labor, little security of life, poor diet and nutrition, and a universal level of livelihood which is an impediment to economic development."⁹ To the contrary, as Sahlins (1968:77) argues, *subsistence* should be understood to mean a *mode* rather than a *consequence* of production which is ". . . directed toward supplying the family with its customary stock of consumable, . . . has built-in limits on output, and no inherent propensity to evoke continuous work or surpassing wealth . . . Production ceases when the domestic quota is filled for the time being."

Thus, the stateless society is internally constituted and motivated in a manner that is significantly distinct from that of the society which comprises the contemporary nation-state.

The geopolitical situation of the stateless society is foretold by the fact that the surface of the earth now has imposed upon it a mosaic of nation-states which leave virtually no part unclaimed. A nation-state, however, is but a recent creation with respect to the stateless society which preceded it. Unlike stateless societies, nation-states claim and bound, subject to international concensus or conflict resolution, territory that they do not necessarily occupy or even periodically exploit. And within the jurisdiction of a nationstate, there may survive one or more autonomous stateless societies.

The Sovereignty Problem

Clearly, stateless and national societies have acquired dominion over land by different methods. This gives rise to a fundamentally moral question: Which method is valid, of itself and as weighed against the practical consequences of measuring validity in such terms?

The stateless society acquired dominion over land through an initial peopling (or by conquest that is obscured in antiquity), continuous occupation, and continuous use of the land. The national society (either as a composite of emigres, a composite of formerly separate indigenous societies, or as an accretion of both) acquired it more recently through conquest, mutual assimilation, or both, and through cartographic manipulations on maps rather than in occupied and

exploited territory.¹⁰ Such manipulations, following international concensus or conflict resolution, have led to the incorporation of land, the dominion over which was not acquired through any kind or arbitration among *all* parties interested in that land. This is not to deny, however, that this acquisition procedure had juridico-political backing.

Certainly, most enlightened people in national society would agree, at least philosophically, that stateless societies have a valid claim to the land that they occupy and have occupied since long before the historical record began; in simple terms, stateless societies were *there* first. Unfortunately, when the practical consequences of moralization are seen, moralization becomes something that is done only when convenient. Bentley supports this contention (1976:351):

. . . there is the view that traditional patterns of behavior will have to be altered to some degree when they come into fundamental conflict with the moral and economic standards of the modern world. Third world nations, struggling to liberate the vast majority of their poeple from inadequate diets and disease through economic development, cannot afford to abstain from exploiting natural resources located in areas where aboriginal peoples live simply in order that the latter may continue to live as they have always done.

Problems of Participation in Policy Redirection

Not only does the sovereignty contradiction cloud the question of what *should* be the proper policy toward stateless societies, but so does the problem of who should be involved in its determination and by what means.

This problem is highly complex, to say the least. At one level, it involves policy-makers in the nation-states where stateless societies currently remain; in the last instance, these policy-makers must redirect their own policies. At another level, it involves the policy-makers who are not in nation-states where stateless societies

currently remain, but who nevertheless exert certain influences over the policy-makers of those nation-states. And at yet another level it involves non-policy-makers, both within and beyond nation-states within which stateless societies currently remain.

To unravel this complex problem requires that one recognize the structure of relationships which compose the ravel, for policymakers and non-policy-makers both within and beyond nation-states that contain stateless societies are each tied (in Gordian fashion) to the others. Insofar as this structure bears upon not only the problem of participation in policy redirection, but also the problem of national penetration into the (stateless) shifting cultivation society, it shall be indicated here at some length by paraphrasing the notably coherent thinking of Galtung.

Galtung (1971, passim.) suggests, "The world consists of Center and Periphery nations; and each nation, in turn, has its centers and peripheries." This is said to reflect ". . . a sophisticated type of dominance relation [i.e. "imperialism"] which cuts across nations, basing itself on a bridgehead which the center in the Center nation establishes in the center of the Periphery nation, for the joint benefit of both." Significantly, Galtung equates centers of Center and Periphery nations with governments; governments, by definition, make policies; by implication, non-policy-makers constitute the peripheries of Center and Periphery nations. Distinguishing "imperialism" (". . . a species in a genus of dominance and power relationships . . .") from the classical sense, ". . . which conceives of imperialism as an economic relationship under private capitalism motivated by the need for expanding markets . . .", Galtung maintains that ". . . imperialism is a more general structural relationship between two collectivities

... [and] ... is a system that splits up collectivities and relates some of the parts to each other in relations of harmony of interest, and other parts in relations of disharmony of interest, or conflict of interest."

Imperialism is a relation between a Center and a Periphery nation so that:

- (1) there is a harmony of interest between the center in the Center nation and the center in the Periphery nation,
- (2) there is more disharmony of interest within the Periphery nation than within the Center nations,
- (3) there is disharmony of interest between the periphery in the Center nation and the periphery of the Periphery nation.

"Interest", whether harmonious or disharmonious, refers in this case to "living condition" (LC); "living condition" may be measured solely in materialistic terms (e.g. income, standard of living), but also in conjunction with intangible factors such as "quality of life" or "autonomy". Accordingly:

There is conflict, or disharmony of interest, if the two parties are coupled together in such a way that the LC gap between them is increasing; there is no conflict, or harmony of interest, if the two parties are coupled together in such a way that the LC gap between them is decresing down to zero.

In sum, "imperialism" may be regarded in the following terms:

In the Periphery nation, the center grows more than the periphery, due partly to how interaction between center and periphery is organized. Without necessarily thinking of economic interaction, the center is more enriched than the periphery. . . . However, for part of this enrichment, the center in the Periphery only serves as a transmission belt (e.g. as commercial firms, trading companies) for value (e.g. raw materials) forwarded to the Center nation. This value enters the Center in the center, with some of it drizzling down to the periphery in the Center. Importantly, there is less disharmony of interest in the Center than in the Periphery, so that the total arrangement is largely in the interest of the periphery of the Center. Within the Center the two parties may be opposed to each other. But in the total game, the periphery see themselves more as the partners of the center in the Center than as partners of the

periphery in the Periphery - and this is the essential trick of the game. Alliance-formation between the two peripheries is avoided, while the Center nation becomes more and the Periphery nation less cohesive - and hence less able to develop long-term strategies.

. . . The two centers are tied together and the Center periphery is tied to its center: that is the whole essence of the situation. If we now presuppose that the center in the Periphery is a smaller proportion of that nation than the center in the Center, we can also draw one more implication: there is disharmony of interest between the Center nation as a whole and the Periphery nation as a whole. But that type of finding, frequently referred to, is highly misleading because it blurs the harmony of interest between the two centers, and leads to the belief that imperialism is merely an international relationship, not a combination of intra- and inter-national relations.¹¹

Thus, the structural model presented by Galtung makes it exceedingly clear who could or should participate in the redirection of policy that ultimately involves and threatens the future of stateless societies: policy-makers (both within and beyond nation-states within which stateless societies currently remain) to be sure, but also non-policymakers; and from the point of view taken here, non-policy-makers (or peripheries) in Center nations, especially. In this latter case, the other half of the policy redirection problem looms heavily: By means of what forum? Here, Galtung provides no direct assistance.

However, it is not acceptable that (for want of an indicated forum in which non-policy-makers might work for the redirection of policy which otherwise threatens stateless societies) stateless societies should continue to be subjected to ethnocide and genocide. Yet, to suggest those forums which might be effective is to tread into an extremely sensitive area of inquiry; especially if the forums already exist and have not contributed to policy redirection with respect to stateless societies, but to the contrary have contributed, often unwittingly, to policy that threatens stateless societies.

A Potentially Effective Forum

The forum which is considered here can be variously thought of as the higher education system, the college/university, or the academv. The academy occupies a rather peculiar position. It is the locus (especially within the Center nation) at which the periphery and center interpenetrate, with the effect that it is difficult to distinguish whether it is part of the periphery, part of the center, or part of both. To be sure, it is comprised of peripheral elements (i.e. individual scholars and academics who are themselves powerless to make policy in their role). It also comprises a center element (i.e. an institution, as an intellectually-elite collectivity, which has considerable sway, if not a major responsibility, in decision-making and policy-formulation). As an institution, the academy gathers power from its local-, regional-, national-, international-, and global-informationgathering, -storing, -processing, and -interpreting functions. Thus, the academy is both part of the periphery and part of the center in the Center nation. And this gives rise to certain conflicts.

The academy is dependent upon externally-produced monetary support. The sources of this support are varied, but not unrelated. There are governmental bureaus and agencies which, by virtue of taxation, allocate funds for the academy and thereby subsidize its activities. As well, there are private endowments provided by corporate enterprise and philanthropic donations contributed by inordinantly successful entrepreneurs.¹² If this funding does not, of itself, give rise to certain gratitudinal obligations to be met by the academy, then certainly the prospects of receiving more funding make mandatory the observation of otherwise-founded obligations (of an expectationary nature). Here, it may be asserted that expectationary obligations are

the scaffolding in the dominance-dependence structure.

The nature of these obligations translates itself in several ways, but with the same effect: governmental bureaus and agencies. corporate enterprise, and entrepreneurs must not be criticized for what it is they do (especially as what they do relates to social matters), beyond an *uncertain* point. To engage in extreme criticism is to place in jeopardy continued funding, for want of which the academy could not continue. For the individual scholar, this imposes a severe constraint.¹³ Certain otherwise compellingly relevant and researchable areas that demand extreme criticism (but in good faith) are implicitly out-of-bounds, owing to that uncertain point of criticism which, when exceeded, may give rise to a termination of funding. Conceivably, however, research which is not deemed "safe" or which is deemed "too political" would pose no major threat (at the level of the individual researcher) provided that the academy, as a collectivity, was not associated with its findings and recommendations. But here it may be suggested that there exists a compelling need for the academy (as a collectivity) to protect itself by policing the activities of its individual academies and to censure and even cast-out those who exceed the rules of "proper" research and thereby threaten the continuation of requisite funding. Yet, weighed against the backdrop of the "real world" (where people are suffering and dying for want of concern for their condition and its real causes), the academy appears riddled with petty caveats for the individuals who comprise it. 14

If the centers in Center nations are to change policies which are in want of criticism in light of their often shattering effects, then the peripheries of those Center nations must break, in Galtung's words, the partnership with their centers and reverse (if not disintegrate)

the dominance-dependence structure. By virtue of its awkward position within this structure, the academy is probably in the best position to bring about such a reversal. At stake is the quality of life and autonomy of the vast majority of human beings that comprise the heretofore powerless peripheries of both Center and Periphery nations, to include those few remaining stateless societies that are the subject of this thesis.

Problems Raised by Sympathetic Answers to the Second Question

Quite clearly, the difficult problems of sovereignty and participation in policy redirection will have to be solved before any complete and tenable answers can be found to the second question: What *should* be the policy of nation-states toward stateless societies? Certain changes in direction have been indicated for existing policies, however. These changes revolve around the issue of aboriginal rights and their legislated protection.¹⁵

Several organizations have been established with this issue as their central concern.¹⁶ On the one hand, these organizations have taken-up the task of informing the public-at-large of the often atrocious manner in which stateless societies have their rights denied. On the other, these organizations have taken-up the cause of informing stateless societies of their rights and insisting on those rights by mounting pressure upon those who should be protecting those rights. Bentley, in arguing the case for one such organization, declares (1976:351):

There are several lessons to be learned from the historical experiences of the aboriginal peoples on the reservations of the Americas. First, the protection of certain token rituals does not guarantee a satisfying way of life. Moreover, the placing of fences around aboriginal societies is no guarantee against encroachments. There are innumerable examples of attempts, many of them successful, to lof off parts of the reservations. . . Thus, if aboriginal peoples

are to control their way of life, they must be aware of their rights within the national community and be able to argue for them.

Some would argue that this would ultimately be selfdefeating - that by becoming politically involved in the national society, aboriginal peoples would change their views of themselves and hence their way of life. If this is the product of their own experience and their own decision, however, one cannot regret it.

Several critical points should be drawn with regard to these organizations, for if they are to be effective, then they must resolve the impracticalities of an ethical position that seeks not only human rights but also human dignity.

To begin, these organizations depart significantly from former pursuits. The protection of rights rather than people is pursued. This pursuit diminishes the impracticalities they must face, for the physical and fiscal burden of maintaining "living museums" is not assumed. There is no need to paternally feed, clothe, and shelter the "primitives". Rather, the position is taken that stateless societies have managed through the millenia to conduct their lives in a manner which they have found suitable; this is a position that recognizes reality and instills dignity. Insofar as their ability to meet their own needs is now, however, increasingly constricted, there arises the problem of forestalling that constriction. The position is thus taken that such constriction follows from failure to observe the rights of stateless societies; accordingly, these rights must be recognized and guaranteed.

Herein lies a practical problem to be solved. Stateless societies, in order to act in their own behalf, must be made aware of the rights which have accrued to them without their knowing it. After all, the notion of rights, particularly in the legalistic sense, is a creation of the nation-state. Any paternalism that is engendered in
this educational process (which is, by name, the practical problem) can surely be excused in light of what that process holds in store for the people being educated. Yet, while this process sets in-motion the drive within stateless societies for their own independence, it by no means assures it. And here, these organizations may be faulted for a certain naivete, because they do not really attend to the intractable unwillingness of policy-makers to allow stateless societies to pursue, by right, their own destinies.

In order for aboriginal rights to be conceded to stateless societies, pressure must be brought to bear upon policy-makers within nation-states where stateless societies remain. In light of the practical consequences of such a concession, it is questionable that those policy-makers would voluntarily relinquish national dominion to certain outstanding aboriginal claims. As this might constitute a denial of habitable or cultivable land, or resources of trade value, to certain segments of the national population, those policy-makers would no doubt be placing themselves in a tenuous (or even suicidal) political position. Suggested here, as well, is that peripheral segments of the national society are not likely to take-up the call for aboriginal rights and their legislated protection because they have their own pressing concerns.

It may be proposed here that the global structure of dominance-dependence could be brought into play, finally and at last nobly. The centers of Center nations could exert their influence on the centers of Periphery nations to bring about an observation of aboriginal rights that emanate in the "far" peripheries of those Periphery nations. This, however, assumes that it is of interest of the centers in Center nations to exert such influences. In light of what has been argued thus far,

this assumption is not warranted; following Galtung, centers in Center and Periphery nations are in harmony of interest. This places the burden of action squarely in the peripheries of Center and Periphery nations. With stateless societies not yet constituted nor conscientized for national political action and with other national peripheral elements preoccupied by their own diversions, the burden falls to the peripheries of Center nations. And herein lies the most serious practical problem of all that must be faced by the above mentioned organizations. Recalling Galtung's contention of a "drizzling down" of "value" from the center to the periphery in the Center nation, by virtue of the "bridgehead" which the center has established in the center of the Periphery nation, one may reasonably wonder how willing might be the periphery in the Center nation to coerce its center into asserting influences abroad that might curtail the "drizzling down" effect. Here, one might ponder the awkward position of the academy, which is made all the more awkward by the respect it reputedly commands within the "lay" periphery. In search of someone to take the lead, the question logically follows: What will the academy do, in light of the glaringly tragic facts that it has in its possession with regard to stateless societies?

One further practical problem that exists for the organizations that seek to secure and protect aboriginal rights has yet to be mentioned. It is a problem that follows in association with their programmatic intentions to educate stateless societies (which is itself a practical problem). Here, however, the problem is not one of delivery or logistics. To approach this problem, it serves to point-out that these organizations seek not only to provide stateless societies with knowledge of the concept of aboriginal rights and its basis, but also ". . to provide aboriginal peoples with the knowledge and understanding

of the modern world that will permit them to manipulate it and its representatives to secure their rights within the national community" (Bentley 1976:352). Presumably, this knowledge and understanding should comprehend and be capable of forewarning of the long-term effects that contact with the modern world brings with it. This expectation would seem nowhere more appropriate than with respect to how such effects impinge upon certain aspects of the stateless society which, if otherwise left alone, assure them some measure of material independence. One of these more basic aspects is the food acquisition system of the stateless society. Here, the stateless society should be totally aware of the circuitous, slow-to-materialize implications of accepting certain material achievements of the modern world and certain of its less tangible idiosyncratic views and values. Unfortunately, as it is contended here, this fundamental (in the knowledge and understanding of the modern world that should be imparted to the stateless society) has not been systematically pursued and thus cannot be adequately imparted.

Up to this point, an attempt has been made to establish the broader political context within which should be seen the specific problem of national penetration into stateless societies. Additionally, certain issues have been raised which appear central to the solution of this problem. With this attempt now completed, attention is turned in the next chapter to a review and evaluation of certain conceptaul approaches which have dealt with how stateless societies have been maintained and/or changed. Following the next chapter, within which a new conceptual framework will be developed, remaining chapters will be devoted to applying the developed conceptual framework to the even more specific case of stateless societies which carry-on a shifting cultivation adaptation and to the impact of national penetration on

NOTES

¹When speaking generally of the society in question, the term "stateless" shall be used in preference to such terms as aboriginal, native, indigenous, primitive, simple, preliterate, preindustrial, band, tribe, or egalitarian. The reasons for this preference are indicated in a later section of this chapter; it may be mentioned here that these reasons are related to both the internal organization (e.g. social structure; mode of production, exchange, and consumption; basis of power and privilege) and geopolitical situation of the societies termed "stateless". Suffice to note here that all "stateless" societies are aboriginal, native, or indigenous, but that the converse is not necessarily true. Aboriginal, native, or indigenous peoples may no longer compose an integrated society (e.g. urban Indians in the US and Canada), and many of those which do (e.g. reservation Indians, or Inuit [Eskimo] communities) have developed, or have had to develop, an almost irrevocable dependence on the nation-state (e.g. as indicated by welfare subsidies; desire for and use of Western goods and services) and in so doing have become part of the nation-state. "Stateless" societies remain autonomous and integrated. Primitive or simple are terms that apply to "stateless" societies if used in the evolutionary context of anthropology, but, too often, they assume prejudicial proportions and misrepresent the often elaborate cognitive world of members of the "stateless" society. See Levi-Strauss (1966, 1969, 1973) and Reichel-Dolmatoff (1971) for what amounts to an argument against the idea that "stateless" societies are really simple. Preliterate or preindustrial are vague terms and there vagueness is tied to the academic problem of defining what constitutes literacy and industry. Does literacy exclusively involve a writing system applied to a medium such as paper? Does industry involve only a chemical transformation of materials with the help of a fossil-fuel subsidy? Band and tribal, as terms referring to the complexity of the social order of a society, are too specific, as they may both apply to the "stateless" society. Egalitarian, as a term that refers to equal accessibility to materials and prestige for all members of a society so named, is probably the most acceptable of the alternatives to "stateless", but, while directing attention to the internal organization of a society, diverts attention from its geopolitical situation.

² In addition to indicating a certain inevitability resulting from contact between stateless and national societies, the comments by Fried, Sauer, and Kaplan are important for raising issues which relate to the manner of their contact. Fried, for example, qualifies his remarks with the notion of an "aggressive meeting". Does an "aggressive meeting" indicate a situation that, in the intent of its creation and in its consequent effects, can only be violent or hostile? Or does it indicate a situation that is consciously pursued (without intended malevolence) with extraordinary intensity for purpose, but without an informed anticipation of consequences which may be in effect hostile or violent in the created situation? Sauer is remindful that contact between societies involves not only societies but also the environment (and usually the environment of the contacted society, for it is there that contact occurs). He implies that the contacted society is more cautious in its own environment than is the society that initiates contact in that environment. Kaplan, in light of Sauer's implication, raises a problem by introducing the idea that the contacting society has more "effective" exploitative techniques than the contacted society. By this, does he mean short-term or long-term effectiveness? As Sauer would have it, this effectiveness cannot be long-term. One may thus infer, to momentarily resolve the contradictory conclusions of Sauer and Kaplan, that what may be productive in the short-term may end-up becoming progressively less productive in the long-term. These issues will receive more systematic attention in the remainder of this thesis.

³This document is corroborated by a variety of sources. Unfortunately, these sources tend to suffer from being so scandalous as to be dismissed out-of-hand for the incredibility of the facts they impart, or from obscurity as there is little demand for such facts. But see, for example, the reports of Akerren, et al. (1970); Hanbury-Tenison (1971); and Brooks, et al. (1972); also see the expose of Bodard (1971) and the findings of Arcand (1972); Bodley (n.d.); Coppens (1972); Jimenez (1973); Munzel (1973, 1974); Siverts (1972); Smith (1974); and Varese (1972). Additionally, one may occasionally find supporting information in the newsletters Akwesasne Notes and Indigena. Publishers of the latter have released a booklet that is probably the first source which should be referred to; it is entitled Supysaua: A Documentary Report on the Conditions of Indian Peoples in Brazil. That what is happening in the Amazon is by no means unique is supported by a recent global survey made by Bodley (1975).

⁴Bentley (1976:351) would argue that, as to the effect of each, the distinction between ethnocide and genocide ". . . poses a somewhat false dichotomy. The history of contact between aboriginal peoples of the American continent and Europeans demonstrates the importance of cultural traditions in ensuring the physical survival of aboriginal peoples. On contact, most aboriginal peoples have suffered catastrophic declines in population through epidemics. In addition, when their beliefs and self-concepts are discredited by Europeans, aboriginals often sink into indifference toward survival."

⁵Blaut (1975:12) similarly argues that the national political economies of the Third World must be viewed within an international capitalist structure which is responsible for ". . . the strengthening of internal colonialism, the completion of the transformation of a traditional oligarchy into a neo-colonial bourgeosie, and of a peasant class into a proletariat consisting of commercialized tenant farmers, landless laborers, mineworkers, and urban poor."

⁶See Bonilla (1972) for a rigorous case study of the impact of a Capuchin mission on the Sibundoy people of Colombia. Interestingly enough, Bonilla is a co-signer to the *Declaration of Barbados* and this may explain its concentrated criticism of religious missions and their inherently ethnocentric character, at the expense of criticism of other kinds of institutions. Sahlins (1969) takes on another kind of notably amorphous institution in the context of a summary of issues that underlie the "substantivist-formalist" debate in economic anthropology; he argues that the latter position may be equated with "business economics" and that business (or "bourgeois") economics is itself inherently ethnocentric. He asserts that the Western-spawned analytical models of business economics view man (Homo economicus), irrespective of his sociocultural context, as an innate maximizer of scarce means among alternate uses for maximum benefits, and at the same time view societies which do not maximize as embryonic versions of those Western societies where the models were developed and appear relevant.

⁷Indeed, as Ribeiro has noted (quoted in Fuerst 1972:28), ". . the fundamental determinant of the fate of native tribes, of the conservation or loss of their languages and cultures, is the larger society and even the international economy. The current price of rubber, Brazil nuts, and other products on the New York market or the prospects of peace or war between the great powers is what causes the waves of extractors of jungle products to advance or recede, permitting the remaining autonomous tribes to survive or condemning them to extermination."

 8 The origins of this prejudice and/or misunderstanding, and their resulting cynicism, have been traced to the sociologist Herbert Spencer by Harris (1968:108-141). In his attempt to correct some inaccuracies regarding the doctrine of Social Darwinism (i.e. "the survival of the fittest") or, as he would argue, Biological Spencerism, Harris notes (pp. 134-135): "The utility of this position for an empire or a corporation on which the sun never sets needs no special emphasis. Adumbrated in colonial policy, it was a perfect rationalization of the status quo of conquest. Missionaries, merchants, industrialists, and administrators, each in their own way, used the imagined biocultural specialties of the 'inferior' races as the justification for inferior treatment. Some of the classic refrains, familiar to anyone who has ever experienced the reality of a colonial system, go as follows: the natives are lazy; they do not respond like civilized men to the offer of wages; they need to be taught the virtues of civilized forms of labor by means other than those appropriate to civilized man. They must be forced to work by limiting their tribal lands, by imposing head taxes, and by compulsory contracts. Unlike civilized man, the 'inferior' races suffer moral and spiritual ills if they are educated beyond the primary level. They therefore should receive advanced training only in manual skills. Being more childlike than Europeans, it is dangerous for the natives to have free access to alcoholic drinks. Such people, if given a chance, prefer to walk rather than to ride; they like to sleep on the cold ground rather than on warm beds; they work in the rain without feeling wet, work in the sun without feeling hot, and carry loads on their heads without getting tired. Life is not so dear to these people as to Europeans; when their children die, they are not so deeply disturbed, and when they themselves suffer injury, it does not hurt so much as it does in civilized man . . . " For the passing of the stateless society, little mourning may be expected from those who adhere to the notion of "the survival of the fittest". If stateless societies

do not survive, it is because they are apparently not fit and are therefore not worth the effort of saving.

⁹ Indeed, Nietschmann (1971:169) has whimsically asked, ". . . whether living at a subsistence level means sweating to barely make it, or making it with no sweat."

¹⁰One may consider, for example, the far-reaching implications of the Treaty of Tordesillas of 1494 (negotiated between Spain and Portugal by Pope Alexander VI to establish hegemony in the New World), the Berlin Conference of 1884-1885 (leading to the partitioning of and subsequent "scramble" for Africa by the European powers), or the Louisiana Purchase of 1803.

¹¹Similar thinking maybe found in Frank (1966:20) who notes ". . . metropolis-satellite relations are not limited to the imperial or international level but penetrate and structure the very economic. political, and social life of the Latin American colonies and countries. Just as the colonial and national capital and its export sector become the satellites of the Iberian (and later of other) metropoles of the world economic system, this satellite immediately becomes colonial and then a national metropolis with respect to the productive sectors and population of the interior. Furthermore, the provincial capitals, which thus are themselves satellites of the national metropoles - and through the latter of the world metropoles - are in turn provincial centers around which their own local satellites orbit. Then, a whole chain of constellations of metropoles and satellites relates all parts of the whole system from its metropolitan center in Europe or the United States to the farthest outpost in the Latin American countryside." Cf. Frank (1967), Blaut (1970, 1973, 1975), Brookfield (1973), Folke (1973), and Slater (1973).

 12 It takes no special wisdom to trace the interconnections between the federal government and corporate industry. The former taxes the latter. The latter provides the bulk of federal revenue. It does not serve the former to restrict too greatly the profitmaking interests of the latter; and to insure that restriction is kept within tolerance of the latter, lobbies exert their pressure in the right kinds of places. As Frank has noted, however, the dividing line between government and corporate enterprises is foggy, and he poses a telling example of the structure of the U.S. society (1967:8), ". . . in which the power elite dominates what President Eisenhower dubbed the military-industrial complex, and in which Douglas Dillon of Dillon and Reed & Co., comes to sit in the cabinet as Secretary of the Treasury, Robert McNamara, President of the Ford Motor Company, becomes Secretary of Defense - as successor to "Engine Charley" Wilson, who gave us the bon mot, 'What's good for General Motors is good for the country'; and in which the bulk of military purchases are from a half dozen great corporations who employ large numbers of retired high level military officers."

¹³This constraint makes its appearance as a dictum for valuefree research in a socially-detached mode. Against this dictum, Berreman (1968:848-849) incisively argues, "If we choose to collect our data and make our analyses without regard to their use - leaving that choice to

others - we may believe that we are adhering to the most rigorous scientific canons (and hence the most highly valued canons - note the word) by not intervening in society. But to say nothing is as much as a significant act as to say *something*. Douglas Dowd noted 'The alternatives are not 'neutrality' and 'advocacy'. To be uncommitted is not to be neutral, but to be committed - consciously or not - to the status auo: it is, in Mills' phrase, 'to celebrate the present' '. . . Silence permits others in the society less reticent, perhaps less scrupulous, almost certainly less informed, to make their own use of the material presented. It leaves to politicians and journalists, to entrepreneurs, scoundrels and madmen, as well as to statesmen and benefactors - but especially to the powerful - the interpretation and manipulation of matters about which they frequently know little, and of whose implications they know less, and nearly alwasy far less than those who collected the material or made the analyses. In 1965 Baran noted in this regard 'it should be obvious that society's elections [or choices] do not come about by miracles, but that society is guided into some 'elections' by the ideology generated by the social order existing at any given time, and is cajoled, frightened, and forced into other 'elections' by the interests which are in a position to do the cajoling, the frightening and the forcing. The intellect worker's withdrawal from seeking to influence the outcome of those 'elections' is far from leaving a vacuum in the area of 'value' formation.' It is therefore wishful thinking of the most elemental sort to assume that our work can be put before the public without context or interpretation, there to be judged freely and intelligently on its merits without prejudice or manipulation, and to be acted upon accordingly. To assume that, is to contribute to misuse born of ignorance or worse. We cannot divorce ourselves from the consequences of our scientific acts any more than we can from those of any other of our acts as human beings." The implications of values which are said to be left at the scholar's library door but which somehow sneak-in behind him or her, are investigated by J. Anderson (1973), Buttimer (1974), and Zelinsky (1975).

¹⁴ These caveats have led to some curious twists. In anthropology, a pedagogical technique is employed which is known as the "ethnographic present"; by means of this technique, stateless societies may be talked about as if they still existed, whether or not this is the case. This technique is no doubt useful for appreciating the former richness of human diversity, but it also diverts attention from the fact that this diversity is being impoverished (often consciously) at an ever-increasing rate. Another example is posed by a publication called Bulletin of the International Committe on Urgent Anthropological and Ethnological Research whose purpose is to indicate the imperiled state of affairs for many societies, including stateless societies. One may ask, upon consideration of its contents, if the central motivation behind this publication is: "Hurry-up and collect as much information as you can before these societies and their curious habits disappear!" Built into this motivation is a disturbing acceptance of the state of affairs. And if the purpose of collecting such information is to nobly shed light on the lifestyle of one particular kind of society (i.e. the national society) by appreciating alternatives to it, so that one kind of society may become enriched by the knowledge of its alternatives which are all the while vanishing, then the question may be sardonically raised: Why bother? Yet another example is posed by Berreman (1968):

"The notion that contemporary world events are irrelevant to the professional concerns of anthropologists was laid neatly to rest when, at the meeting of Fellows of the American Anthropological Association in Pittsburgh this fall, Michael Harner rose to challenge the ruling of the president-elect that a resolution introduced by David and Kathleen Gough Aberle condemning the United States' role in the war in Vietnam was out of order because it did not 'advance the science of anthropology', or 'further the professional interests of anthropologists.' Harner suggested that 'genocide is not in the professional interests of anthropologists.' With that, the chair was voted down and the resolution was presented, amended, and passed." Genocide should not be in the professional interests of geographers either, yet on several occasions, the Association of American Geographers has voted down a resolution by David Harvey to verbally condemn the regime of the geographer-despot Pinochet in Chile and its unceasing commission of atrocities and denial of human rights "because it did not further the professional interests of geographers." This may well be true, for many U.S. geographers are employed by U.S. transnational corporations (e.g. I.T.T.), as well as by certain U.S. government agencies (e.g. the C.I.A.), which do not look kindly on certain foreign governments (e.g. the duly-elected Allende government) who nationalize U.S. business interests or who oppose U.S. ideological dogma. The causes of this collective attitude in geography have been traced out in Eliot-Hurst's (1973) distressing sociology of the discipline.

¹⁵Cumming and Mickenberg (1972) have investigated this issue as it has developed in the North American context. "We have defined aboriginal rights as those property rights which inure to native peoples by virtue of their occupation upon certain lands from time immemorial" [p.3]. They observe, "It is this historical fact and the due recognition which Canadian and English law and policy have given to the principle that native people have a right to retain possession of or be compensated for the loss of their aboriginally held land that underlies and explains the complex legal theory of aboriginal rights, the emergence of most of the Indian treaties, and the continuing and justified demands of native peoples for satisfaction of outstanding claims" [p. 3]. Pittock (1973) has briefly appraised the issue of aboriginal rights in the Australian context. Unfortunately, there are few examples of inquiries into the issue of aboriginal rights; this leads one to conclude that the issue is not of major interest.

¹⁶Consider the work of: (in Canada) Indigenous People's Human Rights Committee, Canadian Association in Support of the Native Peoples; (in Colombia) Comite de Defensa del Indio; (in Denmark) International Work Group for Indigenous Affairs (IWGIA); (in England) Survival International, The Aborigines Protection Society; (in France) Le Comite de Recherche et d'Information sur les Minorites Ethniques; (in Switzerland) Amazind; and (in the U.S.) Cultural Survival, Indigena.

CHAPTER II

CONTACT BETWEEN SOCIETIES OF A VASTLY DIFFERENT NATURE - TOWARD A CONCEPTUAL FRAMEWORK

FOR ANALYSIS

An Initial Comment

This thesis grows from a stream of geographic research known as the "man-land" tradition.¹ In adhering to this tradition, geographers have pursued questions which have sought to instill an understanding of many of the interactions that take place between human populations (conceived of as sociocultural systems) and their habitats (conceived of as ecosystems).² As indicated by the kinds of questions pursued, a number of research thrusts can be roughly identified within this tradition.³ Several of these research thrusts, particularly those made by cultural geographers, have benefitted through a sharing of ideas with anthropologists.⁴

One research thrust which is currently in vogue among many cultural geographers and anthropologists is known variously as human ecology (after Barrows 1923), cultural ecology (after Steward 1953), 1955, 1968), human ecosystematics (after Brookfield 1964), cultural materialism (after Harris 1968), or anthropological ecology (after Anderson 1973). While not denying that this research thrust is itself divergent with respect to the specific interests of individual researchers, it nevertheless entails a broad interest in common to all

individual researchers who lavel their work by the noted verbal shorthands. To briefly glimpse this broad interest, it is well to consider some thoughts that set it in motion. Barrows proposed (1923):

Geography [as human ecology] will aim to make clear the relationships existing between natural environments and the distribution and activities of man. . . [viewed] . . from the standpoint of man's adjustment to environment . . [p. 3]. . . It is not the human fact which is geography, any more than it is the environmental fact, but rather the relation which may exist between the two [p. 12].

Steward (1953:234) coined the phrase "cultural ecology" in reference to ". . . the adaptive processes by which the nature of society and an unpredictable number of features of culture are affected by the basic adjustment through which man utilizes a given environment." Elsewhere (1955:36), he saw as the purpose of cultural ecology, ". . . to ascertain whether the adjustment of human societies to their environments require particular modes of behavior or whether they permit latitude for a range of possible behavior patterns."

While this thesis makes no conscious attempt to trace the development of human ecology,⁵ it considers some of the concerns, assumptions, and, in particular, the conceptual framework which distinguish it as an academic endeavor. Notably, the conceptual framework which is employed in human ecology is fundamental to this thesis. Yet as it stands, this conceptual framework requires some modification, because it deals principally with societies in isolation, rather than with the contact between societies. Indeed, as Sahlins has criticized (1964:134, italics added):

. . . cultural ecology has operated myopically as if it were biological ecology, without reference to *intercultural adaptation*. . . Research into relations between cultures has been carried on as a thing apart, mostly under the traditional head of 'acculturation', as thus not so much

from the perspective of adaptation as from that of assimilation. . . Cultural ecology has an untapped potential to provoke useful thoughts about militarism, nationalism, the orientation of production, trade, and many other specialized developments which, if they are not 'acculturation' in the conventional sense, still come out of the interaction of cultures.

This thesis is concerned with contact between vastly different sociocultural systems, with an interest in the *contacted* sociocultural system inhabiting its ecosystem. Consequently, certain modifications must be made to the conceptual framework provided by human ecology. But first, it must be indicated; this will be accomplished by way of an overview of pertinent human ecology concepts. Following this overview, brief consideration will be given to acculturation and diffusion which are two process-oriented approaches that have specifically addressed the topic of contact between societies. For reasons which will be established later, these approaches are limited and, to some extent, incoherent; they are rejected in preference to the potential of the human ecology conceptual framework that will be developed following their consideration.

The Isolated Society in Its Habitat - An Overview of Human Ecology Concepts Pertaining to the Analysis of Contact between Societies

Basic Conceptualizations of Society

The development of human ecology may be traced through a series of conceptualizations of society. These conceptualizations are useful to consider in their original form so as to better appreciate the logic of extending the human ecology conceptual framework to treat the topic of contact between societies. Following the presentation of these selected conceptualizations, an effort will be made to distill their common and distinctive concerns and assumptions.

Early in the development of human ecology, Barrows noted

(1923:13):

. . . those relationships between man and the earth which result from his efforts to get a living are in general the most direct and intimate; . . . most other relationships are established through these. . .

White asserted (1949:366):

We may view a cultural system as a series of three horizontal strata: the technological layer on the bottom, the philosophical on the top, the sociological in between. These positions express their respective roles in the cultural process. The technological system is basic and primary. Social systems are functions of technologies; and philosophies express technological forces and reflect social systems. The technological factor is therefore the determinant of a cultural system as a whole. . . This is not to say, of course, that social systems do not condition the operation of technologies, or that social and technological systems are not effected by philosophies. They do and are. But to condition is one thing; to determine, quite another.

Radcliffe-Brown contended (1952:9):

When we examine a form of social life amongst human beings as an adaptational system it is useful to distinguish three aspects of the total system. There is the way in which the social life is adjusted to the physical environment, and we can . . . speak of this as the *ecological adaptation*. Secondly, there are the institutional arrangements by which an orderly social life is maintained, so that . . . cooperation is provided for and conflict is restrained or regulated. This we might call . . . the institutional aspect of *social adaptation*. Thirdly, there is the social process by which an individual acquires habits and mental characteristics that fit him for a place in the social life and enable him to participate in its activities. This . . . could be called *cultural adaptation*.

As a major figure in the development of cultural ecology, Steward argued (1955:37):

. . . All aspects of culture are funtionally interdependent upon one another. The degree and kind of interdependency, however, are not the same with all features. . . I have offered the concept of *culture core* - the constellation of features which are most closely related to subsistence activites and economic arrangements. The core includes such social, political, and religious patterns as are empirically determined to be closely connected with these arrangements. Innumberable other features, are determined to a greater extent by purely cultural-historical factors by random innovations or by diffusion - and they give the appearance of outward distinctiveness to cultures with similar cores.

Sahlins has eloquently observed (1964:132-133):

The truism that cultures are ways of life, taken in a new light, is the ground premise - cultures are human adaptations. Culture, as a design for society's continuity, stipulates its environment. By its mode of production, by the material requirements of its social structure, in its standardized perceptions, a culture assigns relevance to particular external conditions. Even its historical movement is movement along the ecological seam it is organized to exploit. Yet a culture is shaped by these, its own, committments: it molds itself to significant external conditions to maximize the life chances. There is an interchange between culture and environment, perhaps continuous dialectic interchange, if in adapting the culture transforms the landscape and so must respond anew to changes that it had set in motion.

Harris, the preeminent spokesman for adopting the cultural materialist

research strategy, has stated (1971:144-146):

The master plan of all sociocultural systems may now be described as follows.

- (1) Ecological patterns: At the base of every sociocultural system are the tools, machines, techniques, and practices relating social life to the material conditions of specific habitats. Ecological patterns consist of the culturally given technology of energy procurement, transformation, and distribution. These technological items interact with the conditions of the natural habitat to yield characteristic levels of energy outputs in the form of food, fuels, and other disposable energy rations. Technological inventories and practices also provide each population with protection against animal predators, disease, climatic extremes, and neighboring human populations (who are also to be counted as part of the environment). . . . All technoenvironmental transactions form part of the ecological pattern. Equally basic, however, are the size and density of population, the pattern of dispersal with respect to resources, the growth rates and age and sex composition, in so far as all these demographic factors modify the relationship between a sociocultural system and its environment.
- (2) Social structure: The maintenance of an orderly social life is a necessity of all sociocultural systems. This necessity does not arise however from some abstract or aesthetic need for law and order but rather from the practical requirements of production and reproduction. The primary function of

social structure therefore is the maintenance of orderly relationships among individuals and groups responsible for technoenvironmental processes and for the breeding and caring of children. Social structure is also concerned with the orderly transfer and distribution of energy and labor power among the various production and reproduction units. . .

(3) Ideology: . . . Ideology thus embraces the entire realm of socially patterned thought. It includes the explicit and implicit knowledge, opinions, values, plans, and goals that people have about their ecological circumstances: their understanding of nature, technology, production and reproduction; their reasons for living, working, and reproducing. Ideology also embraces all thoughts and patterned expression of thoughts that describe, explain, and justify the parts of social structure; that give meaning and purpose to domestic and political economy and to the maintenance of law and order in domestic and political relations; that describe, justify, and plan the delegation of authority. the division of labor, the exchange of products, the sharing or nonsharing of resources. Finally, ideology also consists of the ideology of ideology, thoughts about thoughts, the explanation of itself as in formal systems of philosophy, science, art, and religion.

It may be surprising to some that each of the preceeding conceptualizations bears a varying degree of resemblance to the conceptualization of society that was posited long ago by Karl Marx (1970 [1859]: 20-21):

In the social production of their existence, men inevitably enter into definite relations, which are independent of their will, namely relations of production appropriate to a given stage in the development of their material forces of production. The totality of these relations of production constitutes the economic structure of society, the real foundation, on which arises a legal and political superstructure and to which correspond definite forms of social consciousness. The mode of production of material life conditions the general social, political, and intellectual life. It is not the consciousness of men that determines their existence, but their social existence that determines their consciousness.

As quoted thus far, Marx's conceptualization is incomplete, for it stops crucially short of its dialectic aspect; this aspect will be examined in a later section. Suffice to note here that Marx's influence on subsequent social thinkers has been marked, particularly with regard to their adoption of his notion that society is a functionally-defined hierarchical structure. Needless to say, to some social thinkers, he is considered a father figure; such thinkers have provided further interpretations (or clarifications) of Marx's conceptualizations of society. Harris, in elaborating upon part of Marx's "formulation" and in attempting to set-it to modern anthropological jargon, has concluded (1975:454):

The etic mode of production and the etic mode of reproduction of human populations, interacting through technology with each other and with the natural environment, probabilistically determine the etic organization of sexual, domestic, and political-economic institutions, the etic division of labor, and the etic patterns of exchange, law and order, and conflict and aggression, plus all the emic aspects of these institutions and patterns including domestic and political ideologies, law, religion, and art, through processes of negative and positive feedback.⁶

In keeping with Marx's idiom, Terray has observed (1972:97-98):

. . . the analysis of a mode of production is not to be confused with a general description of economy. The concept of mode of production is far more precise and exacting. It should be remembered that a mode of production is a three-part system: an economic base, a juridico-political superstructure, and an ideological superstructure. In the final analysis the economic base is the determining factor within this system and must therefore, be the point of departure for the construction of the theory of the mode of production. The economic base is, in its turn, a combination of a system of productive forces and a system of relations of production. . . . Marx meant the term 'productive forces' to embrace all the material conditions of production - raw materials, tools, machinery, etc. - and the term 'relations of production' to cover the relations established between the producers in the course of their work. . . . productive forces and relations of production do not relate to two separate categories of 'things', but are two aspects of one single 'reality'; the economic base of a mode of production can be defined as one in which two systems of relations serve to combine the various factors involved in the process of production, labor power, and the means of production - subject and means of labor. In the first place, these factors are involved in definite technical relations which constitute the structure of the process of production, seen as the process of man's material appropriation of nature; the concept of productive forces refers to this first articulation of the factors of production among themselves. In the second place, these

same factors are involved in definite social relations which constitute the structure of the process of production, seen as a process of the social appropriation of the product. Here we find relations of production which allocate the agents and means of production, and the division of the product which follows from that allocation.

Concerns and Assumptions in Conceptualizations of Society

The preceding conceptualizations either implicitly or explicitly regard society as a system. To better understand the concerns of human ecology with respect to society, and the assumptions which underlie these concerns, it is important to first consider the logic for viewing society as a system. To be sure, many of the assumptions that underlie the concerns of human ecology flow directly from its appraisal of society in systemic terms; these kinds of assumptions have their basis in epistemology rather than in verifiable fact.

Society as a System

A system may be abstractly described as a set of units with relationships among them, wherein the state of each unit it constrained by, conditioned by, or dependent upon the state of all other units to one degree or another. The notion of degree refers both to the intensity and to the directness and immediacy of the relationships between units. The relationships may be casual, functional, or normative. By these relationships, the units become organized and distinguishable as a set or system, (cf. Langton 1972:128). "The observer . . . distinguishes a concrete system from non-organized entities in its environment by the following criteria: (a) physical proximity of its units, (b) similarity of its units, (c) common fate of its units, and (d) distinct or recognizable patterning of its units" (quoted in Langton 1972: 129). According to Langton, these criteria resolve themselves into a definition by function or purpose, or stated another way, units of the set or system are examined in terms of the roles they perform in the system.

In terms of the above criteria, society is distinguishable as a system. In passing, it should be mentioned here that ". . . the term society signifies a group of people who are dependent upon each other for their survival and well-being; the term culture refers to a society's repertory of behavioral, cognitive, and emotional patterns" (M. Harris 1971:136-137). Inasmuch as a group of mutually-dependent people cannot survive without this repertory, the system by which they are conceptualized is termed "sociocultural". Sociocultural systems take as their units individual human organisms. These organisms engage in a variety of activities, which are said to take any of three phenomenal forms.

. . . sociocultural entities, events, and relationships consist of phenomena located within the bodies of human actors (thoughts and feelings) as well as of phenomena that result when people communicate and interact with their biophysical environments and with each other and that are physically located outside their bodies [M. Harris 1975:454].

For analytical purposes, these human organisms or units may be separated into functional sets, components, or subsystems of the larger sociocultural system, according to the kind of phenomena that each unit may contribute at a given instant. While employing different terms, the preceding conceptualizations make such a separation by viewing society as comprised of three roughly equivalent functioning sets, components, or subsystems. For example, one view asserts that society is comprised of technological, social, and philosophical subsystems; another view speaks in terms of ecological, social, and cultural adaptational subsystems; yet another speaks in terms of productive forces and relations

of production of the economic base, a juridico-political superstruture, and an ideological superstructure.

Implicit in the preceding conceptualizations is the fact that the functioning subsystems of the sociocultural system are to be appreciated as parts of the whole in that each serves the others and, thus, the whole. This implication is made clear in a discussion of "function" by Radcliffe-Brown (1952a:181):

. . . 'function' is the contribution which a partial activity makes to the total activity of which it is a part. The function of a particular social usage [e.g. in Terray's terms, "man's material appropriation of nature" or "social appropriation of the product"] is the contribution it makes to the total social life [e.g. "mode of production"] as the functioning of the total social system. Such a view implies that a social system (the total social structure of a society together with the totality of social usages in which that structure appears and on which it depends for continued existence) has . . . functional unity. We may define it as a condition in which all parts of the social system work together with a sufficient degree of harmony or internal consistency, i.e. without producing persistent conflicts which can neither be resolved nor regulated.

He adds (Ibid., p. 180):

The concept of function . . . involves the notion of a structure consisting of a set of relations amongst unit entities, the continuity of the structure being maintained by a life-process made up of the activities of the constituent units.

In speaking of a structure as a set of relations, Radcliffe-Brown is concerned with "social structure" which is comprised of "social rela-

tions". He contends (1952b:199):

A social relation exists between two or more individual organisms when there is some adjustment of their respective interests, by convergence of interest, or by limitation of conflicts that might arise from divergence of interests. I use the term 'interest' . . . to refer to all behavior that we regard as purposive. To speak of an interest implies a subject and an object and a relation between them. Whenever we say that s subject has a certain interest in an object we can state the same thing by saying that the object has a certain value for the subject. Interest and value are correlative terms, which refer to the two sides of an asymmetrical relation. . . . interests or values are the determinants of social relations. A social relation does not result from similarity of interests, but rests either on the mutual interest of persons in one another, or on one or more common interests, or on a combination of both of these. The simplest form of social solidarity is where two persons are both interested in bringing about a certain result and co-operate to that end. When two or more persons have a *common interest* in an object, that object can be said to have a *social value*.

The question remains: What is the nature of the objects and objectives that hold value, gain interest, and bond human organisms into a body social to thereby create the structure of the sociocultural system? This question is particularly problematic if it is raised, as it is here, to decrease the degree of abstraction in Radcliffe-Brown's ideas of the structure and function in sociocultural systems. Langton (1972: 131) provides the germ of an answer by noting, "All social systems contain 'things' and 'images of things'. The former are linked by and articulated around flows of matter and energy, the latter by flows of information." While not readily apparent here, it is asserted that the recurring flows of matter, energy, and information within the sociocultural system are, in combination, its structure; in other words, such flows are the "stuff" of social relations. It is further asserted that the flows of matter, energy, and information that occur and, more importantly, recur between human organisms are the functions of the human organisms. These points require elaboration; such an elaboration will be undertaken in a consideration of habitat conceptualizations in a later section. The mere indication of flows of matter, energy, and information is useful here because, in so far as they have magnitudes which can be measured, they provide the basis for an operational definition of a system. Such a definition is necessary to arrive at the concerns of human ecology.

Rappaport (1968:4) has operationally defined a system as ". . . any set of specified variables [i.e. single dimensions of entities] in which a change in the value of one of the variables will result in a change in the value of at least one other variable." Langton, by way of example, makes clearer its meaning (1972:129):

The system having been defined, attention is focused on changes in its variables, variables being 'any of the system's properties which can be measured, such as the number, size, spatial arrangement or rates of change of the units in the set.' Of course, a multitude of variables exists in any system, and in any analysis a small number are chosen for study. The size, spacing and length of life collieries - the 'production units' of a mining system - may . . . be chosen for study. These would then be explained in terms of the spatial attributes of the other subsystems of the mining system: how much coal is produced where and for how long obviously depends upon spatial and temporal variations in the demand for coal, in the accessibility of coal seams (which in turn is partially dependent upon technology), in the shape and capacity of the transport system serving the collieries, in the initiative of the entrepreneurs, and in the supply of labour. This set of 'roles' necessary to explain the variables of the production subsystem is termed the 'environment' of that subsystem, and the values assumed by the variables in which the states of the environmental subsystems are expressed are termed the 'parameters' of the system, differentiating them from the 'variable' of colliery size, spacing, and length of life which are the focus of interest. The parameters are usually. as in the example of the mining system, largely dependent upon factors operating outside the system itself. The object of the exercise is, then, to define a set of units and the functional relationships between them so that the values of certain attributes of one of that set of units, termed variables, can be 'explained' by the values which are independently assumed by attributes of the other units, termed parameters.

Systemic and Sociocultural Aspects of Interest

Society, as a system, can be investigated in terms of either of its states, continuity or change. Clearly, it is function and structure that continue or change. Indeed, function and structure are the inseparable systemic aspects of interest to human ecology. Langton provides a capstone comment, which includes a cautionary note of great significance to geographers in particular (1972:136):

The study of structure is concerned with the values of the variables and parameters and with the interrelationships that exist between the subsystems to allow the system to perform its functions, at any given moment in time. It is *not* concerned with structure in the Davisian or 'land-scape' sense of spatial form . . . but with the structure of the functional linkages of the system.

In assuming (epistemologically) the systemic nature of society, human ecology has taken as its central concern to understand how society works internal to itself (i.e. how it functions and, thereby, exhibits structural continuity). Yet while all societies exhibit structural continuity, they simultaneously (and thus paradoxically) do not work well enough to remain structurally unchanged. That is, they tend to transform themselves and, thereby, evolve. In the main, human ecology has emphasized the self-stabilizing aspect of society, at the cost of its self-tranforming aspect. Here, several points require closer examination, for while human ecology may be faulted for its emphasis, the emphasis is understandable and, to some extent, defendable.

On the one hand, the conceptualizations, upon which human ecology has largely proceeded, have dealt with society as a system in general, rather than as a system in specific cases. The sociocultural system in general has continued since time immemorial by virtue of the reciprocal adaptation of its productive forces and relations of production (together constituting the economic structure), its juridicopolitical superstructure, and its ideological superstructure, regardless of their particular constitution in specific cases. Such is the "postulate of functional unity", as M. Harris (1971:141) terms its. Inasmuch as society does continue, it is important to understand how it does so, despite evolutionary changes in the particular constitution of

its components or subsystems which may have occurred in its generalized history. On the other hand, human ecology has largely concerned itself, in specific cases, with sociocultural systems (commonly termed "primitive") which have been geographically remote and which are comprised of relatively small populations. Following from this, there has been a tendency to assume that because these sociocultural systems are similar in constitution to societies in the distant past, they have thus not evolved but rather have remained stable. The validity of this assumption must be demonstrated (i.e. it is not an epistemological assumption). Complicating this tendency is the fact that human ecology is essentially a fieldwork endeavor, wherein a society is investigated for what amounts to a moment in its particular history. The net effect of this practical problem is that structural transformation (which is usually regarded as a long-term process in sociocultural systems) is rarely, if ever, seen from start to finish and, hence, may not be recognized as actually occurring. If the sociocultural system appears to be working during the period of observation, then it is usually assumed to be structurally stable with functionally compatible components, where, in fact, the particular constitution of its components may be changing to ultimately alter the structure within which they function. This leads to a contentious issue which will be discussed in a later section.

Human ecology, then, has tended to treat adaptation (the key process that creates, maintains, and changes the structure of systems) as leading-up to a structure that is *maintained*.⁷ More specifically, most works in human ecology have preferentially looked for the functional mechanisms in sociocultural systems that regulate the flows of matter, energy, and information between components.⁸ Rappaport's classic work on a highland New Guinea society exemplifies this point

and identifies the basic kind of system that human ecology finds of interest. He states (1968:4):

. . . that Tsembaga ritual, particularly in the context of a ritual cycle, operates a regulating mechanism in a system, or set of interlocking systems, in which such variables as the area of available land, necessary lengths of fallow periods, size and composition of both human and pig populations, trophic requirements of pigs and people, energy expended in various activities, and the frequency of misfortunes are included.

He adds (Ibid.):

The term *self-regulation* may be applied to systems in which a change in the value of a variable itself initiates a process that either limits further change or returns the value to a former level. This process [is] sometimes referred to as 'negative feedback'.

Additionally, he has indicated, by example, the fundamental content of sociocultural systems with which human ecology is concerned, that is the "mode of production" (in Marx's terms) or "culture core" (in Steward's terms).

Nietschmann provides the rationale for this concern by noting

(1973:5):

Food-getting activities and their adaptation to and impact on environment form major links between human subsistence populations and diverse cultural, physical, and biological components in the ecosystem. By studying the ecology of subsistence within an ecological matrix, some of the functional relationships which couple and regulate man-environment interchanges may be identified and measured. In this way one may be able to achieve a more realistic analysis of the interactions between human populations and their environments, rather than simply concluding that subsistence peoples lead a precarious life in a never-ending struggle against Nature. Cultural systems and ecosystems can be thought of as organized patterns for the processing of information, energy, and materials. The transfer of energy and materials from the ecosystem to the human system is primarily through culturally guided patterns of resource evolution and exploitation. A subsistence system, then, is the assemblage of technologies and strategies with which humans modify and exploit energy relationships in order to tap and control biotic systems in the supply of energy and materials for human sustenance and maintenance. In order to maintain a long-term

flow-through of energy and materials, exploitation pressure has to be regulated and balanced to permit the ecosystem to maintain its stability and regenerative capacity. If the relationship between human populations and the ecosystem can be regulated through some cultural mechanism so that negative feedback results, then stability may be maintained.

The Embeddedness of Society in Its Habitat

Ecosystem is a term by which habitat (the place where a population of organisms lives) has been conceptualized. Fosberg has conceived of an ecosystem as (1963:2):

. . . a functioning interacting system composed of one or more living organisms and their effective environment, both physical and biological. . . The description of an ecosystem may include its spatial relations; inventories of its physical features, its habitats and ecological niches, its organisms, and its basic reserves of matter and energy; its patterns of circulation of matter and energy; the nature of its income (input) of matter and energy; and the behavior or trend of its entropy level.

Similarly, E. Odum has noted (1971:8):

Living organisms and their nonliving (abiotic) environment are inseparably interrelated and interact upon each other. Any unit that includes all of the organisms (i.e. the 'community') in a given area interacting with the physical environment so that a flow of energy leads to clearly defined trophic structure, biotic diversity, and material cycles (i.e. exchange of materials between living and nonliving parts) within the system is an ecological system or ecosystem.

From the viewpoint of human ecology, society is part of its habitat (as a population of biological organisms). Indeed, as Vayda and Rappaport have argued (1968:494):

Human populations are units commensurable with the other units with which they interact to form food webs, biotic communities, and ecosystems. Their capture of energy from and exchanges of material with these other units can be measured in quantitative terms. No such advantage of commensurability obtains if cultures are made the units, for cultures, unlike human populations, are not fed upon by predators, limited by food supplies, or debilitated by disease. Rappaport adds a point which is significant to the present work (1969:

184-185):

The local, or ecological, population is defined by precisely those criteria by which the animal ecologist distinguishes a population of any animal species. It is an aggregate of organisms having in common a set of distinctive means by which they maintain a common set of trophic relations within the ecosystem in which they exist together. In foodcollecting and simple food-producing societies. local or ecological populations are likely to correspond to local communities. These are often territorial groups, that is, groups which claim more or less exclusive rights to exploit the resources (enter into trophic exchanges with plants and animals) occurring within demarcated areas. . . . not all local communities are strictly territorial; that is, against other groups similar to themselves they do not all claim the exclusive right to enter into material exchanges with populations of other animals and plants existing within a demarcated area. In such instances it may be necessary to designate a more inclusive group as the local or ecological population and a wider area as an 'immediate environment', consisting of one or more ecosystems. In other instances . . . two populations with very different subsistence techniques (for instance, herders and agriculturalists) may occupy and exploit a single demarcated area in different ways. We may in such instances regard the two groups as separate and distinct populations participating in a single ecosystem. Ecological populations are not discriminated in terms of the taxonomic characteristics of their memberships, but in terms of the position, or niches, which they occupy in ecosystems; herders and horticulturalists occupying the same territory are, in reference to their ecological relations, as distinct from each other as two species of animals.

Just as society is part of its habitat, from the viewpoint of human ecology so too is a portion of the habitat a part of society (as an inextricable component in the mode of production). Hence, to speak of a sociocultural system is to speak automatically of part of the ecosystem. It is in recognition of this fact that one can return to the question which was raised earlier, in connection with the need to operationalize Radcliffe-Brown's abstract ideas on the basis of social relations and, thus, the structure of sociocultural systems. To anticipate an answer to that question, it was asserted earlier that recurring flows of matter, energy, and information in sociocultural systems are, in combination, the "stuff" of social relations, and that such flows between human organisms are their function. Obviously, as biological organisms, humans cannot create unto themselves the materials and energy they require; this truism immediately locks them into a source where those materials and energy are created - the ecosystem. Hence, the flows between humans of matter and energy (short of spermatozoa and mother's milk) are actually first contingent upon an environmental transaction, wherein acquired materials (some carrying consumable energy) may then be exchanged with humans not directly engaged in the environmental transaction. With this qualification, it can be said that the flows between humans of matter, energy and information are contributed by humans and are thus their functions. The following "scenario" is presented in order to demonstrate the ideas of Radcliffe-Brown (as well as the idea of mode of production) in more concrete terms.

Like all biological organisms, humans require energy (as well as organic and inorganic elements). Energy is delivered to humans through their consumption of food. The nutrients, contained in acquired food, that are responsible for providing energy are carbohydrates, fat, protein, and alcohol. The energy provided by these nutrients is liberated by chemical actions inherent in the digestion process, in conjunction with oxygen intake through the respiratory process. According to Durnin (n.d.:3), energy is required by humans to support the following physiological activities: (1) resting metabolic rate of the body, including tissue maintenance and the internal work of the body (e.g. heartbeat, respiratory movements, kidney function, chemical maintenance of cell and tissue fluids); (2) physical activity (i.e. muscular

work); (3) pregnancy and lactation; and (4) deposition of adipose tissue. He adds that ". . . the most important factors in determining the mean energy expenditure of an individual during an average day are his resting metabolic rate and the type and duration of physical activity" (Ibid., p. 7). Obviously, the acquisition of nutrient-bearing foods is a physical activity, which is to say that to acquire energy is expensive in energy terms. A human organism cannot, for long, expend more energy than is taken-in. This point, while obvious, is crucial, particularly when seen in combination with another of the activities that humans conduct like other animal species - reproduction.

Unlike other animals (non-primates, especially), the young of humans go through a long post-weaning period of dependence upon their adult parents, in terms of many things (including their acquisition of food). This is to say that adult humans (who are themselves offspring) create offspring and establish families of non-"producers", for whom they bear the responsibility of supplying food. Hence, human adults must acquire food in quantities greater than they themselves (as "producers") need to consume. The ability of human adults to acquire food is limited, however. This limited ability follows, in part, from availability of exploitable biotic forms (which may exhibit, upon human perception, seasonal variation in maturity, location, and abundance) within the familiar habitat, and from the energy-based (and, thus, limited) capacity of humans to do work (in this case, to acquire food). In result of this limited ability, humans seek-out other humans with whom to cooperate in the acquisition of food. Cooperation of humans (considered as groups), which is predicated upon communication or exchange (i.e. flow) of information that cooperation is liable to be advantageous to those concerned, increases the ability (but to yet another

limit) to acquire food. For example, members of the cooperating group, each with similar energy capacities, can spread their efforts over a greater area (e.g. in search of mobile animals) or can concentrate their efforts in a lesser area (e.g. camp-site plant collection, or in soil tillage and plant tending). Cooperation is rewarded by sharing of harvest (e.g. between successful and non-successful hunter of collector, or from group-created and -maintained fields). This sharing of things, in the form of valued food materials (containing energy), and subsequent consumption of both producers and non-producers is nothing short of a flow of matter and energy and is part of the structure of sociocultural systems. In addition to being a 'thing', food also bears an 'image' in the mind of the human. Its continued acquisition by proven means thus tends to be incorporated informationally into the thoughts and feelings (i.e. ideology) of the human. Members of the group thus sanction against threatening proven means, by ideological constraints, imparted by a mutual circulation among members of the group of appropriate information.

Contentious Issues in the Human Ecology of Sociocultural Systems

In each of the preceding conceptualizations of sociocultural systems, there is the implication of a precedent order, or generation, of various subsystems, proceeding upon initial human adjustment to environmental conditions (in the biophysical sense). No one would belittle the centrality of environmental transactions in human affairs, yet great debates have raged precisely over the issue of their centrality in the determination of human affairs. In passing, it may be noted that Barrows' proposal for "Geography as Human Ecology" was loudly ignored at the time of its appearance because of its explicit concern for human

material adjustment to environment and consequent development of increasingly less tangible human aspects. His proposal was accused of being just another brand of "environmental determinism" or environmentalism".¹⁰ Yet, as Rostlund (1962 [1956]:49) noted, ". . . environmentalism was not disproved, only disapproved." The view taken here is that Barrows' proposal was rejected not so much because of its "adjustment" emphasis but because of the essentially static or terminal manner in which he spoke of the process of adjustment in society (cf. Clarke 1971:200). The issues of "determinism" and "static" models of sociocultural systems continue to have relevance to human ecology (in terms of both its own internal refinement and the respect it seeks to command) because neither has been settled to the satisfaction of everyone. This section looks at these issues more closely, as they bear implications to the present work, and indicates some ideas that may solve their problematic nature.

To begin, it may be recalled that before humans evolved reflective and projective thought, they ate: the idea being that if humans first had not satisfied basic physiological requirements, they never would have evolved to the point where they could think about that satisfaction. Such is the basis of the model with which human ecology has been known to conduct its research: material requirements and their subsequent satisfaction create social conditions from which other human activities are believed to emergy and adapt. The problem with these beliefs is that, without further refinements, they imply both unilinear causality and stagnation. Hence, the model, as expounded by early human ecologists, could not provide an explanation of evolution in specific cases, nor could it escape accusations of "environmental determinism", as it was a simple deterministic model.

It is a pity that Karl Marx, if he in fact influenced later conceptualizations of society and, indeed, the materialist orientation of human ecology, was not more deeply examined for his ideas, for while he did propose that society was a functionally-defined hierarchical structure, he also maintained that, in society, (1970 [1859]:20-21):

At a certain stage of development, the material productive forces come into conflict with existing relations or production. . . From forms of development of the productive forces these relations turn into their fetters. Thus begins an era of social revolution. The changes in the economic foundation lead sooner or later to the transformation of the whole economic superstructure.

Such is the process of the dialectic in material terms. Note should be made of the fact that, in speaking of social revolution, Marx was clearly concerned with revolution as structural transformation of society, rather than with revolution as bloody confrontation of humans. It was the former that he sought, through intellectual enlightenment, rather than the latter, through participation. In fact, by most credible accounts, Marx, while active as a political agitator, never committed a violent act.

With this crucial assertion of contradiction and its subsequent resolution, which is the basis of the dialectic, it cannot be said that Marx's model was mechanically deterministic or static. Rather, it was a dynamic model, based on determination of a wholly different sort. Friedman provides an outstanding interpretation of the kind of determination at work in Marx's model of society, or what he calls the "Model of Social Reproduction". It will serve to quote him at length. Friedman contends (1975:

Structures of social reproduction are not of the same order as institutional structures. A kinship structure can easily be described without reference to time. It is only when we consider its reproduction that we are forced to account for

another kind of relation, that which links kinship to production and distribution, which determines its function with respect to other institutions as well as to techno-environmental conditions. In order to deal with this latter set of intersystemic relations, we must necessarily take the entire social formation into account, for it is only from its internal properties that we can generate the system of transformations which is manifested in the actual historical and geographical distribution of observable societies. [p. 162].

He recalls that:

The social formation includes several distinguishable functional levels:

- Forces of production including here, for the sake of simplicity, the exploited ecological niches; in other words, the totality of the technical conditions of reproduction.
- (2) Social relations of production the set of social (i.e. non-technical) relations which determine the internal rationality of the economy, the specific use to be made of the means of production and the distribution of total social labour-time and product.
- (3) Superstructure ideological and political structures whose contents may be derived from, and whose functions must be defined in terms of, the existent relations of production and conditions of reproduction. [p. 162].

He stresses:

. . . the above categories are functional and not cultural. It is absolutely necessary not to confuse the levels of functioning of a social formation with the cultural institutions that take on those functions. . . This is not to deny, of couse, that the internal structure of the 'institution' determines its behavior. It is only to distinguish it from the structure of material reproduction of which it is a part, its specific causality depending on the place which it occupies in that structure. [pp. 162-163].

He proceeds to the question of determination in his discussion of the

Model of Social Reproduction:

The levels of the social formation are integrated in a single structure of reproduction. . . Each of the . . . levels can be characterized by . . . relative autonomy. This is not a question . . . of partial functional independence, but rather one of the autonomy of internal structural properties. . . we do not suppose that different levels of a social formation emerge from one another. On the contrary, the variation and development of the subsystems depend directly on their internal structures and their intrasystemic contradictions. But the realization of these internal tendencies depends in turn on the intersystemic relations that link the subsystems. These relations are of two types: from the ecosystem up is a hierarchy of constraints which determines the limits of functional compatibility between levels, hence their internal variation. This is essentially a negative determination, since it determines what can not occur but not what must occur. We stress however, that it is the internal properties of the various subsystems which determine the constraints of the larger whole. in that they define the set of possible relations which can unite those systems in the process of reproduction. Their functional compatibility depends ultimately on the structures which must be combined in the social formation. If the technical conditions of production are determinant 'in the last instance' it is because the structure of the productive forces sets the outer limits on the variation and development of all other levels. Working in the opposite direction, the relations of production dominate the entire functioning of the larger system, defining the specificity of the mode of production and its developmental tendencies. Intersystemic contradictions appear when the dominant relations of production cause several subsystems to reach their limits of functional compatibility. [pp. 163-164, italics added].

Given the exploded model of Friedman, not only does an uncommon kind of determination or causality appear, but so too does the idea that the process of adaptation is a *continual* process. It creates the structure and function of sociocultural systems, then it turns conservative to maintain that structure and function, but then (contrary to the predominating message of human ecology), in spite of its conservative aspect, it begins to create (often imperceptibly in the short term) yet a new structure. This leads to a question of why and how adaptation never ceases, or rather, why all sociocultural adaptations are interim In other words, why do contradictions, which must be adaptations. resolved in order for virtual continuity of a society, arise in sociocultural systems? To get at an answer to this question, it is important to discuss the level of aggregation that is employed in human ecology and relate that level to the process of enculturation to which all members of society are subjected.

E. Odum (1971:4-5) has noted that biotic components can be aggregated into genes, cells, organs, organisms, populations, and

communities. Ecological research is said to be concerned with populations of organisms (e.g. sociocultural systems) and communities of populations (e.g. ecosystems). This raises significant doubts that ecological research can inform of the process of evolution, as evolution takes place at the sub-population or, more commonly, individual organism level. With respect to infra-human species, genetic mutation and certain behavioral alterations of an organism can be "naturally selected" as appropriate, over other genetic and behavioral constitutions, to the immediate circumstance of that organism. But what about humans? Humans are reputedly capable of reflective and projective thought about their material conditions of existence. Importantly, such thought, in terms of its structure and content, is learned by a current human generation from a preceding generation. As noted by M. Harris, however (1971:139):

. . . no special wisdom is required to realize that enculturation cannot account for a considerable portion of the behavioral repertory of existing social groups. It is clear that replication of cultural patterns from one generation to the next is never complete. Old patterns are not always faithfully repeated in successive generations and new patterns are continually being added. . . Enculturation, therefore, accounts only for the continuity of culture; it cannot account for the evolution of culture.

The question boils-down to what level of aggregation does enculturation present itself incompletely? It must be at the level of the individual organism (or sub-societal group of organisms) who, in the course of dealing with life chances, may innovate an alternative solution, ideological constraints to the contrary. The significance of this point is that an innovated solution may challenge the structure of the sociocultural system by initiating a contradiction or conflict, particularly if that innovation is copied by other members of the sociocultural system. Seen in this light, the individual human (whose importance is

often downplayed in social science) assumes a proportion he or she deserves. As well, the once-mystical notion of "cultural evolution" is demystified and set to a Darwinian tune (cf. Alland and McKay, 1973). It may be added that, for wnat of an exposition of Marx on the question of enculturation incompleteness and the level at which it presents itself, his ideas on the creation of contradiction appeared somewhat mystyical in themselves. This point is made clearer when seen in the context of the analysis of systems called feedback systems (e.g. sociocultural systems and ecosystems).

Langton has noted (1972:143-144):

. . . in a feedback system the changes in the component subsystems which occur after a stimulus reacts to affect the stimulus and thereby to control the magnitude of total system change. If such relationships exist, then a goal must exist. The recurrence of feedback demonstrates the existence of goal-seeking behavior, and the predication of purpose and goals no longer involves mysticism. Given a constantly fluctuating environment, and then continual change in the constraints of acting on the system and continaul stimulus, feedback operates between the subsystems to cause mutually adaptive change within them. . . . If feedback occurs to maintain a set of relationships which already exists in the system, either by reducing further inputs if these rise . . . or by increasing inputs if they tend to fall, then those relationships must represent the goal of the system, with feedback operating to keep them steady. This type of feedback, which operates negatively in all change-inducing stimuli, is termed negative feedback, and systems which behave in this way are said to be homeostatic or morphostatic. It is important to stress that it is the existence of negative feedback relationships, not stability itself, which is the diagnostic property of homeostasis or a 'steady state'. Stable systems are not necessarily held in that condition by negative feedback and are then not necessarily in a steady state. . . Just as system stability is not necessarily caused by negative feedback, homeostatic systems need not necessarily be stable. . . . If the cumulative effect of a feedback process is to amplify the deviations of a system in a particular direction away from the pre-existing goal, then its effect is to change that goal: this is axiomatic, seeing that goal-directedness is determined by feedback. Such feedback is termed 'goal changing' or positive' feedback, and systems in which it occurs are termed morphogenetic.

The notion of feedback, notably positive feedback, is apparently the source of confusion among human ecologists, particularly those who find Marx's ideas attractive up to a certain point. The confusion seems to revolve around an equation of positive feedback with the dialectic. The former is a process, the latter is also a process, but unlike the former, one which contains the explanation of its own This explanation is to be found in the idea of contrainitiation. diction, as it refers to lack of compatibility of subsystems of the larger sociocultural system. Following upon this confusion is the contention that positive feedback, itself, is a sufficient explanation of system change. The self-proclaimed Marxist anthropologist, M. Harris (as well as his adherents, [cf. Berger 1976]) symptomizes this confusion and subsequent contention. In his restatement of Marx's conceptualization of society, he maintains that various subsystems "probabilistically determine" the constitution of other subsystems "through processes of negative and positive feedback." He adds (1975:454):

For brevity's sake, this principle can be referred to as the principle of demo-techno-econo-environmental determinism. According to certain critics, this principle is not sufficient grounds on which to justify my claim that I am a Marxist. To be accepted as a Marxist one must also embrace the Hegelian ingredients in Marx's thought, especially the principle that sociocultural evolution is characterized by 'dialectical' processes of thought and action involving opposites of 'contradictions'. I remain firm in my contention, however, that the Hegelian dialectical ingredient in Marxism is incompatible with a scientific epistemology, since it contains no operational instructions by which the opposite or the contradictory sociocultural events, entities, or relations can be identified in any particular situation . . . everything that is worthwhile in Marx's insistence upon the prevalence of change and evolution and upon the complex interactive dynamism of base and superstructure . . . is totally subsumed by neo-Darwinian and modern cybernetic concepts of systems. But unlike the strategies that govern some of the research now being performed in the name of cultural or human ecology, cultural materialism does not treat systems as synchronic isolates analyzable
even heuristically in purely synchronic terms, nor does it accord research priority to negative over positive feedback (deviation amplification) processes. Rather, it is concerned as much with the origin of systems and the processes of their transformation and destruction as with their homeostatic regulation.

The debate which has grown out of Harris' views need not be recounted here. His views do, however, beg the question which has too often gone unstated with respect to the *causes* of positive and negative feedback. As mentioned earlier, the Marxist position is that sociocultural systems change through contradiction or functional incompatability of their various subsystems. Such contradiction may be seen as developing through enculturation breakdown, acting at the subsocietal level, and then upon the mode of production itself. Here, an example is in order.

Consider that members of a society are programmed to seek a certain family size (i.e. to produce so many children). Adherence to a certain family size in the past has shown that the means of production and available effective labor of the society can provide adequate return flows of ingestible materials (and their energy) to the members of society (divided into appropriate family sizes). Then consider that a certain mating of people decides to exceed, or accidentally exceeds, family size norms and in so doing demonstrates that a larger family is capable of bringing in greater amounts of ingestible material through the same means of production. In other words, available effective labor has increased and so too has return from labor in terms of increasing material and energy flows. Should this demonstration be taken as proof that larger family sizes are an advantage, by effectively decreasing per capita labor time (as well as the inconveniences of fertility regulation), the society will increase its numbers. Yet by the established

means of production, it is likely that too much energy and matter will be extracted from its source, causing degradation of the flows of energy and matter in the ecosystem made available by the established means of production. Such would be a contradiction, and the source of explanation, for subsequent resolution, viewed as structural transformation of the system. Given too many people (living beyond their established means of production), it is not likely that members of a society would sanction the eradication of their kin. Hence, the means of production would have to be altered in such a way as to provide adequate incoming flows of matter and energy without further degradation of the ecosystem, or alternatively the society would have to disintegrate through outmigration of some of its members, so that former flows could be reestablished to match the old means of production to the ecosystem to which it originally adapted. Placed in systems jargon, the portrayed process of the dialectic would be rendered: the variable of flows incoming to society exceeded the environmental parameters of flows outgoing, wherein positive feedback (i.e. reduced parametric values, through environmental degradation, disallowed continued increased variable values) initiated a change in the structure of flows so that flows would continue to society. While this is indeed an explanation, it does not treat the root cause of the positive feedback process, that is, its initiating contradiction. An explanation of the cause of negative feedback may proceed from the developed example. Consider that the recently dispersed society (here the alternative resolution of contradiction is employed) continues with its original means of production, the only difference in the situation being that former members of society now operate at the edges of the society's operational environment or territory. The dangers of increasing family size are now ideologically entrenched and due weight is given to

them in the enculturation process. Conjugal "mistakes" are, by some means, penalized by members of society as a further reminder that family sizes should remain "normal". In systems jargon, this process, termed negative feedback, would be rendered: the variables of flows incoming to society remained within the environmental parameters of flows outgoing, under the given means of production, owing to ideological constraints and social sanctions against increasing flow demands. But, here, explanative discussions of negative feedback, while looking for regulating mechanisms, rarely proceed to consider them in terms of their longevity as counter-contradiction mechanisms. This point is crucial, in light of the enculturation breakdown problem. People forget the proven costs of change and become less hesitant to initiate processes which lead to it.

Throughout the above example, it was assumed that changes in the environment (and its parameters) were directly caused by the inhabiting society. Obviously, this assumption is often unwarranted in real places. Changes in the environment can be initiated not by the occupying society, but by alien societies through their activities, thus initiating changes in the occupying society. This point is of importance within the context of this thesis and will be discussed shortly. Suffice to note here that the preceding conceptualizations have not treated this problem (Marx included) primarily because of the fact that society was conceptualized as a phenomenon, rather than a collection of often interacting phenomena.

Before moving to a modification of the conceptual framework that has been indicated as employed by human ecology, it is appropriate to briefly consider approaches that have taken as their focus contact between societies.

Acculturation and Diffusion Studies - Prior Analytical Approaches to Societies-in-Contact

It is commonly asserted that contact between societies invariably results in change of some kind and to some degree for at least one of the societies involved. The concepts of "acculturation" and "diffusion" have been employed in the context of the study of such change. If there is a difference between these two concepts, it is likely to be one involving temporal position in the same process. Herskovits (1964:170) notes, ". . . diffusion is the study of achieved cultural transmission; while acculturation is the study of cultural transmission in process." Regardless of the validity of this difference, studies of acculturation and diffusion have focused on different kinds of things. This may be explained, in part, by the fact that studies of acculturation have been undertaken almost exclusively by anthropologists (beginning in the 1920's), while studies of diffusion have been undertaken almost exclusively by geographers. This contention, as well as its implications, will be examined following a closer look at the nature of acculturation, of which diffusion is often taken as its indication.

According to the Social Science Research Council Summer Seminar on Acculturation, acculturation may be regarded as (quoted in Lurie (1968:293):

. . . culture change that is initiated by the conjunction of two or more autonomous cultural systems. Acculturative change may be the consequence of direct cultural transmission; it may be derived from noncultural causes, such as ecological or demographic modifications induced by an impinging culture; it may be delayed, as with internal adjustments following upon acceptance of alien traits or patterns; or it may be a reactive adaptation of traditional modes of life. Its dynamics can be seen as the selective adaptation of value systems, the processes of integration and differentiation, the generation of developmental sequences, and the operation of role determinants and personality factors.

Regarded as such, the suggestion followed that acculturation may be

investigated through (Ibid., p. 294):

(1) characterization of the properties of the two or more autonomous *cultural systems* which come into contact; (2) the study of the nature of the *contact situation*; (3) the analysis of *conjunctive relations* established between the cultural systems in contact; and (4) the study of the *cultural processes* which flow from the conjunction of the systems.

In adhering to the psychobiological functionalism of the anthropologist Malinowski (cf. M. Harris 1968:547ff; Kaplan and Manners 1972 passim; and Hatch 1973:272-335), acculturation studies began and took on a distinctive character. Cultural transmission was seen to involve cultural traits, viewed as patterns of behavior, cognition, and emotion, as well as items of "material culture", but the focus of acculturation studies was on cultural traits and how their adoption initiated personality changes in members of the adopting society. Murphy (1971:27-28) has noted, in reference to the motive behind acculturation studies, that ". . . the aim from the beginning was to reveal the mechanisms and processes by which interchange of culture took place between societies in contact and to ascertain whether the order of change followed certain regularities."

In adhering to the historical particularism of the preeminent anthropologist Boas (who incidentally minored in geography), anthropologists (who, like Boas, rejected evolutionary theory as posited in the early 1900's) took up the study of diffusion to explain culture change and evolution as well as similarities of adjacent societies. Their focus, while dealing with the transmission of culture traits also focused on material culture, and this focus led to the distinctive concern of these anthropologists with "culture areas", as evidenced by observable similar phenomena distributed and distributing over space (e.g. see Kroeber 1939). Interestingly enough, Kroeber was one of Boas'

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students, and he is said to have had great influence on the formidable geographer Carl Sauer (see Parsons 1976:84). Sauer was largely responsible for the conceptualization and methodology of the "cultural landscape", and it was he who saw as relevant to this concern the idea of origins and dispersals of areally-expressed phenomena (e.g. see Sauer 1952). As English and Mayfield have perceptively noted, however (1972: 324):

In the tradition sponsored at Berkeley by Sauer, the approach involved treating diffusion as an auxiliary theme within the over-all concern for cultural landscape. There have been two principal interests of the Berkeley school: (1) the origins of phenomena, and (2) the identification of patterns. In neither case were concerns centered on the processes involved. This led, in turn, to more emphasis on ethnographic records than on field work. The non-contextual nature of these materials made it difficult to examine process. The legitimate concern of the tradition in matters of identification, specification, and typology of culture trait and culture complex did not often lead its students to the rigor available in the contemporary methodology of science. Perhaps it is for this reason that the tradition remained centered largely on the original mode [i.e. the Bay Area and the Great Valley of California], with a dramatic distance-decay function [i.e. without great influence in geographic learning centers to the east].

Overshadowing the Sauer approach to diffusion has been a concern by geographers with what has been termed "spatial diffusion" (see Gould 1969). Strongly linked to studies of spatial diffusion have been quantitative techniques and the pursuit of regularities in the diffusion process, which, in combination, have led to probability statements by these studies for future outcomes in diffusion under similar conditions (i.e. the generation of future spatial "structures"). It may be noted that such studies require a statistical base, which is largely restricted to areas of the world where statistical data are compiled. Hence, spatial diffusion studies have tended to be conducted within the "Western" world or in Center nations; most, in fact, deal with diffusion within

societies rather than between societies. With respect to both types of studies of diffusion by geographers, it should be emphasized, as well, that an ulterior motive in geography, seems to be the creation of maps. This fact bears upon the brief criticism of acculturation and diffusion approaches which will now be undertaken (to provide a rationale for the preference here for the human ecology of societiein-contact).

With regard to acculturation, it is asserted that its study has been hyperfocused and reductionistic. It has been concerned largely with, and has worked often with the anthropological school of, "culture and personality." With respect to the present human ecological work, which is concerned with the mode of production, the acculturation approach is of limited value and, to some extent is mystified (i.e. nonoperationalized) by the "superorganic" notion of culture. Hence, it is not employed.

With regard to diffusion, it is asserted that its study (which has fallen largely to geographers) has, in both of its manifestations, been prone to certain shortcomings. In the Sauer tradition, the concern has been pattern and process; but conclusions about process have been particularly problematic, owing to its synchronic analysis. The distinction between synchronic and diachronic analysis will be raised momentarily. Hence, patterns have been the hallmark of such studies of diffusion and (inasmuch as geographers have long thought maps to be their ultimate contribution) maps of those patterns, their tools and products. Additionally, such diffusion studies have largely been ideographic or particularizing, with no attempt to seek-out regularities in the development of patterns. In part, aversion to nomothetic or generalizing attempts are related to the synchronic mode of analysis

of such studies. In the "spatial" manifestation, the concern has again been with patterns and process, but notably with their predictable regularities. However, the focus has been mystically tied to the abstraction of space (understood as earth-space) and the structures that processually take-on geographical location and thence pattern. Notwithstanding a largely urban-industrial and largely intra-societal content, the concern of the "spatial" manifestation with patterned or structured area, rather than with structured human collectivities occupying area, makes the geographical treatment of diffusion of limited value to the present work. It should be noted, however, that acculturation and diffusion are, as processes, central to the present work.

To approach the distinction between synchronic and diachronic analysis, it is necessary to include a rather painful criticism of human geography in general (and the noted diffusion manifestations in particular) which provides a context in which the distinction should be seen. Langton asserts (1972:131-132):

. . . much of what is usually construed as human geography is not concerned with functioning systems but with the artifacts of systems. That is, with the purely formal study of the distribution patterns of houses, shops, roads, factories, towns, and so on. Although 'living systems create and live among their artifacts', and although 'scientists sometimes neglect to distinguish living systems and their artifacts', the latter are not, of themselves, systems. Thus, as long as geography is primarily concerned with the study of 'landscapes', which are assemblies of artifacts . . . then it is difficult to see how a systems approach can realistically be adopted. It is only when geographers become concerned with explicit study of the functioning of the artifacts that a systems approach is relevant. Whatever the resolution, or even the philosophical relevance, of the debate on the relative merits of formal as distinct from functional studies, it is readily apparent that the systems concept is irrelevant to a large and flourishing component of the subject.

In this irrelevance is the foresaking of an extremely potent mode of analysis, which is dependent upon a systems approach and the assumption

of a structure and functioning of the object of analysis. By name, it is diachronic analysis. In contrast to synchronic analysis, Langton summarizes its features (1972:136-137):

Diachronic analysis . . . is concerned with the mechanisms rather than the structural end products of changing subsystem relationships. It 'attempts to trace the origins of particular elements of the system and their interrelations and then follows the evolution of the way they function, cutting across a successive series of synchronic pictures of the system. . . . This diachronic analysis attempts to find out in what conditions the system changes and when it remains static.' Diachronic studies are necessary if explanation is to be achieved in social sciences; explanation of variables cannot be effected by reference to the simultaneous values of parameters unless a system is in equilibrium. Theories based on comparative statics - that is, on the study of change through the comparison of system structures, which is only feasible if equilibrium is assumed - are thus of limited value. It is only through diachronic analysis that change can be fully studied, and it is only through studies of change that satisfactory explanation can be achieved in systems which are out of equilibrium.

The Human Ecology of Contact between Vastly Different Societies

The conceptual framework, toward which this chapter has worked, calls for an opening-up of the preceeding conceptualizations of sociocultural systems. In effect, such systems have been conceptualized as closed. Contact situations deny the reality of this aspect in the noted conceptualizations.

In opening-up the sociocultural system (i.e. adding parameters which can influence its structure and function), it becomes clear that several levels of functioning (i.e. functioning subsystems) are liable to alteration. These include productive forces and relations of production of the economic base, a juridico-political superstructure, and an ideological superstructure. Conceivably, a contacting sociocultural system is structurally similar, in terms of its levels of functioning,

to the contacted sociocultural system, but is very likely different from the latter in the content or internal properties of each of its functioning levels. Here, the analogy of an electrical plug (the contacted society) and the recepticle (the contacting society) may be appropriate to indicate the situation created by contact. The prongs of the plug (representing each of the functioning subsystems) are inserted in or subsumed by the holes in the recepticle (representing each of the functioning subsystems). The question remains: Is the flow of electricity from the recepticle to the plug going to "burn-out" the "receiving" system? This analogy can be returned to the terms of reference employed in human ecology by way of a criticism of Marx's model.

In his conceptualization, Marx asserted that material conditions dominated the constitution of the social formation (i.e. that the dialectic followed a path from contradiction by changed material forces of unchanged social relations of production, subsequent resolution of the contradiction through a change in social relations appropriate to material forces of production, to subsequent adjustments in juridicopolitical relations and social consciousness. The appropriateness of the model rests on the assumption that there are no influences operating on the ideological level of society other than those from the base, "up". In contact situations, this assumption is not borneout, in light of the effects of religious missions on stateless societies, for example. In other words, externally-induced changes in the ideological component or subsystem of the sociocultural system may bring about a contradictory situation in which resolution is metaphorically downward rather than upward. This is not to deny, however, that material conditions will ultimately be involved to possibly express

themselves in a contradictory manner that will seek on the "rebound" an "upward solution." For example, religious missions may change a contacted society's ideas of polygynous family organization, which may change significantly the "social appropriation of the product" so that some people will be in want of that product, which may in turn call for alteration in patterns of "man's appropriation of nature". Such alterations may, however, be inappropriate to given environmental constraints, leading to the initiation of yet another contradiction.

Also asserted in the conceptually closed model of Marx is that there are no influences operating on the habitat itself, other than those of the mode of production. In contact situations, this assumption is not borne-out, in light of the effects of national efforts to exploit resources in the same areas occupied by the stateless society. Rather than attempting to provide a specific example, of which there are many, suffice it to note that the final part of this thesis will be concerned with just such a task. It should be emphasized, in reference to this criticism of Marx, that his basic ideas are coherent and that, preferentially, he spoke of society as a general phenomenon to understand its general "laws of motion". The criticism leveled here is not aimed at the question of the coherence of his ideas, but rather is aimed at analytically opening up his basic model to account for the influences of specific societies, one upon the other.

The remainder of this thesis seeks to analyze the mode of production that is embodied in a food acquisition system called shifting cultivation. The mode of analysis is diachronic and the result of this analysis is a set of essentially heuristic models in which variables are manipulated to demonstrate under what condition it works and breaks

down. The conditions that lead to breakdown are symptomatic of their causes, which are seen to be a function of changes in parameters within which the shifting cultivation system operates, or of additions of parameters to which the shifting cultivation system has not been subjected, or of both. In the contemporary world, it is reasonable to suspect that these changes are largely external in origin.

NOTES

¹Brief accounts of this tradition, with respect to others in geography, are given by Pattison (1964), Clarkson (1970), and May (1970).

²For example, Wagner (1961:4-5) has pursued ". . . an interpretation of man's use of the earth as the orderly function of technical systems which interact with nature under definite limiting conditions." This pursuit may be seen as an outgrowth of yet another, the "cultural landscape", conceived by Sauer (1963[1925]:343) as ". . . fashioned from a natural landscape by a culture group. Culture is the agent, the natural area is the medium, the cultural landscape the result." Yet another example is provided by Gould (1969[1963]:236-237) who notes, "Man continually finds himself in situations where a number of different choices or strategies may be available to wrest a living from his environment. . . . Perception that alternatives exist, and the recognition that their specific value, or utility, for a given time and place may depend upon an unpredictable environment, about which man has only highly probabilistic notions based upon past experience, is clearly central to any discussion of man-environment relationships. . . . " As if to suggest the direction of his own inimitable work, Tuan (1972[1968]: 79) noted, "The theme we have yet to trace is the involved interplay between environmental attitude and environmental behavior, between the philosophy identified with a people and the actions that people may undertake."

³Culture history, culture area, cultural landscape, human impact on environment, environmental perception (to include resources and natural hazards), and cultural or human ecology indicate topics in which research has been conducted. Several collections of papers (originals and reprints) exemplify research conducted on these topics (see Thomas 1956; Wagner and Mikesell 1962; Vayda 1969; English and Mayfield 1972; Manners and Mikesell 1974).

⁴A useful review of the dialogue between geography and anthropology may be found in Mikesell (1967). That this dialogue has proceeded may be taken as an indication of the influence of the formidable geographer Carl Sauer, who long admonished (1963[1941]:356-357), "... the human geographer should be well based on the sister discipline of anthropology... Methodologically, anthropology is the most advanced of the social sciences, and one of its best developed methods is that of geographic distribution."

⁵For surveys, inventories, and critiques that account for its development, see Bates (1953), Helm (1962), Geertz (1963:1-11), Harris (1968:634-687), Vayda and Rappaport (1968), Netting (1971), Alland and McKay (1973), Anderson (1973). Central to its development are programmatic statements by Barrows (1923), Steward (1955, 1968), Frake (1962), Sahlins (1964), and Rappaport (1969). Young (1974) has made an ambitious attempt to trace human ecology through all the social sciences, with a view toward establishing it as *the* social science.

⁶Harris' uses of the terms, "etic" and "emic", ". . . denote an essential epistemological distinction which is not subsumed by more conventional concepts such as 'subjective/objective', 'ideal/actual', 'verbal/nonverbal', and 'mental/behavioral'. Knowledge of emic phenomena rests ultimately on some form of eliciting operations; knowledge of etic phenomena rests on the observation of actionic performances (including communication behavior)" [1975:454].

⁷Such a treatment of adaptation is discussed in Harding (1960), Cohen (1968), and Alland and McKay (1973).

⁸Within the last few years, many human ecologists have focused their attention on measurement of the caloric values of foods and work. The logic for this focus has been put forward by Shugart et al. (n.d.:1), "While no single factor can adequately explain the complexity of ecological and human systems, energy perhaps comes the closest. It is required by and underlies all life processes whether they be biological or social in nature. At the very least, it serves as a common denominator in quantifying dynamic relationships of these systems. As such it can be used in describing systems, elucidating functional relationships, and providing a basis for their comparison. Rather than being an analytical end in itself, energy serves as a convenient starting point in the study of human ecology." Examples of such a focus are Lee (1969), Gross and Underwood (1971), Kemp (1971), and Rappaport (1971). The *Journal of Human Ecology* may be consulted for more recent examples.

⁹On this note, Meggers (1954:802) has contended, "The primary point of interaction between a culture [i.e. society] and its environment is in terms of subsistence, and the most vital aspect of environment from the point of view of culture is its suitability for food production."

¹⁰ The hypersensitivity of geographers to causality of environment is legion. Lewthwaite (1966) gives some indication for why this is the case.

CHAPTER III

SELF-REGULATING TENDENCIES IN THE INHERENTLY UNSTABLE SHIFTING CULTIVATION SYSTEM OF STATELESS SOCIETIES

An Initial Comment

Shifting cultivation systems (or alternatively, slash-andburn cultivation, forest fallow, conuco, milpa, or swidden systems)¹ remain important throughout much of the continuously- and seasonallyhumid tropics as one of the means employed by human populations to selectively intercept energy and materials that flow and cycle through plants in their habitat. It is thought that shifting cultivation systems had yet a wider distribution in antiquity.²

As of twenty years ago, the FAO estimated that 200 million people, effectively occupying 36 million square kilometers, relied to some extent on some system of shifting cultivation to meet their subsistence needs (FAO Staff 1957:9). While the number of people in stateless societies no doubt comprises a small portion of this estimate (with the bulk being comprised by peasants), it is difficult to establish with certainty what this number might be.

Owing to its vast distribution, to its local and general distinctiveness as a source of livelihood, and to its implications for other aspects of either the human population or habitat which interact by means of it, shifting cultivation is a subject which has commanded both the explicit and incidental attention of innumberable researchers

across the academic spectrum, as well as governmental bureaucrats and, formerly, the colonial officers of the metropoles. Accordingly, the literature on shifting cultivation, upon which much of the remainder of this thesis depends, is extremely diverse.³ From a casual scan of this literature, one surmises three categories of content: (1) regional surveys⁴; (2) ethnographies⁵; and (3) topical inquiries of either an empirical or theoretical character⁶. One may also detect two opposed attitudes which underlie the substance of this literature⁷, which are either favorable or unfavorable to shifting cultivation with respect to its ecological appropriateness. In addition to these often-overlapping categories of content, there are general discussions of human occupation of the humid tropics (which include considerations of shifting cultivation)⁸, as well as discussions of the general nature of shifting cultivation systems.⁹

In consideration of this literature, two fundamental points may be made. First, given their vast distribution, and thus their appearance in a variety of socio-environmental settings, shifting cultivation systems are not everywhere the same with respect to the phases through which they pass¹⁰ or in the degree to which they complement or are complemented by other efforts to obtain food¹¹. Second, while each manifestation of shifting cultivation is unique, each also shares in common with the others certain general attributes. D. Harris (1972) cites five general attributes:

- Shifting cultivation is a "small-scale form of agriculture" in which gardens or swiddens rarely exceed one hectare (2.47 acres). [p. 246]
- (2) Shifting cultivation is a "land-extensive" and "labourintensive" system. He elaborates, "Because plots are only cultivated for short periods of time - perhaps one to three years on the average - before being abandoned for longer periods, there is normally a considerable

excess of fallow over cultivated land within the effective agricultural area of a given population. At the same time the processes of clearance, cultivation, and harvesting involve intensive human effort in the use of hand tools such as axes, knives, hoes and digging sticks, and - less typically - animal-drawn ploughs" [pp. 246-247].12

- (3) Shifting cultivation is ". . . an unproductive system per unit area of land cultivated, but in terms of yields per unit of labour expended its productivity can equal or even exceed that of some types of permanent, fixedfield agriculture" [p. 247].13
- (4) Shifting cultivation is "characteristically associated with low densities of population." He adds a most crucial observation, by noting, "Because fallow must substantially exceed cultivated land if there is to be adequate time before re-cultivation for soil fertility to be restored under regenerating cover of vegetation, there is always need for a large amount of land per head of the population. It is this limitation on productivity per unit area, rather than a limit to productivity per unit of labour, that restricts the capacity of swidden cultivation to support concentrated populations" [pp. 247-248].¹⁴
- (5) Shifting cultivation implies a settlement pattern (with respect to size, distribution, and stability) in which the ". . . usual unit of settlement is the village or hamlet which, in accordance with prevailing low population densities, seldom houses more than 200-250 people" [p. 248]. He notes that ". . . the spatial distribution of settlements normally relates to their average size in such a way that the larger the village units the greater the cultivable area that separates one village from another; conversely the smaller the units the more closely spaced they tend to be" [Ibid.]. He adds yet another crucial observation, in noting, ". . . provided population increase does not upset the equilibrium of the system by causing a reduction of the fallow period to a point where soils cannot recover their fertility and overall productivity declines, it does not necessitate the periodic relocation of village sites."

In light of the following consideration of the operational environment of shifting cultivation systems, one may rephrase Harris' attributes in dynamic terms, by stating that all shifting cultivation systems inevitably submit to: (1) an eventual necessity for gradually and temporarily abandoning once-productive but progressively and rapidly less-productive swiddens; and (2) the consequent necessity for selecting and cultivating anew once-abandoned but sufficiently yet slowly regenerated swidden sites for continued crop production at accustomed yields.¹⁵ It is on the basis of this fundamentally dynamic trend, which is exhibited by all shifting cultivation systems, that this thesis seeks to produce some heuristic models that will demonstrate how the shifting cultivation system works and breaks down.

Just as shifting cultivation systems are not everywhere the same (with respect to the phases through which they pass or in the degree to which they complement or are complemented by other efforts to obtain food), neither are the biophysical environments in which each operates (with respect to such things as local climatic conditions, vegetation formations and soil types). Variation in operational environments no doubt partially explains variation in shifting cultivation systems. Nevertheless, it is possible to generalize without serious distortion about some of the biophysical processes which encourages the noted dynamic trend which all shifting cultivation systems exhibit. This generalization is made all the more pertinent because this thesis limits its attention to stateless societies which employ shifting cultivation systems; such societies are now largely restricted to tropical rain forest habitats.

It should be emphasized here that for its distinctive energy flow and biogeochemical cycles, the tropical rain forest has posed a practical enigma to those societies which have been alien to it but which have sought to exploit it through techniques that have evolved in habitats dissimilar to it. In the main, alien exploitative techniques have not succeeded in the long term (cf. Igbozarike 1971; Dickinson 1972; Dasmann, Milton and Freeman 1973; and Janzen 1973). It is largely for

this reason that the tropical rain forest had remained virtually inaccessible, until recently, to societies that sought permanent occupancy yet based upon inappropriate exploitative techniques. In turn, it is largely for the reason of inaccessibility that stateless societies, until recently, had managed to survive and remain autonomous.¹⁶

With so much said about the "bread-and-butter" association of remaining stateless societies and the tropical rain forest, attention may now be turned to the general biophysical processes of the tropical rain forest. It should be mentioned, however, that the concern here is more with understanding these processes as they create an operational environment for the shifting cultivation system and less with understanding how they create and maintain the tropical rain forest itself.¹⁷

The Tropical Rain Forest as an Operational Environment for the Shifting Cultivation System

The tropical rain forest is said to be the most complex of all terrestrial ecosystems. A number of its qualities or features may be summarized as follows:

(1) The tropical rain forest is a *climatic climax community* (Richards 1952:6, Eyre 1968:12). With respect to this quality, Eyre (1968:10) has observed, "This stable type of vegetation, in complete equilibrium with climatic and soil conditions, has been referred to traditionally as the 'natural vegetation' of an area. This term is not without its ambiguities however, and ecologists now prefer the term 'climatic climax vegetation'. The basic premise is that if a naturally well-drained surface is left completely undisturbed for a protracted period, with no human activity, climatic change or other natural cataclysm, a whole series of plant communities, one after another, will occupy it but, ultimately, a community will establish itself and persist, unchanged, quite indefinitely. This climatic climax community will be dominated by plants which, of all those available, can compete most successfully in the existing physical conditions." As will be noted, however, these physical conditions are not simply a matter of regional climate and the parent material from which soil is formed.

- (2) The tropical rain forest is a plant formation-type which is distinguished by the morphological characteristics that are possessed by those life forms which are dominant in the plant community (Eyre 1968:12-13). In the tropical rain forest, ". . . the overwhelming majority of the plants are woody and of the dimensions of trees" (Richards 1952:2) and the "vast majority cast their old leaves and grow new ones continuously and simultaneously and, in consequence, are rarely if ever leafless" (Eyre 1968:199-200).
- (3) The tropical rain forest occurs in three plant formations: (i) the American (including the Amazon basin, lowland Central America, and the windward sides of a number of Caribbean islands; (ii) the African (including the Congo basin, as well as parts of West Africa where human interference has not been exceptionally intense); and (iii) the Indo-Malaysian (including most of Indonesia, Melanesia, and Polynesia, as well as the Philippines and part of Southeast Asia, where human interference has not been exceptionally intense) (cf. Richards 1952: 10-14; Eyre 1968:198-199, Appendix I). Richards (1952: 7) notes, "In each of these formations almost all the species and many of the genera and families are peculiar and not shared with the other two. The structure of each climax community, and the successional stages in its development are, however, much alike. Each climax . . . also varies in a strikingly parallel manner in response to differences of climate and soil, in spite of the dissimilarity of the flora."
- (4) The trees of the tropical rain forest are extremely numerous in species per unit area. Richards observes (1952:3), "In the Tropical Rain forest there are seldom less than forty species of trees over four inch (10 cm.) diameter per hectare [2.47 acres] and sometimes over a hundred species." Eyre (1968:205) adds, ". . . in the Malay peninsula alone there are about 2,500 such species. In the Amazon Basin also it is calculated that there are at least 2,500 species of 'large tree' -1,000 in the State of Para alone," Not only is the tropical rain forest diverse as to tree species, but, as noted by Richards (1952:4), "Trees of different species are most commonly found mixed in fairly even proportions . . ."
- (5) The tropical rain forest is stratified in terms of heights achieved by its component plants. Richards (1952:31) notes that there are five strata of freestanding plants, including three tree levels (termed A-, B-, C-layer respectively), a shrub layer (D-layer), and ground layer (E-layer) of herbs and tree seedlings. The height achieved by the A-layer varies between 30-40 meters and forms a discontinuous canopy of umbrellalike tree crowns; the B-layer varies between 20-30

meters and forms a continuous canopy of merging conical tree crowns; the C-layer varies between 10-20 meters and forms a continuous canopy. In reference to the effect of this stratification, Eyre (1968:203) corrects a long held misconception, in noting, "Although the density of average tropical rain forest appears to have been exaggerated by some earlier writers, the light intensity beneath the three tree layers is very much reduced. Direct sunlight only reaches the forest floor in small local flecks and even then, only during the middle four or five hours of the day. Away from the sun flecks, the light intensity is usually less than 1% of that just above the forest canopy. It is almost certainly mainly due to this low light intensity that low-growing plants are relatively unimportant. The shrub layer is poorly represented in tropical rain forest and herbaceous plants are also quite unimportant."

- (6) Trees of the tropical rain forest are remarkably uniform in their morphological characteristics despite taxonomic differences. Richards (1952:4-5), "The trunks are as a rule straight and slender and do not branch till near the top. The base is very commonly provided with plank buttresses, flange-like outgrowths which are a highly characteristic feature of rain-forest trees."¹⁸ "The bark is generally thin and smooth and rarely has deep fissures or conspicuous lenticels. The vast majority of the mature trees, as well as of the shrubs and saplings, have large, leathery, dark green leaves with entire or nearly entire margins."¹⁹
- (7) The tropical rain forest, in addition to being composed of trees, shrubs, and ground herbs, is composed of climbing plants and epiphytes. Richards (1952:6) observes, "The abundance of climbers is one of the most characteristic features of rain-forest vegetation. The majority of these climbers are woody (lianes) and have stems of great length and thickness Some lianes cling closely to the trees that support them, but most ascend the forest canopy like cables or hang down in loops or festoons. The number of species of climbing plant is enormous, and there is great variety of form and structure among them. The epiphytic vegetation, as well as including algae, mosses, liverworts and lichens . . . consists of large numbers of orchids and other flowering plants and many ferns. . . . In no other plant community, except some types of Montane and Subtropical Rain forest, are epiphytes more abundant and luxuriant."
- (8) The tropical rain forest modifies the regional climate to which it is subject in its creation of verticallyarranged microclimates. While the climatic limits under which the tropical rain forest may develop have

not been agreed upon in quantitative terms, it is generally agreed that "The dominating features of the tropical rain forest climate are high and very even temperature and heavy rainfall spread over the greater part of the year. Within the general type of climate there are considerable variations, especially in the seasonal distribution of rainfall and temperature, yet throughout the rain-forest belt these main features of the climate remain essentially similar" (Richards 1952:135). The effect of this regime on the tropical rain forest as a whole is that conditions suitable for plant growth never cease to operate. These conditions are in part maintained by the microenvironments which are established by the stratification of vegetation. Again, Richards (Ibid., pp. 158-159) notes, "In comparing the interior climates of a forest with its standard climate, we may assume that at a few meters above the uppermost layer of tree crowns forms a barrier impeding, but not preventing, convectional air currents between the free atmosphere and the space below the crowns; it also offers strong resistance to lateral air movements. A considerable fraction of the rainfall is intercepted by the trees; some of this runs down the trunks and some evaporates without reaching the soil. The trees also interfere with radiation both to and from the surface of the ground. During the day a large proportion of the incident light and heat is absorbed by the leaves. At night radiation of heat takes place mainly from the crowns of the tallest tree layer, though the interior of the forest becomes cooled by the sinking of the relatively dense, cold air from above. If dew forms, it will be on the crowns of the trees and not at ground-level. The effect of the tree-crowns will thus be to give the space below equable climate than that in the open. It has a smaller range of temperatures and relative humidity (or saturation deficit) and all changes in the outside atmosphere will be 'damped down' and followed by corresponding changes inside the forest only after a considerable time lag. The microclimates of the forest interior are, in fact, intermediate in character between the climate in the open and that in the soil, where conditions are even less variable. The microclimate at a given level depends on the height above the ground; there is a continuous or discontinuous vertical climatic gradient from the surface of the ground to the level of the tallest tree-tops. Since none of the tree strata is uniform in density there are also variations in microclimate from place to place at the same horizontal level."20

(9) The tropical rain forest plays a major role in modifying the influence of geomorphic weathering agents. Garner (1974:263-264) has noted, "As a general condition, in

humid lands plants are understood (1) to absorb the energy of falling precipitation to the extent of essentially eliminating rain splash erosion; (2) to frictionally resist surface water flow effectively everywhere except along water courses - usually to the point where actual overland flow elsewhere is prevented; (3) to aid infiltration of water by loosening ground in growth areas, generating root passages, and providing a favorable habitat for burrowers; (4) to use water in a variety of plant 'metabolic' processes associated with photosynthesis and to transpire large amounts back to the atmosphere; (5) to effect groundwater solvency and hence regolith and bedrock leaching through additions of organic acid and carbon dioxide; (6) to influence soil textures and fertility by growth, additions of humic material, and nitrogen fixation; (7) to shield weathered debris from erosion by wind and running water; (8) to resist down-slope movements of regolith under the force of gravity through root anchors extending to the bedrock; (9) to inhibit circulation and otherwise contribute to sediment entrapment in swamps, along lake margins, and elsewhere where there is an appreciable infall of windblown dust; (10) to mechanically exploit weaknesses in soil grains or bedrock by root extensions; (11) to shade or otherwise insulate the ground surface from short-term air temperature extremes, both heat and cold; and (12) to indicate by the major phytic categories present the amount of water actually available at or near the ground surface."

(10) The tropical rain forest is comprised of a multitude of microenvironmental niches which are created by plants and which are exploited not only by a multitude of plant species, but also by a multitude of animal species. As Richards (1973:60) observes, "The composition of the animal population is . . . difficult to characterize because few groups of animals other than birds and mammals have been adequately studied and a vast number of species remain undescribed and unnamed. For those groups of animals that are well known, however, the number of species has been found to be very large. In Panama and Costa Rica, Edward O. Wilson and the late Robert H. MacArthur found that a 300-mile square of rain forest harbored from 500-600 resident species of birds. . . . Thomas W. Schoener and Daniel H. Janzen captured 500 species of insects in 2,000 sweeps of a net in the undergrowth of a Central American forest. and the number of insect species in the canopy and middle layers is certainly much higher." Odum (1971: 401) adds, ". . . in a six square mile area on Barro Colorado, a well-studied bit of rain forest in the Panama Canal Zone, there are 20,000 species of insects . . ." Inasmuch as these niches are microenvironmentally established, they tend to be vertically arranged. As

a consequence, Odum (Ibid.) notes, "A much larger proportion of animals lives in the upper layers of the vegetation than in temperate forests where most life is near the ground level. For example, 31 of 59 species of mammals in British Guiana [Guyana] are arboreal and 5 are amphibious, leaving only 23 which are mainly ground dwellers." Richards (1973:60) adds, "For animals the variety of environments is . . . important. In the various strata the available foods, the opportunities for concealment and the possible modes of locomotion are quite different. For example, animals living in the treetops can readily obtain large quantities of vegetable foods such as flowers, fruits, and leaves but must have limbs adapted to climbing or running along branches and to swinging, jumping, gliding or flying from tree to tree. In contrast, the ground mammals (which include such large and ungainly creatures as the elephant and rinoceros) have little or no climbing ability and depend for food largely on fruits and other plant materials that drop from above . . ."

(11) The tropical rain forest, despite having a deceptively large plant biomass (i.e. living weight per unit area), has a relatively low rate of net primary productivity (i.e. increment of plant material per unit time). This may be demonstrated in several ways. Richards (1973: 62), for example, has noted, "E.I. Fittikau and H. Klinge recently calculated that the mass of the living plants in a hectare of Amazon rain forest is more than 900 metric tons and that the animals of the same area weigh about .2 ton. Only about 7 percent of the animals (by weight) feed on living plant material such as leaves. About 19 percent eat living and dead wood, and about 50 percent feed mostly on litter and other decaying material. The low ratio of animal to plant life (when measured as weight) confirms a suspicion . . . that there is a shortage of edible plants in the rain forest." Odum (1971:46) has shown that the ratio of net primary production to gross primary production (i.e. the total rate of photosynthesis, including the organic matter used up in respiration) for the tropical rain forest in Puerto Rico (13,000:45,000 Kcal./sq.m./yr.) is less than that for a medium-aged oak-pine forest in New York (5,000:17,500 Kcal./sq.m./yr.). (Cf. Golley 1972:72; Watts 1974:48).

This last point bears two implications, the significance of which cannot be overestimated, particularly in consideration of the shifting cultivation system. The first implication deals with the distribution and effect of phagotrophs (i.e. heterotrophic organisms, chiefly animals,

which ingest other organisms or particulate organic matter) on autotrophs (i.e. chiefly green plants, which are able to manufacture their own food from simple organic substances). The second implication deals with the effect of saprotrophs (i.e. heterotrophic organisms, chiefly bacteria and fungi, which break down the complex compounds of dead protoplasms, absorb some of the decomposition products, and release inorganic nutrients that are usable by the producers together with organic substances).²¹

The Distributory Unevenness of Phagotrophs and Evenness of Autotrophs

Richards (1973:61) has noted that the seeds, fruits, and seedlings of trees are the chief sources of food for the predominantly herbivorous animals of the tropical rain forest. He adds that many mammal, bird, and insect species appear to feed exclusively on a single plant species or on a small group plant species, with the effect that the entire seed crop (contained in attractive fruits) of a tree may be destroyed by a particular species of animal. Given the feeding habits of any given species, there is a tendency for members of that species to congregate at those food sources which have been found to be satisfying. As a result of this, it has been hypothesized that (Ibid.):

The pressure of herbivores is greatest close to the parent tree [i.e. seed/food source] and the number of herbivores falls off roughly in proportion to distance. The number of seeds too decreases with distance from the parent tree, and Janzen has suggested that there must be an optimum distance at which the curve for the number of seeds available crosses that for the number of herbivores eating them. This distance will vary from species to species, but if the herbivores are host-specific, natural selection will always tend to produce diffuse rather than aggregate tree populations."

As a result of this evenness and diversity of plant species

within a unit area, he adds (p. 64), "Epidemics of fungal diseases, plagues of caterpillars and other pest infestations, which are a menace to most tropical crops, do not seem to occur in the undisturbed forest."²² A result of this evenness and diversity of plant species for the phagotrophs, however, is that they must constantly move in search of inherently localized and short-term food sources. Given the presence of a swidden along the path of their search, it is obvious that it will pose a localized source of attraction for them and they, in turn, will pose a threat to an intended long-term food source of a human population.

Saprotrophs and "Zero" Net Community Productivity

Net community productivity is that portion of autotrophic or net primary production which remains following heterotrophic respiration (i.e. consumption). In practice, it is usually equated with dry matter accumulation (e.g. plant litter) per year (cf. Odum 1971:43ff). Citing data from a tropical rain forest in Puerto Rico, Odum (Ibid., p. 46) notes that net primary production and heterotrophic respiration are both 13,000 Kcal./sq.m./yr. While this would mean that there is virtually no accumulation of plant litter (i.e. that net community productivity is nil), he adds that these values are approximations. Nevertheless, it is clear that the accumulation of plant litter in a year is indeed very small in relation to a rather large amount of litter that falls in the same period. Watts (1974:48) states that of the greater than 5,000 kg./ha. autotrophic biomass in the tropical rain forest, 250 kg./ha. falls as litter but only 20 kg./ha. accumulates on the forest floor. In comparative terms, he shows that despite having the greatest litter fall in a year (of ten ecosystems which represent a range of temperature

moisture relations), the tropical rain forest has one of the lowest rates of accumulation. This contention is substantiated by Richards (1952:6) who observed, "The ground is only thinly covered with dead leaves and there are often patches of bare soil. Tropical forests in which the ground is 'covered with age-long accumulations of rotting vegetation' are quite exceptional or mere figments of the imagination." The question remains: Where does all the plant litter go? This question leads to a consideration of biogeochemical, mineral, or nutrient cycling, which proceeds only upon the respirational (i.e. consumption) action of the decomposers or saprotrophs. While the precise nature of their roles is not understood, it is clear that they are responsible for release of nutrients through a series of processes: (1) formation of particulate detritus, (2) humification, and (3) humus mineralization (see Odum 1971:367ff). As indicated by high respiration rates, for which saprotrophs are largely responsible in the tropical rain forest, which in turn yield an almost inconsequential accumulation of plant litter, it becomes apparent that the nutrients of dead organisms are quickly made available to living plants. And thus begins the nutrient cycle.

The Nature of the Tropical Rain Forest Nutrient Cycle

Coupled with a high income of precipitation in most months of the year, and the consequent tendency of water-soluble nutrients to be leached downward away from typically shallow root systems, plants of the tropical rain forest have developed the capacity to absorb quickly those nutrients which they require for growth and maintenance. This capacity is indicated by extensive "feeding" root development per plant

within the top ten centimeters of the soil (corresponding with the usual area occupied by humus), by the high degree of association of roots with fungal mycorrhiza, and, on leguminous plants (which tend to be abundant and often dominant when present), by nitrogen-fixing root nodules (Richards 1952:220-221). Fungal mycorrhiza is seen to be central to the "direct mineral cycling theory":

The theory is based on the fact that the bulk of minerals available in the tropical rain forest ecosystems is tied up in dead and living organic systems. Little available mineral ever occurs free in the soil at one time. Mycorrhiza which is extremely abundant in the surface litter and the humus of the forest floor is believed to be capable of digesting dead organic litter and passing minerals and food substances through their hyphae to living root cells. In this manner little soluble mineral leaks into the soil where it can be leached away [quoted in Odum 1971:103].

The high ratio of nutrients in organic matter (living and dead) to inorganic matter (i.e. soil particles) in the tropical rain forest (relative to ratios in more seasonal ecosystems), as well as the rapidity and tightness of the nutrient cycle, may be demonstrated in several ways.

Odum (Ibid., p. 375) compares data from a British pine forest and a tropical rain forest regarding nitrogen content. The soil under the former contained 730.8 gms./sq.m. whereas the soil under the latter contained only 85.3 gms./sq.m. Yet, the percent in biomass was 6.0 and 57.8, respectively. What is remarkable in this data is that when considered in terms of total weight (i.e. leaves, above ground wood, roots, litter and soil), the former holds 821.0 gms./sq.m. whereas the latter holds only 211.2 gms./sq.m. In light of the vast differences in biomass between these two ecosystems (with the latter by far greater), the disproportionately low amount of nitrogen in the latter suggests an incredible turnover rate. Rapid turnover rates have been

demonstrated for calcium. Calcium occurs in tropical rain forest litter in amounts proportionately greater than other essential nutrients (such as nitrogen, phosphorus, potassium, and magnesium) (see Nye and Greenland 1960:39). Jordan and Kline (1972:47) have shown that the total cycle time of calcium in the tropical rain forest is 10.5 years; compartmentally, calcium was held in soil for 3 years, wood for 6.4 years, canopy (i.e. leaves) for 0.9 year, and litter for only 0.2 year (indicating the rapid decomposition rate). Comparatively, calcium cycled through a Douglas fir forest in 93.3 years and a northern hardwoods forest in 60.4 years.

Before turning to the "tightness" of the nutrient cycle of the tropical rain forest, it is important to emphasize that, in light of the inordinate amount of nutrients located in plant tissue relative to that in the soil, plants are the principle source of their own nutrients (although some large quantities are imported in precipitation) (see Richards 1973:64). Because weathering of parent material often takes place at such depths as to make the consequent release of nutrients of little use to plant root systems, some doubt may be raised as to the importance of the variation in soil types under a once-established tropical rain forest, provided that it remains undisturbed.

The tightness or closed nature of the tropical rain forest nutrient cycle is most effectively demonstrated by Richards, who observes (1973:64):

The great efficiency of the forest mineral cycle is indicated by the low concentration of mineral ions in the waters of the Amazon and other rivers that drain rain forest areas. Near Manaus the litter falling to the forest floor contains about 18.4 kilograms of calcium per hectare, yet in the streams of the same area the concentration of the calcium is too small to be detected.

The implications of this distinctive cycling of nutrients, as well as the

incidence of phagotrophs, will be investigated in a following section; attention is now turned to the production unit of the shifting cultivation system.

The Swidden as a Focus of Human Acitivity

A Harvestable Forest from a Natural Forest

Geertz (1963:16-28) has noted that the garden or swidden of the shifting cultivation system is a "canny imitation" of the tropical rain forest into which it is temporarily projected. Similarly, D. Harris (1969:6) has asserted that it comes ". . . closer to simulating the structure, functional dynamics and equilibrium . . ." of the tropical rain forest. In the final analysis, it may well be that notions of imitation and simulation are ill-conceived, for while the tropical rain forest is a notably stable ecosystem, the swidden is inherently unstable and may be viewed as self-destructive. It is therefore useful to look more closely at the basis of these notions so as to appreciate more clearly the truly remarkable nature of the shifting cultivation system and its production unit, the swidden.

Species Diversity and Spacing

The swidden is said to resemble the tropical rain forest in its degree of generalization by having a relatively large number of different species which are each represented by a relatively small number of individuals. Indeed, incredibly high diversity indices (i.e. the ratio of numbers of species to numbers of individuals in a unit area) have been suggested by field observers who have been botanically sensitive. Clarke instills some sense of this diversity, as well as of garden architecture, which will be considered shortly (1971:76-78):

To convey the nature of a Bomagai-Angoiang garden, I will

summarize an actual traverse run in a five-month-old ndangwan nduk. A garden of this age is productive of pumpkin, the bean Psophocarpus tetragonolobus, Hibiscus manihot, Rungia klossil, and a few old cucumbers, most of which have already been harvested. Bananas, the Saccharum species, had not yet begun or are just beginning to produce. From the fence at the edge of the garden the ground is invisibe beneath a continuous cover of crop vegetation in which only a few weedy forbs and ferns are noticeable. To enter the garden is to wade into a green sea. To walk is to push through irregular waves of taro and X anthosoma and to step calfdeep in the cover of sweet potato vines. Overhead. manioc, bananas, sugar cane, and Saccharum edule provide scattered shade. Rising above the flood of crops are remnants of the forest which was there before clearing - two Pandanus papuanus, preserved for their useful leaves, and the pollarded trunk of an Elmerrillia papuana, now sprouting a ball of foliage from its lopped-off top. On the traverse through the garden, the ground of the first three-foot segment is covered with the tukaya variety of sweet potato. Rising out of the mass of vines are a weedy forb and a taro plant. In the next segment the tukaya sweet potato is mixed with the *alepun* variety. Together they cover the ground solidly and are partly shaded by two X anthosoma with twenty-two-inch leaves. Beneath one Xanthosoma is an edible wild fern. By pushing aside the sweet potato vines, one can see a weed form of the edible-leafed, cultivated komeruk (Comelina sp.). In the next segment the continuing mixture of sweet potato varieties is almost completely shaded by a Zanthosoma, a weedy fern, and the edible wild form of the cultivated Setaria. Next a five foot wunum variety of banana dominates the ground cover of daier sweet potato. In the following segment the daier vines are mixed with the *airpo* variety, and a small Colocasia stands next to a seedling of the secondary tree Geunsia farinosa - a presage of the future vegetation on this site. Now fifteen feet into the garden [!], one encounters a seven-foot wurum banana plant around whose base there spreads the cover of sweet potato vines that extends continuously from the fence. In the next segment is still more sweet potato, as well as a not-beforeencountered variety of taro, another kind of weedy fern, a Xanthosoma, and the sprouting stump of a *Ecus* species, seven inches in diameter. Then comes a nunong banana plant, followed by the stumps of two trees felled to char the plot. Beyond the stumps a spreading, vaselike cluster of amp'sun sugar cane has yet to be tied together. Next. airpo sweet potato vines climb over a jumble of decaying logs and continue beyond, where two five-foot Maoutia saplings have been left until they are large enough to harvest for their underbark - an important source of fiber for string-making. In the following

segment a vigorous cluster of taro plants stands above the sweet potatoes that continue unshaded through the next segment. Beyond is another tree stump and a three-foot weedy fern with a cultivated yam (Dioscorea alata) twining about it and trailing off into the sweet potatoes. In the next segment wild Setaria and sweet potatoes abut a throng of taro plants that continue several feet to a weedy fern and a rank pumpkin vine bearing a nine-inch, yellow fruit - which upon being noted, was harvested by the Angoiang gardenowner who accompanied me on the traverse. Beyond the pumpkin were several waist high taro, which continued a few yards to an ngun variety of Saccharum edule around whose six-foot tall stem twined a yam vine (Dioscorea pentaphylla). Nearby, was a bush of the edible-leafed Hibiscus manihot and beyond it tied to a pole, a Psophocarpus tetragonolobus bearing greenish-black seed pods the length of a man's forearm. On the far side of the *Psophocarpus* began a twenty-foot thicket of manioc planted here because the ground being 'hard', was judged unsuitable for taro. Beneath the light canopy of the manioc were a few weeds, tree seedlings, and a drying cucumber vine from which all the fruits had been harvested. On the far side of the manioc thicket was another zone of taro, then a patch of ground covered with sweet potatoes dominated by the two Saccharum species. And so the garden continued with successive variation to its farthest edge. The heterogeneity of species and varieties within such a garden extends to individuals of the same variety of a single species. Of two taros of the same variety side-byside, one may be waist high and luxuriant, the other kneehigh and stunted - the difference being caused by variation in the richness of the soil, in the vitality of the planting stock, and in the length of time since planting, which may vary by weeks.

He adds (Ibid., pp. 78-79):

My garden traverses verified my impression that nearly the entire Bomagai-Angoiang inventory of garden crops (about thirty-five species) occurs in all types of gardens except small, unfenced 'greens gardens', which are a kind of incidental planting.

Similarly, Conklin has observed, among the Yagaw Hanunoo, that (1957:

85):

. . . during the first and most active year of the agricultural cycle, an average swidden may be planted in 100 to 125 separate specific crop types. The range is roughly 85 to 150; in other words, from 20 to 35 percent of the total number of known native varieties. The author has counted up to 40 different basic crops growing in one swidden at the same time. In the same vein as Clarke, he adds a description of a Yagaw Hanunoo swidden (Ibid., p. 147):

During the late rice-growing season, a cross section of a new parayan illustrates the complexity of this type of swidden cropping (which contrasts remarkably with the type of field cropping more familiar to temperate zone farmers). At the sides and against the swidden fences there is found an association dominated by low, climbing or sprawling legumes (asparagus beans, sieva beans, hyacinth beans, string beans, and cowpeas). As one goes out into the center of the swidden, one passes through an association dominated by ripening grain crops but also including numerous maturing root crops, shrub legumes, and tree crops. Pole-climbing yam vines, heart-shaped taro leaves, ground-hugging sweet potato vines, and shrublike manioc stems are the only visible signs of the large store of starch staples which is building up underground, while the grain crops fruit, a meter or so above the swidden floor before giving way to the more widely-spaced and less rapidly-maturing tree crops. Over the first two years, a new swidden produces a steady stream of harvestable food in the form of seed grain, pulses, sturdy tubers, and underground stems, and bananas, from a meter below to more than two meters above the ground level. And many other vegetable, spice, and nonfood crops are grown simultaneously.

From these lengthy descriptions, it is clear that not only is the swidden generalized, like the rain forest, but also individuals of the same species tend to be separated, as in the rain forest. This separation is a function not only of intervening distance and intervening plants of other species, but also of varying stages of maturation within a single species. Figure 1 graphically portrays, in plan view, the diversity and spacing of species in a hypothetical swidden. As will be discussed shortly, species diversity and both spatial and temporal spacing tend to minimize the risks of crop loss in any one species and for the swidden as a whole.

"Architecture"

The swidden is said to resemble the tropical rain forest in terms of its architecture or vertical arrangement in that both exhibit





a closed canopy, as well as layering in heights achieved by their assorted plants. As Geertz has noted (1963:24-25):

In a swidden, this canopy is, of course, radically lowered, but much of its umbrella-like continuity is maintained, in part by planting cultigens not in an open field, crop-row manner, but helter-skelter in a tightly woven, dense botanical fabric, in part by planting shrub and tree crops of various sorts . . . and in part by leaving some trees standing. In such a way, excessive exposure of the soil to rain and sun is minimized and weeding, exhausting task in any case, is brought within reasonable proportions because light penetration to the floor is kept down to a much lower level than in an open field system.

Implicit in Geertz's remarks is the idea of microenvironments, wherein each cultivated plant, faced with its own light, temperature, and moisture requirements, finds them satisfactorily conditioned by adjacent cultivated plants. Figure 2 graphically portrays, in profile, the resemblance of the swidden to the tropical rain forest in architecture (note that line A-B corresponds to line A-B in Figure 1.).

Is the Swidden an Ecosystem?

D. Harris (1969:4) contends:

The structural and functional complexity of generalized ecosystems results in their having greater stability, or homeostasis, than specialized ecosystems. Thus the reduction or removal of a component species, whether by natural or human agency, tends to have less effect because alternative pathways for energy flow are available within the system.

On the basis of this remark, he extrapolates that "polycultural" swiddens represent a manipulation rather than a transformation of the natural ecosystem, which is achieved (Ibid., p. 6):

. . . not by drastically changing its diversity index but by altering selected components without fundamentally modifying its overall structure. Instead of an artificial ecosystem being created to replace the natural one, cultivation may proceed by substituting certain preferred domesticated species for wild species that occupy equivalent ecological niches. Thus an assemblage of cultivated trees and shrubs, climbers, herbs and root crops may take over spatial and




functional roles essentially similar to those fulfilled by wild species of equivalent life-forms in the natural ecosystem.

This extrapolation may be slightly distorted, for while species diversity is maintained, substitution does not involve plants that occupy equivalent ecological niches. Were this the case, substituted plants would continue to survive and the garden would continue to produce indefinitely. Inasmuch as gardens are temporary, one may deduce that there is not functional equivalence, but rather analogy in ecological niche occupation. This is not to deny that substituted cultivates create a broad environment (containing a series of microenvironments) as they grow differentially, which acts upon each of them in such a way as to allow their specific growth habits to be maximized. To the contrary, it is to assert that similar ecological niches are filled but only temporarily because of the relatively rapid life cycles of most cultivates and the broad conditions to which both the swidden and surrounding natural forest are subjected. This argument is made clearer in light of Geertz's contention that the swidden and tropical rain forest have similar nutrient cycles.

Geertz (1963:19-20) has noted that ". . . the ratio of the quantity of nutrients locked-up in living forms (that is, the biotic community) to that stored in the soil (that is, the physical substratum). . ." is extremely high in both the swidden and tropical rain forest. With this, there is no argument. However, the cycling of those nutrients is vastly different. It serves to recall that in the rain forest (because of an excess of precipitation over evaporation and the consequent downward percolation of lukewarm water which leaches soluble silicates and basic nutrients), the dominant life forms have developed the capacity to *retain* the nutrients they potentially need in their

foliage and, through "time-released" leaf-drop and the subsequent action of decomposers, to retrieve the nutrients held in their fallen vegetal matter. However, with cultivates in the swidden, retained nutrients are not eventually retrieved by the plant, but by the humans who harvest the locus of that retention, the fruit. As a result the plant is "robbed" of its own creation. Whether or not the cessation of this robbery would permit the eventual and long-term uptake by the creating plant of nutrients in fallen fruits is another question, the answer to which would seem to be in the negative. Many plants in a swidden are, by their genetic constitution, short-lived and poor competitors (e.g. the seed crops); others, while quite tolerant to nutrient and moisture deficits (e.g. the root crops), are genetically constituted so as to be unable to compete for light relative to tallergrowing and longer-living spontaneous vegetation. Thus, it may be said that the swidden is a self-transforming (through harvesting) system that the swidden is a self-transforming (through harvesting) system that selfdestructs, whereas the tropical rain forest is a self-transforming (through plant succession) system that comes to maintain itself. Notwithstanding this argument, that the swidden is not an ecosystem despite deceptive similarities, the swidden remains a truly remarkable human intervention which is sensitive to limiting conditions that are posed by the parameters and variables of the tropical rain forest ecosystem.

Successive Work Strategies in the Swidden

Before work strategies can be properly discussed, it is necessary to mention, as background, the general principles by which swiddeners constitute themselves for work.

Organization Principles

Stateless societies which engage in shifting cultivation are, in the main, segmentary tribes. Sahlins notes (1968:21):

The segmentary tribe is sharply divided into independent local communities . . . These communities are small. They rarely include more than a few hundred people, usually many less . . . and rarely claim more than a few square miles as their own domain. In form of settlement the primary segment may be a compact village or an 'open community' of scattered homesteads or hamlets. The precise organization also varies: in some tribes the autonomous community is a simple descent group (e.g. a lineage) in others an association of different lineages, in still others a loose network of kith and kin that ultimately entangles everyone (a local kindred). But whatever the precise organization, it will be the same as other communities of the tribe: the several primary segments are 'structurally equivalent'. And each does for itself, economically and in other ways, what the others do for themselves: they are also 'functionally equivalent'.

As to structure, he adds (Ibid., p. 15):

. . . the tribe is divided [conceptually] into concentric circles of kith and kin: the household in central position, a circle of lineage kinsmen surrounding it, a wider circle of village relations, on out to the tribal and intertribal spheres. Each sphere, otherwise a *level of organization*, becomes . . . a sector of social relations, relations increasingly broad and dilute as one moves outward from the familial navel.

Central to the relative strength of these social relations is the notion of a continuum of reciprocal exchange which stretches across levels of organization from household to intertribal spheres. As Sahlins suggests (Ibid., p. 82):

Observable at one end of the spectrum is assistance freely given [i.e. "generalized reciprocity"], the small currency of everyday kinship, friendship, and neighborly relations, the 'pure gift' . . . regarding which an explicit demand for reciprocation would be as unthinkable as it is unsociable - although it would be equally bad form not to bestow similar casual favors in return, if and when it is possible. Toward the middle of the continuum stand balanced exchanges [i.e. "balanced reciprocity"], in which a fair and immediate exchange is right behavior, as for example when kinsmen come from a distance seeking food and bearing gifts. And at the far end of the spectrum: self-interested seizure, appropriation by chicane or force requited only by an equal and opposite reaction on the principle of *lex talionis* - 'negative reciprocity' . . .

In respect to functional arrangements within this reciprocally-bonded

structure, Sahlins observes (Ibid., p. 17):

. . . workaday problems fall mainly to smaller groups, while major issues are resolved by the higher organization. The family, with its domestic division of labor by sex and age, is constituted for day-to-day production - both of subsistence goods and many handicrafts - and neighbors of the home community can usually be relied on for further assistance. Thus, not only production, but the circulation of goods (as domestic pooling and mutual aid) is most intense at homebred levels of society. The smaller groups too take possession of, or enjoy direct access to, strategic property, the resources and technical means of production. But the functions of domestic groups are more than economic and also go beyond the care, education, and socialization of the young. The household is a political entity, and in a tribal society, one of some consequence. A little chiefdom within a chiefdom, it is mainly self-regulating, as it is self-organized by the niceties of respect and authority embodied in familial relations. Indeed, a father usually has greater power to keep his house in order than has any community leader in his domain: at least a man can take a stick to his own child (and perhaps his wife), but the village tyrant who lives by the club risks dying by it.23

Thus, like the village which is essentially autonomous from other like villages within the tribe, the household (comprised often of an extended family) is essentially autonomous within the village. With the household placed at the center of things, attention may now be devoted to work strategies in the swidden.

The Sequence of Forest Transformation

Forest transformation begins with site selection, often by an elder member of the household who is familiar with the uses to which land has been put in the past and who, by experience, is capable of determining the capacity of the land for swidden productivity. Often, more than one swidden site is selected for cultivation. It is apparent that such things as local soil conditions, degree of vegetation development, slope, exposure to sun and wind are taken into account in such determinations (cf. deSchlippe 1956:37-47; Conklin 1957:33-49). Upon a decision as to the appropriate location for a swidden, members (mostly male) of the household enter the area to initiate leveling of vegetation. Here it should be noted that, depending upon the age of the vegetation (i.e. either primary or secondary growth), different labor-time requirements are involved. Conklin (Ibid., p. 150) reports that, for the Yagaw Hanunoo, it takes 61% less time to slash and fell secondary growth than primary (owing to variation in tree girths) (cf. Freeman 1955:89-90; Clarke 1971:173). If leveling of vegetation is timed to coincide with a dry spell and work is behind schedule, or if the size of the household (especially in terms of available men) is small, households may combine their labor to get the job done, although the produce of the swidden is directly owned by the household which selected the site and which will proceed to plant. In some cases, as Dentan (1971: 141) has observed among the Senoi Semai on the Malay peninsula, ". . . one need not clear a field at all, providing one does some work in co-villagers' fields. As one man remarked, 'We'll eat, we have friends.'" Following clearance, the downed vegetation is allowed to dry, if possible, and is then put to the torch. Often, other households will aid in preventing the fire from getting out-of-control, as it is not in anybody's interest for it to do so. Following the burn, planting occurs with all but the very young members of the household participating.²⁴ Swiddens are usually planted in a variety of crops (hence the term "polycultural") and, often, the planting of a particular crop will take place at varying times so that it will come to fruition at likewise varying times. Plants are often spaced according to microconditions within the

swidden (such as in the ash where the log of a particular kind of tree once laid) which will maximize their growth. As well, plants of any one species are often dispersed within the swidden in anticipation of losses by visitation of pests (Janzen 1972:1-6). Figure 3 portrays the difficulty imposed by such dispersion on the ability of pests (or diseases) to potentially locate a particular preferred crop (note that the locations of individual maize plants correspond to those in Figure 1); this difficulty is imposed not only by distance, but also by intervening plants of other species. Plant-tending as crops mature, involving weeding and watching for pests, usually requires that all members of the household contribute some portion of their time. This latter task is often done in association with harvesting as crops come to fruition in the order in which they were planted. As swiddens are abandoned, for reasons which will be discussed in the next section, it is important to note that many semi-perennial plants (e.g. bananas, manioc) may continue to be harvested for some time after plant-tending ceases to be undertaken, as a complement to swiddens coming into production by reapplication on new sites of the above strategies.

Contrary to conventional wisdom, the time spent in work on swiddens is significantly less than that spent in work by the "leisure" societies of Euro-America. Carneiro, in discussing the Kuikuru of the Amazon basin, has observed (1961:49):

At the present time a man spends only about $3\frac{1}{2}$ hours a day on subsistence - 2 hours on horticulture, and $1\frac{1}{2}$ hours on fishing. Of the remaining 10-12 waking hours of the day the Kuikuru men spend a great deal of it dancing, wrestling, in some form of informal recreation, and in loafing.

Similarly, for the Yagaw Hanunoo, Conklin (1957:151) reports, "The average swidden farmer puts in 1,200 hours of agricultural work a year" or what amounts to 150 eight-hour days (cf. Clarke 1971:173). If so



little time (in relative terms) is devoted to such labor, one may well wonder if indeed such stateless societies have not hit upon a sound strategy, for clearly they are not struggling to survive (from a subsistence point of view).

Environmental Impact and Declining Yield

In addition to supplying the human population with food, the swidden has three other fundamental effects. It breaks the nutrient cycle, which has evolved under perpetually warm and moist conditions, through removal of standing vegetation (which acts as an important nutrient storage site and replenishment source). In so doing, it creates an environment which is suitable for the growth of not only cultivates, but also colonizing vegetation. And it concentrates, in time and space, edible portions of cultivates which are attractive not only to humans, but also to herbivorous animals. In combination, these latter effects initiate a progressive reduction in the variety and overall yield of crops which can be grown and harvested by the human population. It is important to note that this progressive reduction in yield, rather than its underlying causes, necessitates the abandonment of a once-productive swidden. This view is shared by Janzen, who notes (1973:1215):

In shifting agriculture, fields are commonly left fallow after 2 to 5 years of farming. The standard explanation for this is exhaustion of the nutrients in the soil. However, the real cause is lowered yield, and pest insects and competing weeds probably contribute as much as or more than soil depletion does to lowered yield.

Evident in Janzen's comment is the point that nutrient depletion, pest infestation, and weed invasion act differentially in a period of time to reduce swidden yields. In other words, nutrient depletion is seen to be a cause for reduction of swidden yields, but one of less immediate importance than pest infestation and weed invasion. It is a point which

must be reckoned with in detail so as to more fully appreciate why this food acquisition system involves a shifting of gardens and what the long-term costs of not shifting soon enough might be.

Nutrient Depletion²⁵

As mentioned, the swidden is created by first leveling the standing vegetation which, with time, has spontaneously appeared on the selected site and by then burning the felled vegetation in a period of reduced precipitation. In effect, this burning oxidizes some nutrients, such as carbon (C), nitrogen (N), and sulphur (S), but also brings, to the floor of the former forest, ash which bears an inordinant amount of nutrients, such as calcium (Ca), magnesium (Mg), potassium (K), and phosphorus (P).²⁶ Following the first rain, these nutrients or, more properly, cations (i.e. positively-charged mineral ions) are washed into the soil solution, there to be adsorbed to sites on clay (especially kaolinite) and humus (i.e. organic matter which has gone through the decomposition) colloidal nuclei or micelles, upon displacement from those sites of hydrogen ions. Notably, humus has a much greater number of exchange sites than does clay (kaolinite having the least of all the kinds of clay), and therefore a greater capacity to hold cations.

As evidenced by an increase in cation exchange capacity, adsorption effectively increases base saturation of the micelles and thereby the quantity of nutrients that may be displaced potentially by root hairs of growing cultivates which contact those micelles. It is at this point where a misunderstanding exists with respect to cation removal. It is usually thought that heavy rainfall and subsequent percolation directly removes cations from micelles, whereupon those cations are leached away and lost to growing plants. Here, it is important to note that cations are electronically-bonded to micelles, but that each cation has its own bonding characteristic. Most cations, with the exceptions of Na (sodium) and K, are not readily displaced by incoming, percolating water. Leaching of cations is not so direct a process. It must follow in association with the mineralization of humus.

Humus (which is composed of roughly 60% C, 6% N, and smaller portions of P and S) is highly resistant to further decomposition. For its mineralization (i.e. the final stage in decomposition), it depends upon nitrifying bacteria. Upon their action, nitrates are released into the soil solution for uptake by plants. Nitrates are anions (i.e. negatively-charged mineral ions) and are capable of attracting cations (especially those with a low valence) that have adsorbed to micelles which have not gone so far in the decomposition process. Nitrates are also highly leachable and take with them equally important cations. Thus, high nitrate levels in the soil solution are both a boon and a bane. High nitrate levels are not a common condition in humid tropical soils. Such levels are momentary and are dependent upon a large population of nitrifying bacteria, which is itself temporary.

Nitrifying bacteria flourish with an increase in soil pH (which follows an influx and saturation of exchangeable bases on micelles upon burning), and a concomitant warming, drying, and aeration of the soil (which follows from dessication in association with burning and intense insolation at the soil surface). As these concomitant conditions change, with increased precipitation and percolation, and plant growth, the population of nitrifying bacteria normalizes. So too does the rate of humus mineralization and the quantity of nitrates. Apparently, however, nitrates continue to be made available in quantities that can adequately support plant growth for several years. It should be noted that

the same conditions which cause the population of nitrifying bacteria to subside, namely cooler, moister, and less-aerated soils, cause an increase in the heterotrophic soil population (which competes with crops for nitrates) and an increase in the activity of denitrifying organisms (which change nitrate into nitrogen gas that escapes from the soil).

The significance of humus mineralization (through nitrification) cannot be overestimated. It is seen to progress at a fairly constant rate, regardless of the amount of organic matter which is being added at the soil surface. With the creation of the swidden, however, no organic matter is being added or at least not in substantial quantities, as when the soil was covered by a canopy of tree crowns. The net consequence of this is that humus decomposition (i.e. mineralization) exceeds humus formation (i.e. humification) and if such a condition persists, the total cation exchange capacity will eventually decrease, and with it the quantity of exchangeable bases. So too will decrease the level of nitrates, as progressively fewer humus micelles will be available for mineralization.²⁷ The depletion of humus does not proceed as rapidly as is commonly thought, however. As Nye and Greenland note (1960:99):

. . . actual measurements of the rate of decline of humus are available from a variety of sources, and all these show that while it is larger than in soils of the temperate zone, it is not so large that loss of humus necessarily becomes a serious problem, even over a cropping period of ten or more years.²⁸

They add, as well (Ibid., p. 114):

. . . changes in pH are in general very slow [after burning], even over cropping periods of several years, which implies that not only is the fall in quantity of exchangeable nutrients small, but also that their availability remains steady.²⁹

Sufficient quantities of nitrate (as mineralized from an apparent tenyear store of humus) and sufficient quantities of exchangeable bases (as attached to humus micelles in apparently great quantity) suggest

that cropping could take place for a much longer period of time than is normally reported for shifting cultivation systems. The question remains: Why are cropping perioeds usually less than three years in such systems?³⁰

Pest Infestations and Weed Invasions

Janzen (1973:1215) asserts, "The literature of tropical agriculture is replete with fertilizer trials, and there is almost no information on the dynamics of field colonization by insect and weed fauna." With this, there is no reason to disagree. Most references to biotically-posed problems are allusionary. Chang, for example, observes (1968:359):

The humid tropical environment is highly favorable for the multiplication of a wide variety of insects. Some species damage crops directly; others are vectors that help to transmit infectious diseases. In Southeast Asia alone paddy is attacked by some forty kinds of insects, of which seven appear frequently in widespread areas. Insect attacks are difficult to forestall in the tropics, where pests often swarm in from neighboring wild, alternative, host plants without notice.

Without any systematic attempt to measure, for example, the quantities of cultivates which are consumed by pests, or the nutrient and moisture uptake of weedy plants in relation to cultivates, it is difficult to make any conclusive statements about biotically-induced pressure to shift gardens. Nevertheless, this pressure must be rather great because gardens are apparently shifted before they need to be, from the standpoint of availability of soil nutrients.

Some indication of this pressure is given by the ratio of the amount of time devoted to solving biotically-posed problems relative to the total amount of time devoted to swidden work. Conklin (1957:150) notes that the Yagaw Hanunoo spend an average 2975 man-hours per hectare in swidden work (starting from secondary growth vegetation). Of this total, 150 man-hours is devoted to fencing (to keep out deer and wild pigs, as well as domesticated livestock), 275 man-hours is devoted to actual guarding (through direct observation of the swidden; the making of traps for monkeys and rodents; and the making of various devices to frighten animals in general, to include birds and bats), and 600 manhours is devoted to weeding. Roughly, a third of swidden work involves the anticipation or treatment of biotically-posed problems. He adds (Ibid., p. 108) that ". . . for the most part the Hanunoo lack direct and effective techniques for coping with serious attacks of insects on crops. . . . When crop protection requires the extermination of insects, the Hanunoo rely heavily on magicoreligious techniques." Interesting to note is that the Hanunoo employ the same term for both malevolent spirit forces and "small pestiferous insects, especially those attacking swidden crops," underscoring the threat that insects pose.

Clarke, in discussing biotically-posed problems as they appear in Bomagai-Angoiang gardens, has observed (1971:164):

As the garden ages, the composition of the weed flora changes. The initially prevalent soft forbs Crassocephalum and Ageratum are succeeded by grasses, ferns, vines, and a variety of tree seedlings. Because the selective weeding favors trees of several species, by the time the garden is fifteen months old, saplings of six to eight feet are common, and are beginning to shade the lower crops. But, . . . the firmly rooted grasses and ferns are harder to weed than the soft forbs that first invade young clearings. Rodents find a hospitable niche in the older trash-littered gardens and compete increasingly with the people for food as the gardens age. Diseases and insect pests do only a little damage in the intercropped gardens of the Bomagai-Angoiang, but would presumably become a more serious threat if garden sites were immediately reused. In summary, two important reasons for shifting gardens from site to site in the basin are a decline in soil fertility and an increase in labor costs for weeding if the same site were to be reused without an interval of fallow. Two

other reasons for shifting are the decay of fences and the predilection of the men to move about within their territory. Within twenty months after being put up, fence posts are half rotten and the bindings that hold them together are coming apart. Because pigs can easily get through fences in such condition, it would be necessary to rebuild the fence around a plot that was to be reused. But in an old garden there is no ready supply of wood, a lack that one man gave as his principal reason for shifting sites. 'I am lazy,' he said. 'If I regardened in my old garden, I would have to search around and fell trees elsewhere on lands of mine or friends of mine and then carry the posts and poles to the garden; it is easier to clear in a new place.'

In addition to highlighting some locally relevant biotically-posed problems, as well as possibly overemphasizing the decline in soil fertility (as the Bomagai-Angoiang have instituted a crop-fallow regime of approximately two years cropping and forty years fallowing for each garden site), Clarke raises an important point regarding the relationship of labor input (or energy expenditure) to return from labor. In his example, it is simply not worth the effort to extend the cropping period for a given garden by intensive weeding and fence rebuilding, when it is easier to clear new land where weeds are not a problem and where fence materials may be derived from the felled vegetation. This same point is drawn in a number of other cases. Nye and Greenland, for example, describe the influence of weeds on the milpa system of tropical America (1960:78):

In the northern part of the Yucatan Peninsula the rainfall is around 50 in., and is concentrated in a 5-month rainy season. The land is under 'bush' - a woody fallow reaching 30-50 ft. after 10-20 years and containing few annual weeds and almost no grasses. Cropping is rarely more than two years and the fallow averages 10 years. A man can clear 1/5 acre of bush in a day for the first milpa and it takes him the same time to clear the same weeds and sprouts for the second-year milpa. He can weed about 1/10 acre a day, though the second milpa is always more weedy than the first. In all, an average family holding of 4 acres will occupy the milpero for a total of 80 days only, this total including an allowance of 20 days for planting and harvesting. The second crop yields less than the first probably because it is more weedy. It is therefore easier to clear more land than to continue cropping the old plot.³¹

In light of these notions, one may well ask if, in fact, declining yields, no matter their cause, are responsible for the abandonment of swiddens. It may well be that the mere threat of declining yields, which carries with it the promise of increased work requirements to forestall such a decline, is sufficient encouragement to shift swidden locations. In any event, if yields do decline, it seems clear that biotically-posed problems are immediately responsible, followed, if the swidden remains cropped for longer periods, by soil nutrient depletion.

The Environmental Recovery Regime - A Model

The net effect of the swidden is to feed that part of the human population which created it and to degrade that part of the tropical rain forest which it occupied. Food acquisition and environmental degradation go hand-in-hand, but, in the case considered here, for only a brief duration. The swidden produces yields which are deemed satisfactory (relative to actual and impending work requirements) for only a brief period. The causes for this briefness are related to changes in growing conditions to which cultivated plants are subjected. To recapitulate, these changes (by which degree of degradation is indicated) include: (1) disruption of the nutrient cycle of the tropical rain forest; (2) habituation of other food competitors (acting also as disease vectors), such as insects, birds, and mammals, to the location and content of the swidden; and (3) invasion by wind- and animal-borne seeds which subsequently germinate into weedy or otherwise non-utilizable plants which compete for nutrients and moisture and which are less

attractive to "pests". Yet in the causes for the briefness of satisfactory swidden production is the cause for the briefness for environmental degradation. Colonization by spontaneous vegetation of the increasingly less-productive swidden is the principle means by which the degraded part of the tropical rain forest begins to recover its normal cycle of nutrients and patterning of biota. In short, colonization initiates the process of ecological succession. E. Odum has characterized ecological succession or, as he conceives it, the "strategy of ecosystem development" in the following terms (1971:251):

- It is an orderly process of community development that involves changes in species structure and community processes with time; it is reasonably directional and, therefore, predictable.
- (2) It results from modification of the physical environment by the community; that is succession is communitycontrolled even though the physical environment determines the pattern, the rate of change, and often sets limits as to how far development can go.
- (3) It culminates in a stabilized ecosystem in which maximum biomass (or high information content) and symbiotic function between organisms are maintained per unit of available energy flow.

He adds (Ibid.):

The whole sequence of communities that replaces one another in a given area is called the *sere*; the relatively transitory communities are variously called *seral stages* or *developmental stages* or *pioneer stages* while the terminal stabilized system is known as the climax. Species replacement in the sere occurs because populations tend to modify the physical environment, making conditions favorable for other populations until an equilibrium between biotic and abiotic.

Basic to the environmental recovery regime of the shifting cultivation system is the process of ecological succession. The logic of this regime stems from the swiddeners' recognition that a swidden, which must be abandoned because of the development of inappropriate growing conditions for cultivates (as evidenced by real or impending declining yield), will with the passage of time alone acquire the conditions which are appropriate to the growth of cultivates (as indicated by the appearance of large trees and their associated litter which may be felled and burned for the release of their nutrients to the soil and for the intensification of light at the floor of the former forest).³² Figure 4 graphically portrays the succession of forest in an abandoned swidden (note that line A-C corresponds to line A-C in Figure 1).

As suggested by the notion of crop-fallow ratio, there is a drawback to this regime: the time taken by an abandoned swidden to naturally return to conditions favorable to the growth of cultivates by far exceeds the time taken by human activities to create inappropriate conditions for the growth of cultivates, resulting in the necessity for swidden abandonment. This drawback is not nutritionally significant to the human population, as long as there are tracts of land which contain a vegetation complex that may be converted temporarily into an environment which is suitable for the growth of cultivates. While this drawback is not nutritionally significant to the human population, this drawback is nevertheless significant to the amount of land which the human population requires totally and at any given time.

The determination of what constitutes an adequate amount of land rests most fundamentally with the size of the human population and the capacity of the swidden complex to produce. Each member of the human population has his or her own energy and nutrient requirements, as modified by age, health, and degree and kinds of work undertaken. Each swidden produces so many units of energy and nutrients, as modified by its areal extent, previous time in fallow, crop assemblage, time in production, degree of gardening care, and virulence of pests. Provided that there are no other significant food acquisition activities (such as hunting, plant collecting, or fishing), the amount of land





under cultivation should indicate theoretically the amount which is deemed adequate by the existing population to satisfy its needs. Carneiro (1961:48) reports that the Kuikuru, of the Amazon basin (numbering 145 people), who derive 90% of their energy and nutrients from swiddens which mainly produce manioc, have 38.5 hectares in production at any one time. This works out to a little less than 0.3 hectare per person per year. Conklin (1957:146) observes that the Yagaw Hanunoo of the Philippines (numbering 125 people), who derive 80% of their diet from root crops and bananas and the remainder from upland rice, have 51.0 hectares in production at any one time. This works out to about 0.4 hectare per person per year. Clarke (1971:157) observes that the Bomagai-Angoiang of New Guinea (numbering 154 people), who derive 53% of the caloric value in their diet from sweet potato and taro and only 3% from pig meat, have 23.1 hectares in production at any one time. This works out to a little less than 0.2 hectare per person per year.

Insofar as land is only temporarily cultivated and must spend a longer period in recovery, it follows that the area of cultivated land does not itself constitute the total area of land required by the population. In short, there must be an area of reserve land which is all the while accruing quality (through ecological succession) for later use and which is of sufficient quantity to afford an equilibrium with the later needs of the population. The determination of the total area of land required rests in part on how long an abandoned swidden remains unused, which is a function of how long it takes to accrue exploitable quality. To some extent, the length of time required to accrue exploitable quality is conditioned by the degree to which a swidden degrades the environment, which is a function of how long it is cultivated. Thus, given the amount of land which must be cultivated per person at any one

time, the relationship of cropping time to fallow time, will establish nominally the amount of cultivable land which a population of a given size requires for the total cropping-fallowing cycle.

From the above discussion, a model may be developed to demonstrate in a visual way the dynamics upon which the shifting cultivation system is supposed to work. These dynamics are chiefly the result of the interaction of several variables such as size of population, swidden productivity, amount of land which must be cultivated at any one time, crop-fallow ratio, and extent of exploitable territory. A model employing these variables is presented in Figure 5.

The model assumes a human population of 150 people who are locally settled in a river-side village. It assumes that this population is arranged into twelve extended family households, each comprised of 10-15 people. It assumes that each household requires two hectares of land to be in cultivation at any given time to support its subsistence needs (roughly 0.2 hectares per person). It assumes that each of 24 active swiddens (two per household), will produce adequate yields for only two years. It assumes that these same swiddens, before they might be cultivated successfully once again, must be subjected to the process of ecological succession, which may adequately proceed in no less than ten years. It further assumes that, in the twelve year cycle, the population remains the same and that the limits to the territory exploited by cultivation are established only by the standardized perception of walkable terrain and distance and the will to walk. For purposes of demonstration, the terrain is idealized in terms of its quality for cultivation; all parts are exploitable.³³

In Figure 5-A, one finds a small hamlet surrounded by 24 gardens (totalling roughly 30 hectares) amidst a carpet of tree crowns.

SELF-REGULATING SHIFTING CULTIVATION SYSTEM (Figure 5.)

NOTES



RIVER



TRAMPLED VEGETATION





8 YEARS 6 YEARS 4 YEARS IN FALLOW Ī IN FALLOW FALLOW

IO YEARS IN FALLOW

are arranged into about 12 extended families. Settlement comprised of approximately 150 people, who

one particular area. as insurance against the eventuality that posts may ravage acres). Garden_areas are each approximately one hectare (2.47 Each household maintains two seperate yarden sites

TIME ENVIRONMENTAL DEGRADATION PHASE (Involving weed invasion, pest infestation, ECOLOGICAL SUCCESSION PHASE (Involving weed suppression, pest deconcentration, and nutrient regeneration) SPONTANEOUS VEGETATION FELLED, BURNED, AND TEMPORARILY SUPPRESSED BY WEEDING. PROGRESSIVE INCREASE IN BIOMASS OF SPONTANEOUS VEGETATION, IN ASSOCIATION WITH THE SEQUENTIAL CHANGE IN PLANT LIFE-FORMS. PROGRESSIVE DECREASE IN YIELD BY RESIDUAL CROPS SUCH AS MANIOC OR BANANAS.

SUFFICIENT REGENERATION OF SPONTANEOUS VEGETATION TO WARRANT RENEWED CULTIVATION.









For purposes of model development, this carpet is undifferentiated as to the seral stages which comprise it. The slight orientation of gardens along the river suggests the utilization of the river as a transportation medium. Upon completion of the first two-year period, the initial 24 gardens are phased out of production, whereupon, as indicated in Figure 5-B, 24 new gardens are put into operation for a two-year period. After completion of the third two-year period, as indicated in Figure 5-C, the first 24 gardens will have been submitted to the process of ecological succession for four years, the second 24 gardens for two years, with the third set of gardens ending their period of productivity, and with the fourth set of gardens about to be established. Figure 5-F represents a situation in which the cycle may close upon itself, for the initial set of gardens has been in fallow for ten years and thus has accrued the conditions which are appropriate to the growth of cultivates (as indicated by the reappearance of large trees and their associated litter which may be felled and burned for the release of their nutrients to the soil and for the intensification of light at the floor of the former secondary forest). Other sets of gardens, in various seral stages of ecological succession, differentiate the landscape by their biomass, with no set having a sufficient quantity except the initial set.

The situation represented in Figure 5-F is particularly crucial to the future of the human population employing the shifting cultivation system. They must decide where to cultivate next: the initial set of gardens or a new set of gardens at greater distances from the village. Advantages attached to the former include ease of clearing secondary growth (as opposed to difficulty of clearing primary growth, which is a disadvantage of the latter) and a return to short-distance between hamlet and swidden (as opposed to increased distances, which might

be viewed as a disadvantage of the latter). Advantages attached to the latter include no requirement to restrict population growth (which is a disadvantage of the former, given land requirements and the crop-fallow regime). Obviously, if the population has not restricted its growth during the cycle period (as was assumed in the model, for discussion purposes), the decision to move outward is predetermined to some extent, unless the population is willing to absorb potential declines in yield, by lengthening the cropping period and shortening the fallowing period, on preexistent gardens to thereby remain close to the established hamlet. The likelihood of this alteration to the established crop-fallow regime is unlikely, however, owing to the fact that gardens will lose some measure of productivity but must nevertheless support a population now in excess of the population they were initially capable of supporting.

Without the need for restriction of population growth, the shifting cultivation system has what Sahlins (1968:31) has called a "centrifugal effect" on the distribution of settlements. This effect is modified by two conditions which may be elemental to the need for restriction of population growth. First, while shifting cultivation societies are arranged in the main on the principle of lineage segmentation (with the effect that households have a large measure of political and economic autonomy and are thus prone to dispersion without disrupting the fabric of the community from which they move), it may be argued that the breaking of friendships and bonds of reciprocation is not generally viewed as desirable within households, whereupon they voluntarily seek to curb somewhat their reproductive exuberance so that a community of households need not fission and disperse for too large a population. Second, and by far more compelling, is that condition which arises if the local community and its associated exploited

territories, in which case the decision to move outward (as one of two alternatives posed in the situation represented in Figure 5-F) is negated or at least discouraged by the potential of conflict with neighboring communities which would preclude the effective use of land.

The issue of population growth and territoriality will be dealt with more completely in the next chapter. Suffice to note here that the biological tendency toward population growth in a community makes the shifting cultivation system unstable, particularly if a community is circumscribed by other communities, but that this tendency is countered by the sociocultural tendency to restrict population growth. Provided that the population of a community is not too large (150 in the model), the tendency toward increasing severity or instability of environmental degradation by the shifting cultivation system is countered by the tendency for shifting cultivators to respond to the initial indicators of the degradation (i.e. biotically-posed problems) by moving before environmental degradation becomes more onerous and thus, before the shifting cultivation system can no longer meet the subsistence requirements of the population.

NOTES

¹Spencer (1966:175-180) provides a glossary of no less than 150 vernacular and technical terms which have been employed in the literature as alternatives to the term shifting cultivation. With respect to the vernacular terms, this glossary is particularly useful in that it provides the geographic area where the term is employed.

 2 cf. Narr 1956; Pfeifer 1956; Slicher Van Bath 1963; Butzer 1964; and Parain 1966.

³The diversity of this literature is attested-to by now dated but still useful bibliographies compiled by Bartlett (1955, 1957, 1961), Hills (1960), and Conklin (1963).

⁴Notable among the regional surveys of shifting cultivation are those of: Allan (1965), Miracle (1967), and Moss and Morgan (1970) for Africa, south of the Sahara; Pelzer (1945) and Spencer (1966) for Southeast Asia; Barrau (1958, 1961) and Watters (1960a) for the Pacific archipelago; and Watters (1971) for Latin America.

⁵Ethnographies, in which shifting cultivation is of central importance, include those of: Izikovitz (1951) on the Lamet of Laos; Geddes (1954) on the Land Dayak of Sarawak; Freeman (1955) on the Iban of Sarawak; deSchlippe (1956) on the Zande of southern Sudan; Conklin (1957) on the Yagaw Hanunoo of Mindoro, Philippines; Meggitt (1958) on the Mae-Enga of Papua-New Guinea; Murphy (1960) on the Mundurucu of the Amazon Basin; Salisbury (1962) on the Siane of Papua-New Guinea; Scudder (1962) on the Gwembe Tonga of Zimbabwe; Brookfield and Brown (1963) on the Chimbu of Papua-New Guinea; Pospisil (1963) on the Kapauku of Papua-New Guinea: Vermeer (1964) on the Tiv, Ibo, and Birom of Nigeria; Yengoyan (1964) on the Mandaya of Mindanao, Philippines; Netting (1968) on the Kofyar of Nigeria; Rappaport (1968) on the Maring-Tsembaga of Papua-New Guinea; Carter (1969) on the Kekchi of eastern lowland Guatemala; Clarke (1971) on the Maring Bomagai-Angoiang of Papua- New Guinea; Waddell (1972a) on the Raipu-Enga of Papua-New Guinea; and Nietschmann (1973) on the Miskito of eastern coastal Nicaragua. To these selected ethnographies could be added journal-length field findings; these are too numerous to mention here, although many are referred-to in remaining chapters.

⁶As might be expected, topical inquiries are extremely The impact of shifting cultivation on soils and vegediverse. tation has been investigated by Bartlett (1956), Budowski (1956), Conklin (1959a), Popenoe (1959), Nye and Greenland (1960), Clarke and Street (1967), Vine (1968), Kellman (1969), and Scott (1974), as well as by the "Symposium on Effects of Shifting Cultivation on Natural Resources with Special Reference to Problems in Southeast Asia" (see Ninth Pacific Science Congress) and the "Symposium on the Impact of Man on Humid Tropics Vegetation" (see UNESCO). The role of shifting cultivation in the creation of a cultural landscape has been sought by Uhlig (1969, 1971). The role of shifting cultivation in the rise and fall of Mayan civilization has been pondered by Drucker and Heizer (1960), Cowgill (1961, 1962), Dumond (1961), Reina (1967), and Sanders and Price (1968). In light of many unresolved problems regarding the sociocultural evolution of particular societies (such as those posed by the Maya), a number of studies, which have focused on shifting cultivation, have taken-up the theoretical and methodological question of human carrying capacity of the habitat under existing food acquisition systems (Alland 1949; Conklin 1959b; Carneiro 1960; Loffler 1960; Hunter 1966; Bose 1967; Steet 1969; Brush 1970; Ajaegbu 1972; Bayliss-Smith 1974). Following Boserup's (1965) contention (cf. Dumond 1965: Clark 1967) that the approaching and surpassing of carrying capacity through population growth leads to intensification of labor and capital input in food acquisition systems, a number of studies have investigated the "Boserup hypothesis", with shifting cultivation as their focus (Watson 1965; Clarke 1966; Netting 1969; Carneiro 1970; Harner 1970; Maude 1970; Brookfield 1972; Waddell 1972b; Basehart 1973; Seavoy 1973). The "Boserup hypothesis" has been viewed as such a compelling alternative to the more commonly-held view, that intensification of agriculture initiates population growth, that it has received organized critical consideration in a colloquim entitled "Population Resources, and Technology" (Spooner 1972) and in the first number of the Peasant Studies Newsletter (see Nell 1972; Rubin 1972; Spooner and Netting 1972; de Vries 1972). Other studies have investigated the relationships of shifting cultivation systems and other organized social behaviors such as warfare (Sahlins 1961: Vayda 1969[1961]; Chagnon 1970; M. Harris 1974) and social structure (Sahlins 1968; Butt 1970; Forge 1972). Yet other studies have made comparisons of shifting cultivation systems and the tropical rain forest ecosystem in which they are commonly found (Geertz 1963: 15-28; D. Harris 1969; Igbozarike 1971; Dickinson 1972; Janzen 1973), while, recently, attempts have been made to provide energetics models of shifting cultivation systems (Rappaport 1971; Moran 1973; Montgomery and Johnson n.d.) and systems models of shifting cultivation (Shantzis and Behrens 1973; Hagle 1974).

⁷As Watters (1960: 59-60) has remarked, "Largely as a result of the low carrying capacity of most forms of shifting cultivation, and the deleterious effects to the environment aht occur when this capacity is exceeded, officers of the FAO have appealed for co-ordination among research specialists and field workers in renewed attempts to overcome the problems associated with shifting cultivation. They assert that shifting cultivation in the humid tropics is '. . . the greatest obstacle not only to the immediate increase of agricultural production, but also to the conservation of the production potential for the future in the form of soils and forests.' Stronger expressions of this view condemn the system as being wasteful or illegal, judging it to be not only a backward type of agricultural practice but symptomatic of a backward type of culture in general. Such a view is widely held amongst agronomists and forestry officers who are concerned largely with environmental aspects of shifting cultivation." Consider the instructive comment by Street (1969:106), who notes, "A pitfall that often trips enquirers into the ecology of shifting agriculturalists is the tendency to become enamored of the object of their scrutiny; the swiddeners appear to be so self-sustaining, so well integrated with their environment, so in harmony with nature that it is hard to believe that they may be damaging their resource base. . . . Unfortunately, my observations and those of many botanists and foresters are at variance with this belief." Could it be that the views of natural scientists and business-oriented types are trapped by enamoration of their own objects of scrutiny and are thereby prone to distortion of facts? Consider the reation of a forester who watches a mahogony tree go-up in a puff of smoke after being felled for the creation of a garden, for example. What makes this point particularly problematic in the present context is that natural scientists and business-oriented types seem to pull more weight in the influencing of policy than do those with some sensitivity to people engaging, as they have since time immemorial, in a way of life. To return to Watters (1960b:60), "An opposing view is held by many social scientists who see man and his way of life as the prime factor in the situation and conceive of agricultural systems largely in terms of the cultures which they exemplify. This view may be represented by Carl Sauer who has upbraided the modern

industrial West for its insensitiveness to other ways and values: 'We present and represent to the world a blueprint of what works well with us at the moment, heedless that we may be destroying wise and durable native systems of living with the land.' With some qualifications, Sauer finds shifting cultivation, 'in its basic procedure and crop assembliages,' to be '. . . most conservative of fertility at high levels of yield; that, being protective and intensive, we might consider it as being fully suited to the physical and cultural conditions of the areas where it exists.'"

 8 See, for example, Gourou (1956, 1966) and Sauer (1963).

⁹See Watters (1960b), Conklin (1963), Brookfield (1968), Clark and Haswell (1970:38-56), D. Harris (1972) and Grigg (1974:57-73). Of historical note, the first rigorous discussion of the systemic nature of shifting cultivation is probably that of Cook (1921); the first attempt to account for its circum-tropical distribution is probably that made by Whittlesey (1937a, 1937b).

¹⁰Conklin (1963:10-22), in his outline for the ethnographic study of shifting cultivation, discusses five processual phases of shifting cultivation: (1) site selection; (2) cutting; (3) burning; (4) cropping; and (5) fallowing. But as he points-out, these processes are varied as to place and may in some instances be inappropriate (cf. Brookfield 1968). For example, he cites the work of West (1957) where it is recorded that the people of the Choco in northwestern Colombia do not burn cleared vegetation but mulch it under perpetually humid conditions.

¹¹Watters (1960b:65) has suggested a classification that is sensitive to the centrality of shifting cultivation in a society's overall subsistence efforts, ranging from: "(1) Predominantly hunters and gatherers, but practicing shifting cultivation to some extent" through "(3) Depending almost entirely on shifting cultivation with almost no other source of food production" to "(8) Depending mainly on some permanent form of agriculture with some shifting cultivation."

¹²H. Odum (1970:5) draws a useful distinction in noting that shifting cultivation is a solar-based system (i.e. dependent upon photosynthesis and human energy expenditure) whereas the agro-industry of the United States, for example, is a fossil-fuel-based economy (i.e. requiring vast subsidies of fossil-fuel and its derivatives).

¹³Despite high productivity per unit of expended labor, Sahlins (1972:42) has remarked, "The major evidence for underexploitation of productive resources comes from agricultural societies, especially those practicing slash-and-burn cultivation." He adds, "This is not the simple point that the output of primitive societies is low: it is the complex problem that production is low relative to existing possibilities. So understood, 'underproduction' is not necessarily inconsistent with a pristine 'affluence' [cf. Ibid. pp. 1-39]. All the people's material wants might still be easily satisfied even though the economy is running below capacity. Indeed, the former is rather a condition of the latter: given the modest ideas of 'satisfaction' locally prevailing, labor and resources need not be exploited to the full" (p. 41).

¹⁴As will be discussed in the next section, soil fertility depletion and restoration is a slight oversimipligication of the need for long fallow periods. Indeed, soil fertility may well be a misnomer, in that it diverts attention from the significant locus of nutrient storage in the humid tropics context.

¹⁵Brookfield (1968:417) has argued that ". . . the use of the crop-fallow time ratio as a single criterion [for a typonomy of cultivation systems] be discontinued and that in its place we should move toward an *appreciation* of agricultural systems, based on their success in sustaining a maximum yield and ensuring that nutrients are not taken out of the ecosystem faster than they can be replaced." Accordingly, he suggests that, in light of their areal variation, such things as tillage completeness, labor input, crop rotations, degree and type of water control, nutrient control, and erosion control be given consideration in the classification of cultivation types. While one cannot criticize this argument, as it pertains to a classification exercise, the fact remains that when shifting cultivation is considered in terms of its dynamics, rather than as an "ideal type", the focus automatically proceeds to the crop-fallow regime (which subsumes the factors suggested by Brookfield). Harris (1972:260) shares this view in noting, "Despite Brookfield and Brown's suggestion that Chimbu agriculture 'is so far removed from the classic 'swidden' type that the term is a misnomer' it may be regarded as a swidden system - albeit an atypical one - in the sense that most land is cultivated for shorter periods than it is fallowed."

¹⁶Unfortunately, this "sanctuary" is now being penetrated with at least short-term success, owing to massive applications of recently innovated fossil-fuel derivatives (e.g. fertilizers, pesticides, and herbicides) and fossil-fuel-dependent machinery (e.g. earthmovers, helicopters). Whether or not the current repetition of past techniques can be made viable (i.e. that their proven failures can be forestalled). by the derivatives and dependencies of fossil-fuel), matters little in this context. What matters is that the erosion of the formerly inaccessible homeland of stateless societies is proceeding. Denevan (1973), a noted cultural geographer, views the demise of the Amazon rain forest as imminent and considers the consequences of this demise in terms of climatic and hydrologic change from deforestation, wildlife impoverishment through hunting, depletion of genetic material, and the removal of a vast "scientific laboratory" and source of "mystery and beauty". It is somewhat troubling that he did not mention the implications of this demise to the native human inhabitants. This threat, however, is not overlooked by Goodland and Irwin (1975).

¹⁷The tropical rain forest has received systematic attention from Richards (1952) and Odum and Pigeon (1970). Many general texts on biogeography discuss the tropical rain forest in detail, as well. See, for example, Walter (1964) and Eyre (1968).

¹⁸ The reasons for this characteristic have not been agreed-upon. Richards (1952:69-74) discusses several theories of buttress formation. One theory propounds that, in the competition for light and the subsequent attainment of increasing heights, the susceptibility to "windrock" has brought about the need to counteract compressive or alternatively, tensile stresses at the tree base. Another theory deals with the contention that tap roots are largely absent on buttressed trees because of water-logged soils, whereupon it is concluded that the extreme development of lateral roots (as evidenced by buttresses) is compensation for their absences.

¹⁹Eyre (1968:202) attributes bark thinness to high atmospheric humidity and warm ambient temperatures and adds ". . . bark thickness of only one to two millimetres is therefore quite common." He suggests as well, that leaf cutinization is brought about by the fact that ". . . the intense insolation and high temperatures at midday would cause less well-protected leaves to collapse and become useless for photosynthesis" (p. 209). He also notes that the leaves of most trees and shrubs which do not project to and through the forest canopy possess and elongated "drip-tip" which allows them to shed water easily and dry quickly. "This may be important for two reasons. In the first place epiphytic mosses and other small plants are more likely to infest a moist leaf than a dry one and thus impair its ability to photosynthesise; in the second place, a wet leaf will not transpire so quickly as a dry one. In the low light intensities that obtain inside this type of forest, photosynthetic efficiency is obviously important; furthermore, because of the prevailing low evaporation rates in this almost windless environment, efficient transpiration is equally important; unless water is lost from the leaves, there will be no mechanism by which water can be brought up from the roots, carrying with it essential, dissolved minerla nutrients" (pp. 200-201).

²⁰The significance of these microclimates may be seen in light of a comment by Richards (1952:401) who notes, "The removal of the forest cover at once changes the illumination at ground-level from a small fraction to full daylight. The temperature range greatly increases and the average and minimum humidity becomes much lower. There is a change from the complicated system of microclimates characteristic of high forest to conditions closely approximating to the standard climate of the locality."

²¹Meanings of the terms heterotroph, autotroph, and saprotroph were taken from Odum (1971:8).

²²To emphasize the importance of species diversity, Richards (Ibid., pp. 64-65) cites a case where a particular species of caterpillar killed-off trees in patches of a few acres, but he added, "The forest affected is not a typical rain forest, however, but a specialized type [i.e. swamp forest] dominated by a single tree species."

²³On a point which will gain significance in the next chapter, Sahlins (Ibid.) adds, "More general difficulties are confronted by greater communities. Some things, like rain, epidemic, or crop failure, happen to everyone. 'Everyone' then - that is, the village or all the villages thereabouts - may combine in supplication of the great super-natural agencies governing the common fate. It hardly needs saying that the feelings of collectivity and interdependence thus inspired help strengthen these larger groups. The way may be paved for cooperation in secular affairs, say communal construction of technical facilities, regional trade, or aid to neighboring communities suffering food shortages. The regional economy, however, is usually episodic; if it emerges at all. The tribal superstructure is a political arrangement, a pattern of alliances and enmities, its design shaped by tactical considerations."

²⁴ It may be noted here that if a swidden community often engages in warfare with other communities, the reasons for which will be discussed in the next chapter, then planting and subsequent garden activities fall largely to women. Because of this, marriage partners in shifting cultivation societies often exhibit residence based on location of a wife's family (i.e. uxorilocal) and reckon descent through a mother's line (i.e. matrilineal) (cf. Service 1962:110).

²⁵Most of the ideas contained in this section are derived from Nye and Greenland (1960). It is asserted here that this valuable book is deceptive and for want of a very careful reading of it, many researchers who have referred to it have interpreted it incorrectly and have thus perpetuated several myths about tropical soils and the impact of shifting cultivation on them.

²⁶ For example, Scott (1974:60), reporting on the Campa shifting cultivation system in eastern Peru, notes, "When available P, K, Ca, and Mg levels in the top 50 centimeters of soils under mature forest in the Shumahuani area are compared with those of new swidden only in use for half a year, the new swidden soils are seen to have higher levels for all of these nutrients. Amounts of N, P, K, Ca, and Mg are approximately 40, 215, 85, 275, and 470 percent greater, respectively, in new swidden soils than in those under mature forest close by" (cf. Popenoe 1959:75-76; D. Harris 1971:491-492).

²⁷The consequences of these eventualities will be considered in the next chapter.

²⁸Similarly, Scott (1974:59) observes, "Biomass studies indicated . . . that apart from obvious losses of the vegetation-cover nutrient-pool, soil organic matter contents only undergo minor changes before swidden abandonment." In his case, swiddens produce from one to three years.

²⁹ These rather exceptional statements do not deny, of course, that changes in the direction of nutrient depletion are indeed occurring. Exception is taken only as to the rate at which they occur. After all, crops are taking-up nutrients. Nye and Greenland (Ibid., p. 116) note, ". . . crop removal makes a significant contribution to the loss of potassium and to a lesser extent of phosphorus." As to erosion, they add (Ibid.), "In a forest soil under crop the greatest concentration of nutrients is in the top 3 in . . . Under normal native practice on slopes less than 10 percent loss by erosion during three years of cropping should not exceed 50 tons per acre and will usually not come near this amount. Thus, the loss is at most about one tenth of the fertile 3-in. layer. In spite of the fact that the eroded soil may be richer than the remainder, such a lose during a single cropping period
will have little effect on the availability of nutrients in the top soil. It seems therefore that erosion can scarcely be held responsible for a rapid decline in fertility except where catastrophic erosion occurs."

³⁰Scott (1974:61) contends, "While abandoned swidden soil nutrient levels vary little from pre-swidden levels, soil physical properties [e.g. bulk density] vary greatly. Soil physical property changes [e.g. toward compaction] must therefore contribute more than actual nutrient content changes to the widely held belief that swidden soils are seriously affected by extended use." (cf. Clarke and Street 1967; Kellman 1969).

³¹Some sense of weed intensity in an area not far removed from that described by Nye and Greenland is found in Kellman and Adams (1970).

³²The actual changes in floristic composition during a succession to a "secondary" forest are discussed in detail by Richards (1952:371-403). Important to note is that as succession proceeds, biomass increases and along with it the amount of nutrients stored in biomass. Nye and Greenland (1960:24-25) cite data for two secondary forests of different age at Yangambi, Belgian Congo (Zaire), in which a 5-year plot had roughly 40% less biomass than an 18-year plot, with the major differences being accounted for by woody matter. The latter plot showed increases in N (143%), P (310%), K (118%), Ca and Mg (192%) stored in plant material.

³³Obviously, in real situations some land is not available for cultivation owing to drainage problems or to conceptions of some land as sacred (e.g. burial sites) or inhabited by malevolent spirits, for example (cf. Conklin 1957:33-34).

CHAPTER IV

DEMONSTRATED PERTURBATIONS IN THE SHIFTING CULTIVATION SYSTEM OF STATELESS SOCIETIES

Recapitulation

In the preceding chapter, it was demonstrated how the shifting cultivation system is cyclical. It involves a long intervening period of ecological succession between brief periods of cultivation on the same site. Provided that the intervening period is long enough, it operates in such a way as to continually meet (albeit at changing locations) the subsistence needs of the human population without degrading the habitat progressively. It was suggested that this cycle is realized by a tendency to return to former swiddens with anticipation of continued production at accustomed yields. This tendency was seen to be encouraged by a preference for minimizing energy expenditure requirements (by slashing and felling secondary rather than primary forest and by walking and carrying things shorter rather than greater distances) and for maintaining established social relations. The maintenance of these relations, apart from reasons of sentiment (which may carry force in themselves), may serve to minimize energy expenditure requirements through reciprocated cooperation and aid. Yet this tendency is permitted only by a restriction of population growth. To exceed a certain population size is to initiate either group fissioning (to maintain labor inputs embodied in the established crop-fallow regime) or intensification

of labor inputs (i.e. energy expenditure) on the swiddens of a community (to compensate for the eventual reduction of the established fallow period as initiated by the increased demand for areas under cultivation at any given time). The latter alternative, while assumed to be not preferred, may be necessary if the group has nowhere to expand.

Readily apparent in the above discussion is the fact that the shifting cultivation system is not capable of supporting a large population in a small area. The presence of a large population initiates some rather drastic changes in the shifting cultivation system, as well as in the human population itself and its habitat. Thus, an increase in the density of the population is a serious matter which, while not necessarily unfortunate or unnatural, may well be unfortunate should it occur at an unnatural rate. It is therefore important to consider population density is terms of the means by which it increases and the time it takes to increase so as to acquire a proper perspective on perturbations in the shifting cultivation system.

Population Density - Means and Duration of Increase

Population density relates size of population to size of exploitable territory. It will increase: (1) with an absolute reduction in the unit-area of a stable population; (2) with an absolute increase in the number of people within a stable unit-area; or (3) with some combination of area reduction and population increase. Territorial subtraction and population addition, as the fundamental changes by which population density increases, may be considered in isolation, for despite having a similar impact on the shifting cultivation system (as will be demonstrated in a later section), they develop along dissimilar lines.

Territorial Subtraction

Territorial subtraction is essentially a straightforward process. It is the effective removal, from the domain of the shifting cultivation system, of land (and its attributes) upon which that system once actually or potentially depended. Effective removal of land can be initiated in several ways: (1) by the unfailing intention of people not involved by the system to occupy and exploit land held within the system and the consequent creation of a "no-man's land" by unresolved use-precluding conflict with people involved by the system [see Figure 6-A]; (2) by the actual occupation of land held-within the system by people not involved by the system [see Figure 6-B]; or (3) by the incidental transformation of land (and its attributes) held within the system, to the exclusion of human occupancy, by forces not directly "aimed" at the system [see Figure 6-C].¹

Viewed in such terms, territorial subtraction is a process that is induced from beyond the community which depends on the integrity of its territory, as that integrity would be defined by the cropfallow regime of the shifting cultivation system. It is a process over which the shifting cultivation community has little control and in the face of which it must react. And inasmuch as territorial subtraction is externally induced, it may occur at a moment's notice as a result of external circumstances.

Population Addition

Population addition is not so straightforward a process as territorial subtraction. To be sure, it is an increase in the number of people dependent upon the shifting cultivation system. But while population growth is usually reckoned by both in-migration and natural

increase, in-migration is largely irrelevant in shifting cultivation communities, owing to their closed social order. People not related by birth or marriage to the lineage or lineages which comprise the community have difficulty gaining admission into the community. This explains in part why land, if it is to be used by outsiders, must first be taken from the insiders. If people are added to the shifting cultivation community, then it must be by means of natural increase, which follows from a fertility (i.e. actual reproductive performance) rate that exceeds the mortality rate. Unfortunately, the demography of stateless societies has not received wide attention, particularly with respect to the nature of their natural increase. This is not to deny, however, that certain assumptions have been made about their demographic characteristics. In referring to the classic transition theory of population growth which postulates three successive phases of demographic structure as established by relationships between rates of birth and death. Kunstadter has observed (1972:314):

The first [phase] is supposed to have been characteristic of the vast majority of populations for the bulk of prehistory and history of mankind. This type has a high birth rate and a balancing death rate, with a consequent absence of population growth. The high birth rate gives these populations a high potential growth rate; many children are born, but few survive to reproduce. This condition accounts for the observed fact that on the average human population grew at an extremely slow rate from the time of the origin of the species until a few hundred years ago.

Yet he challenges the validity of this phase by arguing (Ibid., P. 315):

A more nearly accurate model of demographic conditions in the small hunting and gathering or agricultural communities within which most non-modern men have lived may have been high fertility (beyond the level needed for replacement in normal years) with low-to-medium death rate, with occasional or periodic variations in death rates due to natural disasters (floods, earthquakes, climatic fluctuations disrupting the normal environmental relations, insect plagues, crop failures, epizootics, etc.), and

probably more recently, epidemic diseases.

The pervasiveness of a high fertility-high mortality regime in stateless societies has also been placed into question by Neel, who has observed (1970:816):

The total human population apparently increased very slowly up to 10,000 years ago. If we may extrapolate from our [Amazonian] Indian experience, the slowness of this increase was probably not due to high infant and childhood mortality rates from infectious and parasitic diseases. We find that relatively uncontacted primitive man under conditions of low population density enjoys 'intermediate' infant mortality and relatively good health. . . . However, most primitive populations practiced spacing of children. Our data on how this spacing was accomplished are best for the Yanomama, where intercourse taboos, prolonged lactation, abortion, and infanticide reduce the average effective live birth rate to approximately one child every 4 to 5 years during the childbearing period. The infanticide is directed primarily at infants whose older sibling is not thought ready for weaning, which usually occurs at about 3 years of age. Deformed infants and those thought to result from extramarital relationships are also liable to infanticide. Female infants are killed more than male infants, which results in a sex ratio of 128 during the age interval 0 to 14 years.

These challenges to conventional wisdom are extremely significant here. It was implied in the previous chapter that, in order for the shifting cultivation system to work properly (i.e. to meet the subsistence needs of the human population without progressively degrading the habitat), there must be, minimally, a balance between the needs of the human population and the technically-modified capacity of the land to meet those needs, or if not a balance, then a quantity of exploitable land in excess of the needs of the population. But human populations exhibit a biological propensity to approach the balance point and to exceed it (i.e. to overpopulate) if not constrained for some reason and in some manner. The wisdom imparted by classic demographic transition theory is that high fertility is offset by the Malthusian checks of famine and epidemic disease, with the added implication that populations of stateless societies fluctuate greatly in their numbers. A high fertility-high mortality regime does not deny the possibility of a balance between population and productive territory, but the assertion of the prevalence of such a regime assumes that famine and epidemic disease are likewise prevalent. It has already been noted that famine is largely unheard of in shifting cultivation societies, owing to the way in which communities within the society reciprocate in times of hardship. And, by Neel's reasoning with respect to relatively uncontacted stateless societies, epidemic diseases are uncommon. He argues (Ibid., p. 819):

. . . the pattern of immunity to endemic diseases in the Indian and possibly other primitives can already be seen to differ in a number of aspects from the pattern in most civilized communities. Among the Xavante and Yanomama, for example, we find gamma globulin levels approximately two times those in civilized areas. Newborn infants presumably possess a high measure of maternal antibody acquired transplacentally. From the first, these infants are in an intimate contact with their environment that would horrify a modern mother - or physician. They nurse at sticky breats, at which the young mammalian pets of the village have also suckled, and soon are crawling on the feces-contaminated soil and chewing on an unbelievable variety of objects. Our thesis is that the high level of maternally derived antibody, early exposure to pathogens, the prolonged period of lactation, and the generally excellent nutritional status of the child make it possible for him to acheive a relatively smooth transition from passive to active immunity to many of the agents of disease to which he is exposed.

In the absence of such levelers of population as famine or epidemic diseases, the assumption of a high fertility rate in stateless societies would imply extremely rapid population growth and a general fillingin of the ecumene, a condition for which there is no archeological or historical evidence. Nevertheless, populations do tend to overpopulate. Yet, as Kunstadter has remarked (1972:323-324):

All societies have developed methods of dealing with their problems of underpopulation and overpopulation. In general, the first problem (avoidance of extinction due to reproductive failure) is handled by having annual reproductive rates on the average higher than values required for replace-The second problem, that of overpopulation of the ment. local community, is handled by a number of mechanisms affecting not only birth but also death and migration factors in the demographic equation. These mechanisms include such things as delay at marrigae by requirements of bride price (as economic conditions decline, marriage will be further delayed, thus increasing spread between generations, decreasing the number of childbearing years for the average married woman, and slowing the annual rate of population growth) selective morbidity (infanticide, geronticide, suicide. . . also, perhaps head-hunting, and warfare in general), non-reciprocal post-marital residence rules (especially situations in which women leave the village and are not replaced by equal numbers entering), village fission, expulsion of village members (e.g. for witchcraft, violation of taboos, etc.).

To these mechanisms may be added polygyny (i.e. several wives per hus-

band) which is prescriptively commonplace in segmentary tribes.

Benedict has speculated (1972:76):

Factors which may reduce the fertility of polygynous union are: (a) lower frequency of coitus per wife. Many societies have rules about the number of nights a husband is required to spend with each wife; (b) age factors. In most polygynous societies it is only older men who have gained enough wealth, power, and prestige to take more than one wife. Second and subsequent wives are usually very young women. It is assumed that such older men are less sexually active than young men. At the same time, the wives are forbidden sexual relations with other men.

Given these mechanisms of population control (in addition to the absence or at best infrequent occurrence of great levelers of population numbers in stateless societies) it is thus likely that, in the past, low rates of population growth (following from moderate fertility rates in slight excess of lower mortality rates) prevailed among stateless societies. Such a regime would not deny the possibility of a community balance between population and territory exploited by shifting cultivation. It is important to include here some further comments on the rationale behind population controls, for in addition to lending credence to the likelihood of a moderate fertility-mortality regime in stateless societies, they also will serve as background for certain issues raised in the final chapter. These comments proceed from a view voiced by Neel (1970:817):

The deliberate killing of a grossly defective child (who cannot hope for full participation in the society he has just entered) or of the child who follows to soon the birth of an older sibling (and thereby endangers the latter's nutritional status) is morally repugnant to us. I am clearly not obliquely endorsing a return to this or a comparable practice. However, I am suggesting that we see ourselves in perspective. The relationship between rapid reproduction and high infant mortality has been apparent for centuries. During this time we have condoned in ourselves a reproductive pattern which (through weanling diarrhea and malnutrition) has contributed, for large numbers of children, to a much more agonizing 'natural' demise than that resulting from infanticide. Moreover, this reproductive pattern has condemned many of the surviving children to a marginal diet inconsistent with full physical and mental development. . . . accepting the general harshness of the milieu in which primitive man functioned, I find it increasingly difficult to see in the reproductive history of the civilized world a greater respect for the quality of human existence than was manifested by our remote 'primitive' ancestors.

The "proper perspective" of which he speaks is developed by his incor-

poration of a view held by Firth (quoted in Ibid.):

It might be thought that the so-called sanctity of human life is not an end in itself, but the means to an end, to the preservation of society. And just as in a civilized community in time of war, civil disturbance or action against crime, life is taken to preserve life, so in Tikopia infants just born might be allowed to have their faces turned down, and to be debarred from the world they have merely glimpsed, in order that the economic equilibrium might be preserved, and the society maintain its balanced existence.

Dumond has attempted, in a rather convincing way, to distill the factors

underlying population growth (1972:288):

. . . to any breeding population bent by definition upon reproducing itself, equilibrium is in a sense 'unnatural', in that it is achieved through externally [i.e. non-genetic] inflicted, 'unforeseen' deaths. The anthropomorphic phrasing here is intended to highlight the coloring that is given to the maintenance of population-resource equilibrium among humans by two especially human characteristics - the power of foresight and the tendency to inject affection into close interpersonal relationships. The first of these allows advance warning of the possibility of at least some externally inflicted deaths. The second makes these deaths painful, not to those killed, but to those who survive. 'Unwanted' deaths are deplored. . . . Unwanted deaths - those that would be classed here as 'external' controls on population [e.g. starvation] - may be partially avoided by acts of three sorts:

- (1) Limitation of population increase either at or before birth.
- (2) Migration of surplus members outside the territorial sphere of the society [or community].
- (3) Expansion of subsistence techniques and resources . . .

In addition to suggesting two actions which were discussed earlier, Dumond mentions alteration of the established subsistence strategy. This point will receive further attention in the next section. He cogently argues further what underlies any of these actions or deci-

sions (Ibid,):

In general, I expect the[se] decisions involve a balance among three components - the satisfaction of material wants, the satisfaction of affective relationships (including purely symbolic ones, as with gods), and expenditure of least effort. This balance is not achieved by 'maximizing' returns in any of these spheres. Rather, it is achieved by the minimization of relative deprivation. Relative deprivation is used approximately as it was presented by Aberle, who extends the concept to all spheres in which things or acts are valued - to matters of possessions, status, behavior, and worth - and defines it as a 'negative discrepancy between legitimate expectation and actuality, or both.' It is *relative* in that it is individually determined according to cultural standards and individual experience.

With so much said for the rationale behind the conservative nature of population growth, especially among stateless societies, two final points regarding population addition should be made.

First, it should be clear that while population control is to some extent conscientized and direct (e.g. abortion and infanticide), there are other methods which yield the same result but which may not be recognized as achieving or pursuing that end. For example, prolonged lactation, so as to increase the life chances of a suckling infant, effectively spaces permitted births. Katz (1972:362) has suggested a "nursing inhibition of pregnancy". If a birth manages to occur prior to weaning of the older sibling, it may be terminated not so much to control population increase as to insure that the older sibling begins a good life (i.e. to prevent its deprivation). The decrease in the childbearing years of a woman brought-on by the economically-founded inability of a man to pay a bride price is yet another example of indirect population control.

Second, regardless of whether or not population control mechanisms are conscientized, such mechanisms are seen to involve adaptive interaction of the productive forces and relations of production of the economic base and the ideological superstructure (to recall the terms employed in an earlier chapter). As such, population addition, unlike territorial subtraction, is essentially a process which is induced within the community, as conditioned by the ability of the shifting cultivation system to meet the needs of the population, existing and increasing, and as modified by actions to minimize relative deprivation. Should population increase to the point where relative deprivation is experienced as a norm, then one may well wonder if the adaptive interaction of the various levels of human activity is being disrupted.

Impact of Territorial Subtraction and/or Population Addition

On the Shifting Cultivation System

To illustrate the impact of the process of either territorial subtraction or population addition on the shifting cultivation system, it will serve to extend the model presented in Figure 5-F. In this extension (see Figure 7), the process of population addition will be considered. It should be noted that no attempt will be made at this point to account for the reasons behind the addition considered. Recall that in the earlier model, a population of 150 was assumed and that roughly 0.2 hectares per person was required to be in cultivation at any given time, given the productivity established by the prevailing food acquisition techniques. If one assumes that the population increases from 150 to 300, it is clear that the land in cultivation must rise from 30 hectares to 60 hectares to meet the nutritional needs of the increased population by the same food acquisition techniques. If it is further assumed that the limits of exploitable territory are no longer fixed by the will-to-walk, but are fixed by external forces (e.g. abutting territories of other shifting cultivation communities), then the increased requirements for cultivable land must be met within the territory. Given the prevailing food acquisition technique, land continues to be cultivated for two years before being required by biotic pressures to revert to a seral stage of vegetative growth.

A comparison of Figure 5-F and Figure 7-A will reveal that 60 hectares are being cultivated on the more rejuvinated areas of the territory. Some of the cultivated area is superimposed over abandoned swiddens which have been in fallow for ten or eight years; some is superimposed over interstices of forest growth which may be primary or

STRESSED SHIFTING CULTIVATION SYSTEM (Figure 7.)

NOTES:



RAIN FOREST









2 YEARS IN FALLOW 4 YEARS IN FALLOW

> Settlement population has increased from 150 to 300 people. In so doing, the land area required to support that population at any one time has increased from 30 hectares to 60 hectares.

Garden areas are each approximately one hectare (2.47 acres), although they have come to be contiguous with adjacent gardens.

ENVIRONMENTAL DEGRADATION PHASE SPONTANEOUS VEGETATION FELLED, BURNED, AND TEMPORARILY SUPPRESSED BY WEEDING. ECOLOGICAL SUCCESSION PHASE PROGRESSIVE DECREASE IN YIELD BY RESIDUAL CROPS SUCH AS MANIOC OR BANANAS. PROGRESSIVE INCREASE IN BIOMASS OF SPONTANEOUS VEGETATION. HOWEVER, WITHOUT A SUFFICIENT REGENERATION OF SPONTANEOUS VEGETATION WITHIN THE TERRITORY, CULTIVATORS ARE FORCED TO INITIATE CULTIVATION IN AREAS WHERE ECOLOGICAL SUCCESSION AN INTERDICTION IN THE PROGRESSION OF BIOMASS INCREASE TO A LEVEL WHICH WOULD OTHERWISE

WARRANT RENEWED CULTIVATION.







secondary but which, in any case, are more developed than abandoned swiddens. After two years of cultivation, yields begin to diminish and thereby bring about a movement to 60 "fresh" hectares (in Figure 7-B). A problem arising here is that, while some of the new cultivated area is superimposed on forest interstices, some is superimposed on plots which have not been in fallow for more than six years. One may assume, however, that some offsetting takes place between more productive and less productive areas and that adequate yields are realized for two years. Again, however, there is a need for 60 "fresh" hectares after two years of cultivation (see Figure 7-C). As before, some offsetting in yield performance can be expected, with adequate yields being realized but with greater difficulty since some of the land will have been in fallow for only four years. Upon completion of cultivation in Figure 7-C, the next 60 hectares must be found in the area which has been in fallow the longest. Such an area will have been in fallow for only four years. So begins a foreshortening in the crop-fallow ratio of the established shifting cultivation cycle, from twelve years (two years cropping, ten years fallow) to six years (two years cropping, four years fallowing), wherein determination of the proper crop-fallow strategy to follow is difficult. The problems attached to such a determination are best considered in the context of the habitat in which such a foreshortening is experienced.

On the Habitat

Given such a foreshortening, it might be argued that cultivators initially seek to maintain the fallow that has proven to be long enough to provide adequate growing conditions for cultivates. In order to maintain such a period (i.e. ten years in the model), the land in

cultivation must now be cultivated for a period of five years rather than the "normal" period of two years. As will be argued in this section, however, the maintenance of a ten-year fallow, by lengthening the cropping period, is not a viable option in the long-term. The problems here are that biotic pressures (i.e. weeds and pests) continue to increase with time and make the adequacy of yields in the extended period more of a tenuous proposition than in the normal period. Recall that it was because of such pressures that yields began to decline to thereby force a movement of swiddens after two years. Unfortunately, in addition to biotically-posed problems, the increased time in cultivation of swiddens and contiguously increased areas under cultivation at any one time set in motion other causes both for progressive declines in yield and variety of yield and for the need to increase the minimum time for adequate fallow. These causes involve nutrient depletion, soil compaction and erosion, and impoverishment of spontaneously-occurring genetic materials, all of which are interrelated.

While nutrient depletion was not regarded as an immediate cause of abandonment of swiddens in the previous chapter, it was not denied that it was a process which was initiated with clearance of the forest growth. Such a clearance removed the continued source of plant litter, so important to the formation of humus. Despite the removal of this source, it was contended that humus levels did not decline rapidly but slowly albeit steadily. As a consequence, humus micelles were capable of holding large quantities of cations, which were washed into the soil from the ash of burned plant materials, thereby raising the fertility of the soil. However, mineralization of humus, the consequent release of nitrates (as well as phosphates), and the attraction of low valence cations (e.g. potassium) by nitrates in soil

solution, as well as the direct removal of cations from micelles by root hairs, all combined to reduce soil fertility over time.

With time, a reduction in the availability of low valence cations may pose a limiting condition for the growth of certain crops which require them in fairly large amounts. For example, Nye and Greenland (1960:116) note, "The removal of potassium will be increased by greater production of carbohydrate crops like cassava, yam, cocoyam, sweet potato, and plantain which have a high potassium content." It stands to reason that as time progresses so too will the reduction of potassium, either through crop uptake (and the subsequent removal of crop parts from the swidden site), or leaching. Such a reduction will limit yields, if not proper growth of nutrient- "specific" crops altogether. If the growth of certain crops is so limited, it follows that crop variety will be decreased.² It need not be overemphasized that such a decrease is likely to have nutritional consequences in the human population as there are less plant types from which to choose. For a population to acquire most of its protein from plants, it needs only to be pointed-out that plants are rather limited in the kinds of amino acids which comprise them and hence a wide variety of crop types is essential to acquire the various kinds of amino acids necessary for a sound protein diet (cf. Guthrie 1971:53-55). What needs to be emphasized is that such a decrease bears implications to the rate at which secondary vegetation can reestablish itself.

Not only does a decrease in crop variety symptomize nutrient depletion (which itself must be overcome somehow if secondary vegetation is to reestablish itself), but also it means that fewer kinds of crops (tolerant of nutrient-depleted conditions) can serve by their now simplified growth habits to protect the soil surface from a beating by

precipitation. Such beating promotes soil compaction, as does intensified walking in the garden area with time, as indicated by increases in bulk density of swidden soils over time (Popenoe 1959: 73-74; Scott 1974:59). Soil compaction, in turn, reduces infiltration of rainfall and thereby promotes sheet and rill erosion. Such erosion laterally transports nutrients and adds to the nutrient depletion problem at the source of eroded materials. Kellman (1969: 49) has observed that the loss of sediment from a new swidden planted in maize was 418 grams in a cropping period while the loss from a twoyear old swidden planted in maize was 1215 grams; the loss from a new upland rice swidden was 229 grams while the loss from a twelve-year old upland rice swidden was 34,800 grams. Given the larger area under cultivation, without intervening breaks of established vegetation (as when swiddens were small and scattered), it may be argued that erosion is further promoted (cf. Nye and Greenland 1960:88).

Despite nutrient-depleted conditions, weeds make their appearance without apparent difficulty (Scott 1974:60). As is often the case when the cropping period is extended, however, swiddens are reburned so as to suppress nutrient-competing colonizing vegetation. Unfortunately, in addition to further aggravating the possibilities for erosion by exposing the soil to rainfall, tree saplings are included in this colonizing vegetation. As Nye and Greenland observe (Ibid., p. 8; cf. Budowski 1956):

Some grasses and other herbs will always invade an abandoned clearing, but in normal circumstances the developing forest species rapidly suppress them. When, however, woody regrowth is slow the herbs form a good cover. This may be burnt during the following dry season, killing the firetender suckers and seedlings of the forest trees; and then

the forest gives way to a 'derived savanna' maintained by annual burning.

The slowness of woody regrowth is no doubt attributable to nutrient depletion (through crop uptake, leaching, and accelerated erosion) and it may be postulated that the greater the depletion, the slower the regrowth. But contributing to the slowness of woody regrowth is subsequent reburning in the period of extended cropping which serves to destroy genetic materials of woody plants. Were the cultivated area not too large, as when individual swiddens were about one hectare each, reseeding from the forest edge might not prove too difficult despite reburning, yet given such a large cultivated area, it seems reasonable to assume that reseeding is made difficult and that reestablishment of forest growth is further prolonged.³

The prolongation of forest reestablishment extends the minimum adequate fallow period, thereby making the strategy of extended cropping periods to maintain ten-year fallows an exercise in futility. The cost of this exercise is further increased by progressive declines in yield and variety of yield. It serves to recall here that the effects of the fallow period are to "cleanse" the former swidden of bioticallyposed problems (i.e. to deconcentrate animal pests and to shade-out weeds), to replenish the humic fraction of the soil, and to hold in vegetated storage nutrients which may be released upon burning. Cultivation of former swiddens prior to the return of adequate levels of nutrient-holding and -bearing humus and living vegetation-stored nutrients obviously bears serious implications for the quality of further cropping. Yet shortening the normal cropping period, as the alternative strategy to that discussed above, brings with it a shortening of the fallow period. For example, reducing the cropping period

to one year in the model would mean that fallow periods could be no more than two years. While a shortened cropping period would suggest a reduction in biotic pressures, nutrient depletion, soil compaction and erosion, and genetic impoverishment, swiddens would not be abandoned for a period long enough to establish woody fallow, so important for the addition of organic matter to the soil for humus formation and for burn-released nutrients and for the removal of weeds. Rather, a fallow of two years would probably allow only non-woody spontaneous vegetation to establish itself before cultivation was resumed.

Nye and Greenland (1960;24-25) compare the nutrient content of woody and non-woody fallows. From their data, it is clear that there is less litter and smaller quantities of nutrients in standing vegetation of the latter than of the former. The significance of this point is that humus formation proceeds at a lesser rate than it is mineralized and that nutrients are added to the soil in smaller quantities upon burning of the lesser developed vegetation, with the consequence that soil conditions are progressively degraded as evidenced by spontaneous vegetation which succeeds only to grassland (cf. Conklin 1959a). In the cropping period, this means that poor yields and a reduced variety of yield may be expected at the onset and, because of the matlike root systems of grasses, that erosion-accelerating soil tillage with traditional tools (which is minimal under normal conditions) is made inordinantly difficult yet necessary.

Given the rather severe changes in the habitat which are brought on by a foreshortening of the shifting cultivation cycle, as the immediate response to increased population density, it is important to consider what these changes hold in store for the human population which has increased in size to bring about these changes.

On the Human Population

The implications of increasing population density (as a function of either territorial subtraction or population addition, or both) on the human population of the shifting cultivation community are usefully considered in conjunction with certain theories which view population growth and the subsequent pressure on resources as the driving force in the transformation of societies.

With an increase in population density and a concomitant foreshortening of the shifting cultivation cycle, conditions are said to arise which compel an intensification of labor to counter those conditions (i.e. to increase yields on the decline and thereby meet the subsistence needs of the expanded population). Such is the theory of agricultural growth, as posited by Boserup (1965). Spooner has noted the finer points of this theory accordingly (1972:xvi):

As population grows, more people per unit of land are faced with the necessity of producing more food per unit of land, and they are able to do this by intensifying their relationship with the land - their technology - moving from hunting and gathering through stages of cultivation with ever shorter fallow periods to the final stage of intensification which is multicropping with no fallowing. However, according to her thesis there is a penalty: with each increase in output per unit of land, output per unit of labor is more likely to decline than increase. Therefore, according to the Law of Least Effort, cultivators do not normally intensify, or adopt technological innovations related to intensive agriculture, except when forced by the pressure of population on resources.

It should be emphasized that, according to the Boserup theory, intensification proceeds only if other options are closed-off, such as when there is no territory which remains unexploited to which surplus members of a community may migrate. Yet even here, an option to intensification presents itself, and, for this reason, some exceptions may be taken to the Boserup theory with regard to the immediacy with



which intensification is undertaken following the expression of population pressure. Rather than immediately intensifying subsistence labor, population pressure may lead to warfare over land between the community experiencing such pressure and other communities within the same tribe or of adjacent tribes which surround it.⁴

Perhaps in the short term, warfare alleviates the need for intensification of subsistence labor, for as Vayda has theorized (1968: 88-89):

(1) A diminishing per capita food supply and increasing intra-group competition for resources generate intense domestic frustrations and other in-group tension; (2) when these tensions reach a certain level, release is sought in warfare with an enemy group; (3) a result of the warfare is reduction of the pressure of people upon the land either because of heavy battle mortality or because of the victorious group's taking its defeated and dispersed enemy's territory; (4) the reduced pressure on the land means that the diminution of per capita food supply and the increase of intra-group competition over resources are arrested and that domestic frustrations and other in-group tensions can be kept within tolerable limits.

As M. Harris (1971:231) contends, however, "Excessive warfare is an ecological trap into which primitive man has fallen again and again," and he adds that ". . . there is no need to impute any high efficiency to warfare as a population control mechanism." One may deduce that, for stateless societies, warfare is something less than efficient as a community mechanism for controlling population growth because of several factors. Weaponry is relatively crude; combatants are similarly armed; delivery of weaponry is modified by its fearful aspect.⁵ But while warfare may not be an efficient community mechanism for controlling population growth, it may nevertheless be an efficient mechanism for controlling because of its fearful aspect. Carneiro, in an attempt to isolate the

theoretical conditions necessary for the emergence of the state, has observed (1970:735):

Warfare was certainly frequent in Amazonia, but it was waged for reasons of revenge, the taking of women, the gaining of prestige, and motives of a similar sort. There being no shortage of land, there was, by and large, no warfare over land. The consequences that did occur in Amazonia were as follows. A defeated group was not, as a rule, driven from its land. Nor did the victor make any real effort to subject the vanquished, or to exact tribute from him. This would have been difficult to accomplish in any case, since there was no effective way to prevent the losers from fleeing to a distant part of the forest. Indeed, defeated villages often chose to do just this, not so much to avoid subjugation as to avoid further attack. With settlement so sparse in Amazonia, a new area of forest could be found and occupied with relative ease, and without trespassing on the territory of another village. Moreoever, since virtually any area of forest is suitable for cultivation, subsistence agriculture [viz. shifting cultivation] could be carried on in the new habitat just about as well as in the old. It was apparently by this process of fight and flight that horticultural tribes gradually spread out until they came to cover, thinly, but extensively almost the entire Amazon basin. Thus, under the condition of unlimited agricultural land and low population density that prevailed in Amazonia, the effect of warfare was to disperse villages over a wide area, and to keep them autonomous.

Yet with the eventual "filling-in" of the Amazon basin and the consequent claim by dispersed villages on territory surrounding them, there was created a situation wherein any outward expansion of a community's territory in response to the growth of its population was, at some point in that expansion, in danger of encroaching upon the territory of a neighboring community, or, at best, of getting close enough to become vulnerable to village attack or swidden raiding from a neighboring community. The simple fear of attacks and raids, increased by occupation and exploitation of territory too close to neighboring communities, may well explain why many communities restricted the growth of their population so that population pressure would not force group

fissioning. It has already been suggested that group fissioning may have been tempered by control of population growth so as to maintain established social relations and thereby minimize individual energy expenditure requirements for subsistence. Adding to this the idea that a group which fissions is faced with a potential adversary, it becomes understandable why the Amazon basin was not more densely populated by shifting cultivation communities. Nevertheless, one shifting cultivation society in Amazonia is notably anomalous for extreme group fissioning and intense warfare, although the reasons for such activity appear not to derive from the shifting cultivation system which it employs. Despite its anamolous nature, Yanomamo society exhibits tendencies which, if they were not spawned by the shifting cultivation system which they employ, certainly bear serious future implications for the food acquisition technique. By examining these tendencies, it becomes clear why warfare, as an alternative to intensification of subsistence labor, is a short-term proposition.

According to Chagnon (1970:249), the Yanomamo Indians number some 10,000 individuals and are distributed in 125 widely-scattered villages, of which none are more favored than the others in terms of available resources. One might expect therefore that villages would be more or less evenly-spaced and roughly equal in the number of inhabitants of each. Such is not the case, however. Villages at the center of Yanomamo territory tend to be larger than those at the periphery, and closer together. By being closer together, they tend to impinge upon one another more frequently than those at the periphery, with more frequent and intense warfare as a consequence. Chagnon concludes (Ibid., p. 251):

. . . where warfare is intense and migration out of the area is not feasible, there is selection for larger local

groups and more elaborate intergroup relations. The key to the developments appears to be in the absence of an accessible frontier. . . For all intents and purposes, Yanomamo villages for which long migrations are not practicable or possible are in fact circumscribed, not by geographical features, but by competing social entities.

In the emergence of large and allied local groups, which are obviously a distinct military advantage, Chagnon maintains (1970:250):

. . . [there] is a greater committment to cultivation. Where reciprocal feasting and alliance occur, villages tend to have substantially larger gardens. Thus a village at the center of the tribal distribution must not only produce enough food to feed its members but it must also produce a surplus beyond this that is used either for entertaining guests at feasts or to feed the members of a beleaguered village should they be forced by their enemies to take refuge with that ally. Thus, alliance necessitates a greater committment to gardening which in turn diminishes the possibility of migration to a new area when enemies threaten. This is so because a group with a large garden is more reluctant to move, since starting a new garden elsewhere involves extreme difficulty, both in terms of the labor involved and the privations that are endured during the first year or two when the crops ripen in cycles.

Thus, in the center of the territory, villages have little choice but to stand and fight, which is a significant change from the fight and flight regime that initially filled in the Amazon basin. What is important to note is that warfare does not appear to be checking population growth, despite the fact that roughly 30% of all males die violently and that, in accordance with a preference for male births (for eventual warfare), female infanticide is institutionalized (Chagnon 1972, passim). As villages grow, the question remains: What will be done in the gardens to increase production for the larger village and for larger allied villages which must continue to be treated to feasts as a guard against attacks from larger non-allied villages? It seems clear that, whether or not warfare continues, subsistence labor will have to be intensified so as to compensate for the eventual foreshortening of the shifting cultivation cycle which must follow an increase in population density with no associated fissioning of the group.

It becomes even more clear that warfare is not a viable long-term option to intensification of subsistence labor when combatants are not of equal prowess, as is often the case when different sociocultural adaptations are vying for the same territory. Netting (1965: 84-85) contends that, in response to the slave raiding of the mounted armies of the Fulani vassal states, the Kofyar of Nigeria sought refuge in the rocky hills of the Jos Plateau, for purposes of protection from a cavalry which was highly effective on the surrounding plain. Growing in number yet confined to an externally limited area of exploitation, the Kofyar intensified their agricultural techniques out of necessity, by bench terracing, composting, the planting of nitrogen-fixing legumes, and fertilizing with household ash. They were thereby able to offset the deleterious effects of foreshortening of their shifting cultivation cycle to a point where continuous cropping occurred on the same plot yet still produce enough food to meet their subsistence needs. In recognition of the Boserup theory, he adds (1969:106):

It is too often overlooked that intensive methods without corresponding improvement in technology imply an increase in the amount of labor expended relative to food units produced. The intensive cultivator works harder for his daily bread than his shifting brethren. Terrace building and elaborate ridging, maintaining of domestic animals for manure, careful hoeing, and weeding, transplanting, multicropping, water control, and conservation all involve more working hours than slash-and-burn field preparation. Given the fact that 'the best general rule to the behavior of primitive farmers is that they work to get the maximum return for the minimum effort' (Nye and Greenland 1960: 129), the effort will only be intensified when the maximum return, under the old system of agriculture, is no longer enough to maintain a desired standard of living. Conversely, if population pressures are relaxed by the opening of new land, even fully competent intensive cultivators such as the Kofyar will quickly revert to less strenuous farming methods.

Interesting to note is that British "pacification" effectively halted slave-raiding and thereby opened formerly restricted territory (Netting 1965:94). The Kofyar, who were beginning to experience population pressure even under intensive techniques, are now moving back to the plain and exploiting it by means of shifting cultivation. And while not as productive per unit area, Netting (1969:106) observes that farms on the plain are larger than in the hills and compensate in areal extent for lesser yields per acre.⁸

It has been argued thus far that warfare over land is a shortterm option to intensification of subsistence labor (or that avoidance of warfare may bring such intensification about). Nevertheless, it should be mentioned in passing that warfare, whether for land or less crucial reasons, may be disintensified at least temporarily, not necessarily through intensification of subsistence labor but through crop changes and consequent extensions in the range of exploitable land (see Harlan 1972). New Guinea provides an excellent example of this. Watson (1965a:302) has cogently argued that with the introduction of the sweet potato (Ipomoea batatas) some 200-300 years ago, the incipient horticultural populations of New Guinea exploded in their numbers (albeit at different rates) to the extent that warfare became endemic in many areas, owing to ". . . greater propinquity of communities and, native perception to the contrary, greater pressure upon the land" (Watson 1965b: 447). Yet there is little reason to believe that warfare did not occur prior to the "Ipomoean revolution". One may suspect, however, that warfare was of the sort suggested by Carneiro for the initial "filling-in" of the Amazon basin, that of fight and flight. The effect of the sweet potato was to increase the area to be filled-in (by its ability to thrive in the cooler temperatures found at higher altitudes in the

Highlands), as well as to increase the carrying capacity of the area to be filled-in (by its more prolific yield as compared to important pre-Ipomoean crops such as taro or yam). In short, it created a density threshold much greater than that before its arrival, which may have been made even greater by the coincident pursuit of sweet potato by wild, and ultimately domestic, pigs (Watson 1965a: 299). 9 With the eventual growth of populations and the consequent approaching of the new threshold, foreshortening of shifting cultivation cycles began to occur and so too warfare over land. Evidence of such foreshortening is to be found in the many areas of New Guinea which have been converted into permanent grasslands (Watson 1965b:444). Given the inefficiency of warfare as a population control mechanism in stateless societies, except in isolated cases, intensification of subsistence labor appears to have been selected by those populations exhibiting high population 10 densities (although warfare has occurred simultaneously in many cases).

In sum, the impact of increasing population density on the shifting cultivation system is a foreshortening of its cycle. To this foreshortening the human population must respond, eventually, so as to compensate for the deletereous effects such a foreshortening has on the habitat and consequently on crop yields. Compensation involves the adoption of techniques which are aimed in their effects at substituting for the natural effects of ecological succession. To the extent that ecological succession is suppressed, it could be added that suppression means degradation of the environment, but if intensification manages to provide the same effects as ecological succession, it may be said that degradation is under control (i.e. not progressive).



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Some Compelling Questions

By way of the model presented in Figure 7, it was demonstrated under what conditions the shifting cultivation system becomes stressed and how, if these conditions persist, the system breaks down. To demonstrate this breakdown, it was assumed that the human population of the shifting cultivation community doubled in size, over that presented in Figure 5, while its territorial extent remained the same, although recently circumscribed by territories of neighboring communities. Such a change was seen to increase the population density and thereby foreshorten the shifting cultivation cycle. Such a foreshortening was seen to initiate severe degradation of the habitat and decline in crop yields and varieties. Such degradation and associated decline was seen to encourage warfare with neighboring communities in an effort to acquire more territory and, eventually, to force intensification of subsistence labor to compensate for incomplete ecological succession so that higher yields per unit area could be realized to meet the needs of the expanded population.

No attempt was made to explain the basis of an assumed doubling in the population. Rather, for heuristic purposes, it was considered more important to directly impress the extreme perturbations which the shifting cultivation system could be brought to manifest by too great a population density and what the human population might do in response to these perturbations. This tactic makes the question of population growth extremely compelling in light of the drastic consequences of such growth. Early in the chapter, it was argued that human populations possess foresight. So why would a population grow if it saw that its area of cultivation at any one time was increasing while its overall territory was not? It was also argued that population

growth in stateless societies is rather slow. Could this slowness allow for experimentation with intensive techniques, given the foresight of pressure on the land from a slowly increasing population? Could the "ecological trap" of warfare, as an alternative to intensification of subsistence labor, buy time for further experimentation? Such questions are no doubt of general academic interest, but they divert attention from a more compelling set of questions which follow from an assumption that the doubling of the population occurred at an extremely rapid rate. Under what conditions might a population grow "abnormally" quickly and why might foresight not temper such growth? Could the population experiencing such growth be able to react with sufficient speed as to intensify without experimentation of its subsistence labor and successfully increase the yields necessary to support the rapidly expanded population? In light of the drastic consequences of population growth generally, these latter questions seem worthy of pursuit so that conditions favoring rapidity of population growth might be known, if not avoided.

While population addition was considered as one means by which population density increases, territorial subtraction was considered another means. And while the former was considered essentially an internal matter, the latter was viewed as externally induced. In the discussion of warfare, the point was made that warring shifting cultivation communities had some measure of equality and that territorial subtraction by one such community of another was a difficult proposition. For territorial subtraction to succeed, there must be an overpowering of one group by another. One might expect, therefore, that better equipped, organized, and supported groups would have an overpowering advantage on groups not so well equipped, organized, and supported.

In what instances might such advantages exist? In light of the first chapter, this is something of a rhetorical question. The question is raised, nevertheless, to suggest that activities of institutions and agencies of the nation-state, in addition to effectively engaging in territorial subtraction, may also create conditions responsible for rapid population growth in shifting cultivation societies. It is useful to recall here that, despite the assumption of rapid population growth, stateless societies left to their own devices appear to grow rather slowly. If they are to grow rapidly, it seems likely that externallyinduced changes in their ideological prevention of birth and their technical ability to prevent death play a significant role. This likelihood, together with the reality of territorial subtraction, will now be examined and their implications considered in the context of contact between shifting cultivation societies and agencies, institutions, and socio-economic classes of the nation-state.

NOTES

Hunter (1966, 1967) provides a fascinating example of this last kind or territorial subtraction. Although his example deals with shifting cultivation (bush fallowing) in savanna woodland of northern Ghana, it provides an interesting lesson. He shows how the advance of the black fly, the vector of onchocerciasis (river blindness), has forced the effectively permanent abandonment of two-fifths of the cultivable territory, thereby increasing population density in the area where the fly has not entered. This invasion has rent havoc on the population, bringing about male emigration (for purposes of finding alternative means of livelihood) at 4% per year and a sex ratio in the 15-44 age group of the remaining population of 52 males per 100 females.

²Vermeer (1970), in discussing the Tiv of Nigeria, has observed that with population pressure traditional crop rotation practices have been altered. Yams, of paramount importance in the Tiv diet and ceremonial activity, were formerly planted first in a swidden sequence, but with current degraded soil conditions, they do not yield well. Other crops, such as fast-maturing sweet potatoes and peanuts are now planted first, followed by yams in succeeding years, with yields substantially less than in former times. The point here is that if crop variety is not decreased, the importance of certain crops may nevertheless wain because of poor performance, with consequent dietary and cultural disruptions.

³This may be inferred from Conklin (1957:62) who argues that in the normally small swiddens of the Yagaw Hanunoo, ". . . some trees are trimmed or pollarded but are not felled. In primary forest sites this is done to reduce the prodigious amount of labor not only in felling but also in subsequent leveling. In secondary growth areas, especially where large or joined swiddens are cleared, leaving such trees promotes reseeding of like woody species during the fallowing period. While it is true that complete firing of primary growth may kill most unfelled trees, reseeding is less of a problem then because the site is usually bounded on several sides by other tall primary growth." It should be clarified that Hanunoo gardens are in no case as extensive or as contiguous as those in Figure 7. It may be added that in the case of Figure 7, most trees will probably have been felled and burned for their nutrient-bearing ash.

⁴Vayda (1969), in discussing the Maori of New Zealand, has suggested that they went to war for land long before any kind of population pressure expressed itself through environmental degradation. They found themselves surrounded by much primary forest. He deduces that they went to war with neighboring communities to acquire more easily cleared secondary forest which those neighboring communities created in the abandonment of their swiddens.

For example, Chagnon (1970:290) has noted that one village, of the intensely warlike Yanomamo of the Venezuelan-Brazilian border, was subjected in a two-year period to 25 raids by 12 other villages, but lost only 10 people.

Further to his theory for the origin of the state, Carneiro (1970:736) cites a notable exception to this general low density, in discussing the varzea habitat. This riparian environment, with its annual replenishment of silt, was capable of continuous cultivation and of supporting fairly dense populations, which could also exploit riverine biota. He adds (Ibid., pp. 736-737), "Concentration of resources along the Amazon amounted almost to a kind of [environmental] circumscription. While there was no sharp cleavage between productive and nonproductive land, as there was in Peru [where a state evolved], there was at least a steep ecological gradient. So much more rewarding was the Amazon river than adjacent areas, and so desirable did it become as a habitat that peoples were drawn to it from surrounding regions. Eventually crowding occurred along many portions of the river, leading to warfare over sections of river front. And the losers in war, in order to retain access to the river, often had no choice but to submit to the victors. By this subordination of villages to a paramount chief there arose along the Amazon chiefdoms representing a higher step in political evolution than had occurred elsewhere in the basin.

⁷Harris (1974:99ff), in noting that the Yanomamo were formerly hunters and have not yet successfully incorporated the variety of the cultivates necessary for a sufficient protein diet, suggests that ". . . Protein scarcities and not libidinal surpluses account for the constant fissioning and feuding among Yanomamo villages. . . . The Yanomamo have 'eaten the forest' - not its trees, but its animals and they are suffering the consequences in terms of increased warfare, treachery, and infanticide, and a brutal sex life."

⁸ Striking parallels to the Kofyar, in terms of their internal differentiation of cultivation intensity have been indicated for the Matengo of southwestern Tanzania by Basehart (1973), for similar reasons.

The elaborate dietary interplay of humans, pigs, and sweet potatoes in New Guinea has been elucidated by Vayda, Leeds, and Smith (1972), and Rappaport (1968), who also relates this interplay to warfare and its regulation.

10 No attempt will be made here to account for the specific nature of intensification, short of what has been indicated already, Waddell (1972), however, provides an exemplary description of shifting cultivators who have intensified some of their garden space to the extent that they now rely more on continuous cultivation for yields than on the yields from coexistent swiddens.
CHAPTER V

MAKING CONTACT WITH THE SHIFTING CULTIVATION SOCIETY -SOME CONCLUSIONS ABOUT THE METHODS AND IMPACT OF THE NATIONAL POLITICAL ECONOMY

A Preliminary Qualification

Before proceeding to the methods by which the national political economy contacts the shifting cultivation society, it must be emphasized that the impact of these methods, as well as the methods themselves, will likely vary in content depending upon the conditions which prevail prior to contact in the communities of the shifting cultivation society. Such conditions involve the extent to which the precontact population is placing pressure on its resource base and is in contact with adjacent populations of a similar nature. Such conditions may be said to prepare the immediate outcome of contact.

It is therefore useful to distinguish those pre-contact societies which, by their own population growth, have had to foreshorten their shifting cultivation cycle and to engage in warfare for land, from those which have not had to foreshorten their shifting cultivation cycle or to engage in warfare over land. Many of the precontact societies of New Guinea serve as examples of the former case, while those societies of the Amazon basin which carried on a horticultural tradition do so for the latter case. In this chapter, New Guinea and the Amazon basin will be considered briefly for the manner

in which contact in those areas has unfolded.

The position taken here is that the example posed by contacted New Guinea societies bears a lesson which demonstrates the ultimate implications of contact for societies now being contacted in the Amazon basin. This lesson, however, holds relevance only to the extent that genocide may be somehow prevented in the Amazon basin. While this may prove a naive expectation, it is a proviso which is raised nonetheless to underscore that, in light of the New Guinea situation, the simple prevention of genocide is by no means an adequate assurance that contacted peoples in the Amazon basin will be permitted to seek their own destinies.

Following a consideration of the issues raised by the New Guinean and Amazonian examples, an attempt will be made to distill, in structural terms, the methods of contact and their impact on the shifting cultivation society.

The Amazon Basin - Integration and/or Deaths of Native Peoples

Contact with native peoples in the Amazon basin by foreigners has occurred since the time of European exploration and conquest of the New World, beginning in the 1500's. However, as to intensity of contact, it may be concluded that contact in the Amazon basin has passed through several phases. In an article which is said to have created the original international uproar about Indian policy in Brazil, Lewis traces out the ebbs and flows of contact intensity (1974:11):

The atrocities of the Conquistadors described by Bishop Bartolomeo de Las Casas, who was an eyewitness of what must have been the greatest of all wars of extermination, resist the imagination. There is something remote and shadowy about horror on so vast a scale. Numbers begin to mean nothing, as one reads with a sort of detached, unfocused



belief of the mass burnings, the flayings, the disembowellings, and the mutilations. Twelve millions were killed, Las Casas says most of them in frightful ways. Wherever they could be reached, in the Caribbean islands, and on the coastal plains, the Indians were exterminated. Those of Brazil were saved from extinction by the tropical rain forest . . . and to the south of it, the half million square miles of thicket and swampland - the Mato Grosso . . . The processes of murder and enslavement slowed down during the next three centuries, but did so because there were fewer Indians left to murder and enslave. Great expeditions to provide labor for the plantations of Maranhao and Para depopulated all the easily accessible villages near the main Amazonian waterways, and the loss of life is said to have been greater than that involved in the slave trade with Africa. Those who escaped the plantations often finished in the Jesuit reservations - religious concentration camps where conditions were hardly less severe, and trifling offenses were punished with terrible floggings or imprisonment: 'The sword and iron rod are the best kind of preaching, ' as the Jesuit missionary Jose de Anchieta put it. By the 19th century some sort of melancholy stalemate had been reached. Indian slaves were harder to get, and with the increasing rationalization of supply and the consequent fall in cost of Negroes from West Africa - who in any case stood up to the work better - the price of the local product was undercut. As the Indians became less valuable as a commodity it became possible to see them through a misty Victorian eye, and at least one novel about them was written, swaddled in sentiment, and in the mood of the Last of the Mohicans. A more practical viewpoint reasserted itself at the time of the great rubber boom at the turn of the century, when it was discovered that the harmless and picturesque Indians were better equipped than Negroes to search the forests for rubber trees. While the eyes of the world were averted, all the familiar tortures and excesses were renewed, until the collapse of the boom and the renewal of conscience, the Indian Protection Service [SPI] was formed.

The establishment of the SPI in 1910 marked a turning point in the future of Indians in Brazil. In reflecting upon its establishment, Ribiero commented (quoted in Junqueira 1973:10):

For the first time respect for the indigenous tribes was established as a principle of law, respect for people who had a right to be themselves, to have their own beliefs, to live according to the only way they knew: the way of life they had learned from their ancestors and which could change only very slowly.

Yet after a brief period in which native rights were defended, the SPI

began to voice, in an increasingly unrelenting manner, the interests of national groups (Ibid.). Lewis (1974:9) has phrased this changein-tone in a manner more to the point, that native peoples continued to be ". . . virtually exterminated, not *despite* all the efforts of the Indian Protection Service, but with its *connivance* - often its ardent cooperation." In an apparent burst of self-righteousness, the Brazilian Minister of the Interior announced the dissolution of the SPI and a judicial inquiry into the activities ten years prior to its dissolution in 1967. The official report which followed this inquiry (Ibid.):

. . . was calm - phlegmatic almost - all the more effective therefore in its exposure of the atrocity it contained. Pioneers leagued with corrupt politicians had continually usurped Indian lands, destroyed whole tribes in a cruel struggle in which bacteriological warfare had been employed, by issuing clothing impregnated with the virus of smallpox, and by poisoned food supplies. Children had been abducted and mass murder gone unpunished. . . . The huge losses sustained by the Indian tribes in this tragic decade were catalogued in part. Of 19,000 Mundurucus believed to have existed in the Thirties, only 1200 were left. The strength of the Guaranis had been reduced from 5000 to 300. There were 400 Carajas left out of 4000. Of the Cintas Largas, who had been attacked from the air and driven into the mountains, possibly 500 had survived out of 10,000. . . . A few hundred only remained of the formidable Chavantes . . . but they had been reduced to mission fodder - the same melancholy fate that had overtaken the Bororos, who helped change Levi-Strauss's views on the nature of human evolution. Many tribes were now represented by a single family, a few by one or two individuals. Some, like the Tapaiunas - in this case from a gift of sugar laced with arsenic - had disappeared altogether.

According to the head of the inquiry, Attorney General Sehnor Jader Figueiredo, \$62 million worth of possessions had been stolen from the Indians during the period of inquiry. Figueiredo stated (quoted in Ibid.):

It is not only through the embezzlement of funds, but by the admission of sexual perversions, murders and all other crimes listed in the penal code against Indians and their property, that one can see that the Indian Protection Service was for years a den of corruption and indiscriminate killings.

With the dissolution of SPI, the problems facing native peoples did not disappear. The spirit, if not the letter of the law, still had to be enforced. As a consequence, FUNAI (National Indian Foundation) was established in 1968 to replace SPI. In a FUNAI policy statement, entitled *Supysaua*, *O Indio Brasiliero*, it was noted (quoted in Junqueira 1973:10):

When establishing the guidelines of its action FUNAI must take into account, on the one hand, the needs of national integration, the interests of the Brazilian community which wants to expand and is expanding, by eliminating any obstacles on the path of development and, on the other hand, it must consider the needs of the Indian who cannot change abruptly and whose traditions, customs, beliefs and way of life must be preserved so long as he needs them for his survival.

If one wonders how such contradictory guidelines could be followed to the benefit of both stateless and national society, it serves to point out that apparently FUNAI did not find such guidelines compatible. The reasons for this have been laid out in a document which was presented anonymously by a group of retaliation-conscious Brazilian anthropologists to the XLI International Congress of Americanists, Mexico City, September 1974. In this document they assert (Anonymous 1974:35):

By 1970 . . . FUNAI began to change its policy, and deviate from the principles stated in its original charter. Economic groups from the south of the country, large landowners, and foreign corporations began to pressure the government to open up the lands of the Amazon, and opposed the recognition of Indian rights. The government announced plans for the construction of the Trans-Amazonic Highway, mobilized financial support from international agencies such as World Bank, and introduced a system of fiscal incentives to lure investments into the Amazon region. Finally, several FUNAI declarations began to assume an entrepreneurial position, arguing that Indians must be integrated as a manual labor force into Amazonian

development and growth.

As an example, they cite (Ibid.) a 1971 decree by the President of FUNAI which read, "Assistance to the Indian will be as complete as possible, but cannot obstruct national development nor block the various axes of penetration into the Amazon region." They conclude, with apparent justification (Ibid.):

In accordance with this new orientation, FUNAI's central preoccupation became the rapid attraction and pacification of tribes living along the route of the *Trans-Amazonic Highway*. Immediately, it became clear that FUNAI's function was not the protection of constitutionally recognized Indian rights, but the protection of highway workers against a supposed Indian threat.

Space does not permit a full discussion of the numerous examples of FUNAI's bending-of-the-rules which are cited by the noted document. However, a few examples should be briefly recounted to demonstrate in concrete terms some of the issues raised in the first chapter [see pp. 19-21, especially].

These examples are placed in alarming context by a fully documented table entitled "The Rape of Indian Territory: Foreign Aid and Investment in the Brazilian Amazon." This table is arranged into five categories of activity: (1) Trans-Amazon Road System; (2) The Mining Frontier; (3) The Agri-Business Frontier; (4) The Extractive Frontier: Rubber and Timber; and (5) Other Projects.

With regard to the first category, the table shows that the Brazilian government (i.e. the Brazilian National Department of Roads and Highways [DNER]) drew a \$400 million loan from the (US) World Bank for highway development; Caterpillar Brazil, a locally-based operative of the (US) Caterpillar Tractor Company, sold 770 pieces of machinery worth \$47 million to the Brazilian Army Engineer Corps and seven private companies building Amazon roads; Komatsu (Japan), Fiat (Italy), General

Motors, J.I. Case, Clark Equipment, Eaton Corporation, Wabco, and Huber-Warco (all US) sold \$125 million worth of earth-moving equipment to the builders of the Amazon roads; the US Agency for International Development provided an \$8.4 million grant for training of Brazilians in the use of remote sensing data at the Earth Resources Observation Satellite headquarters at Sioux Falls, South Dakota, while Earth Satellite Corporation, Litton Industries, and Westinghouse Corporation (all US) contracted for a \$7 million aerial photographic survey of the Amazon region (termed Project Radam [Radar Amazon]). In addition to saying much about the nature of international relations (recall the global structure of dominance/dependence discussed in the first chapter), these data are related directly to what they mean for the native inhabitants of the Amazon basin. Facilitated by foreign capital, the Trans-Amazonic system has invaded the Indian lands of the Juruna, Arara, Parakana, Asurini, Kararao, Gaviao, Kraho, Apinaye, Xavante, Xerente, Kreen-Akarore, Xingu National Park (to which are now confined the Txikao, Yawalapiti, Kamayura, Mehinaku, Matipu, Kalapalo, Kuikuru, Aweti, Waura, Juruna, Suya, Kayabi, and Txukahamai [see Junqueira 1973]), Tumucumaque Indian Park (to which are now confined the Parakoto, Charuma, Wariyana, Vayana, and Tirio), Waimiri-Atroari, Yanomami Indian Park, Atalaia do Norte Indian Park, and Aripuana Indian Park (to which are confined the Cintas-Largas and Suruis). The significance of these roads should be obvious. They carry, through the once effectively impenetrable selva, the civilizados who seek untapped riches, of which iron ore, manganese, bauxite, and tin (or cassiterite) may be included.

The table indicates (under the Mining Frontier category) that the US Geological Survey, in collaboration with the National Department of Mineral Production (DNPM) and the state-owned Mineral Research

Corporation, is conducting 21 mineral and geological exploration projects under sponsorship of the Brazilian government and the US Agency for International Development. Additionally, the (US) Export-Import Bank has extended a loan of \$5.5 million for a manganese pellet plant to Industria e Comercio de Minerios (in which [US] Bethlehem Steel is involved), whose operations involve territory of the Palikur, Karipuna, and Galibi-Marworno. Also involved in mining activity are: Amazonas Mineracao (in which United States Steel is participating), operating in Xikrin-Cayapo territory; Alcoa, Alcan (the Canadian subsidiary of Alcoa), Nippon Steel (Japan), Kaiser Aluminum, National Bulk Carriers, Pecheney, Alusuisse, Rio Tinto Zinc, Hanna Mining, and several Brazilian front-companies for Euro-American operations, operating in territories of numerous groups not already mentioned.

In addition to the mining interests which have entered the Amazon basin, there have come several agri-corporations; notably, the Swift-Armour King Ranch,² operating a 180,000 acre cattle ranch which has displaced the reserve set aside for the Tembe and Urubu-Kaapor, and Volkswagon Brazil (Germany), operating a 56,000 acre cattle ranch which has displaced several northern-Cayapo tribes.³

Against this backdrop, the examples provided by the Brazilian anthropologists take on especial meaning. They note (Anonymous 1974: 36):

At the end of 1970, FUNAI "attraction" teams contacted the first tribes along the route of the *Trans-Amazonic Highway* in the state of Para: the Jurunas, 75 kilometers from Altamira, and the Araras, on the banks of the Penetacua River 170 kilometers from the highway. By 1972, of the 200 Araras contacted, no more than 50 were left. The tribe had abandoned its village, and was wandering, perplexed, along the highway, in the darkest of misery. Also, in 1970, contact was established with a group of Paracana Indians, in the valley of the Pacajas River, to the north of the Serra do Caraja. Support for "pacification" of the Paracanas

was provided by the United States Steel Company, who, in conjunction with the state-owned firm of Vale do Rio Doce, had obtained a large iron ore concession in the area. On December 18, 1970, a helicopter carrying a FUNAI delegate and a director of United States Steel arrived in the area, and made contact with 25 Paracana tribesmen. The Indians were given blankets, and immediately were striken by an epidemic of influenza. Within six months of first contact, not less than 40 Paracanas had died from influenza.

They provide another example (Ibid.):

The Tembe live on the banks of the Gurupi River, along the border between [the states of] Para and Maranhao. For several years they were protected against land invasions by a title deed provided by the government of Para. Nevertheless, in the late 1960's FUNAI began to negotiate with King Ranch, a United States-based enterprise, for the transference of the Tembe lands. In order to receive financial incentives from the government agency charged with the development of the Amazon region (SUDAM), the King Ranch needed a certificate demonstrating that no Indians occupied these lands. FUNAI provided them with the certificate. Then the King Ranch, together with the government, began proceedings for the voiding of Indian title, and the Tembe were dispossessed of their lands. The invasion of the Tembe Reserve is typical of what is happening to the Indian lands all along the Trans-Amazonic Highway. By the end of 1973, almost all the region was occupied by agricultural enterprises, colonization projects, or mining firms. Of eleven reserves created by government decree to receive tribes found along the highway, not one has been concretely planned or protected against outside invasions.

And as a final example here, they note (Ibid., p. 37):

Throughout the 1960's, they [the Cintas-Largas] were victims of a series of massacres, which included the slaughter of Indian women and children, the bombing of their villages, and death through 'presents' of sugar mixed with arsenic poison. Finally, in 1968, a FUNAI 'pacification' team convinced the Cintas-Largas to live peacefully with settlers along the expanding frontier, and in 1971 the Aripuana Indian Park was created to protect the more than 2000 Cintas-Largas and Suruis Indians. Their protection, however, was short lived, and immediately tragedy struck these tribes. In October 1971, a measles epidemic arose among a Surui band, and in December the Indians rebelled, killing an Indian agent in charge of the Aripuana Park. General Bandeira de Melo, the President of FUNAI, blamed the Indian rebellion on a number of colonization companies who had invaded the Park, but later it became known that these companies were authorized by the Indian Foundation itself. One company in particular, the Itaporanga Colonization Company, was selling land parcels in the Park. . . . Finally, in October 1973, FUNAI announced that the original demarcation of the Aripuana Indian Park was 'hasty', and declared that it would be reduced to one-third of its present size. At the same time, it was learned that ten mining companies were given prospecting rights in the Park, including multinational affiliates of *Billington Corporation*, *Royal Dutch Shell*, the *Iton* financial group, an associate of the *Rockefeller-Moreira Salles* group, and the *Molybdenum Corporation* (MOLYCORP).

The Latin American Working Group, in reflecting on the last example, has

raised an important question (1976:9):

With so many transnational corporations now moving into the Amazon, how many incidents like Aripuana are occurring which are blacked out by press censorship? While companies like Alcan claim there are no Indians in the area of its Amazon operation, what is really happening? The recent government declaration that no foreign anthropologists or journalists will be allowed on native reserves is a bad sign. Since the ban does not apply to corporations, one can only guess this is an attempt to hide further atrocities. Even if corporations are not involved in direct conflict with specific Indian nations, their collusion with the government implicates them to some extent in the horrors that occur. The fact that native policy is geared to remove native people from their lands to make room for their operations, means that transnational corporations must take some responsibility for what in fact that policy implies.

Brazil, of course, is not the only nation-state which makes claims on the Amazon basin in which shifting cultivation societies seek their own destinies. Peru, Bolivia, Ecuador, and Colombia make such claims as well. And while not making claims on the Amazon basin, Venezuela lays claim to the upper reaches of the Orinoco river system, in which shifting cultivation societies also live. For reasons which are not entirely clear, there nation-states differ from Brazil in their treatment of native peoples, although the difference appears to be one of degree rather than of kind.

Coppens (1972) discusses a 1969 invasion by colonists (including individual miners) of the central part of the Makiritare territory (the Paru-Cacuri region) in southern Venezuela. He notes that such an invasion was illegal because (1) no title deeds were issued by the National Agrarian Institute, the only government agency empowered to award land for settlement; (2) no legally-required permission was granted by the Ministry of Justice to private persons (e.g. colonists) for entry into an indigenous (i.e. Makiritare territory); and (3) no mineral prospecting permits were granted because the Paru-Cacuri region is an area legally and exclusively reserved for the Ministry of Mines and Hydrocarbons. He adds that on the pretext of establishing a "cooperative" with the Makiritare, the colonists had denied them hunting and fishing (in which they engage as a complement to shifting cultivation) in the colonized area and, further, they had registered no cooperative with the Ministry of Development (which is required by the Cooperative Associations Act). He presumes that government pressure has now forced the colonists to withdraw, but adds (Ibid., p. 19; cf. Arvelo-Jimenez 1973:19):

It is important to keep in mind that the Paru-Cacuri episode is taking place in the area which is actually being covered by the so-called 'Conquest of the South' movement. This Government-sponsored programme aims at bringing about the political and socio-cultural integration of the hitherto isolated Amazon Federal Territory and the Cedeno District of the adjacent Bolivar State. One of the most significant characteristics of this southern territory, which is mostly covered by rain forest or semi-deciduous forest, resides in the fact that about 43 percent (approximately 22,000) of its population is indigenous.

To underscore the significance of this point, he argues that the Makiritare territory falls into a legal category of "uncultivated waste land", about which he makes an incisive comment which should make sense in light of the previous chapters (Ibid., p. 20):

The basic anthropological criteria should be taken into consideration upon reviewing this legal category. First of all, semi-nomadic economies based on the resources of slash-and-burn cultivation, fishing, hunting and gathering

do not permit the continuous and visible exploitation of the same tracts of land. Secondly, it is known that the indigenous conception of land tenure rights and obligations may diverge quite rapidly from our own legal criteria. As far as fallow lands are concerned, it is of fundamental importance to realize that aboriginal groups who temporarily evacuate certain cites situated within their traditional homelands, do not relinquish their permanent territorial claims. In other words, tracts of land which enter the regeneration phase of shifting cultivation cycles, are in no way considered to be vacant 'no man's land' by the aboriginal population. . . . it is obvious that upon referring to the area as an uncultivated waste land, the invaders of Paru-Cacuri meant to equate this legal definition with the notion of vacant land. Any observer . . . knows that the fiction of vacant land has been traditionally invoked to justify the usurpation of native settlement and subsistence areas.

In Coppen's remarks, one finds in Venezuela what appears to be a contradiction which parallels that of Brazil's Indian vs. development policies. However, there is a curious twist in Venezuela which potentially sets-it apart from Brazil. In the "Conquest of the South" movement, the National Agrarian Institute is said to be assuming jurisdiction over southern Venezuela. With this jurisdiction comes the Agrarian Reform Act, in which is included (cited in Ibid., p. 22):

Article 2, section d., [which] states the following. 'This [Agrarian Reform] Act guarantees and recognizes the right of the indigenous populations which de facto retain their communal or extended family status - without prejudice to the privileges to which they are entitled as Venezuelans, according to previous paragraphs - to hold lands, woods and waterways which they occupy or which belong to them in those sites where they customarily dwell, without detriment of their incorporation to the national society according to this and other laws.'

According to law, the *colonos* must be granted title deeds for land by the National Agrarian Institute, which must at the same time uphold declared native rights to land. While one might expect cynically that native rights will be violated as colonization pressures mount, and there is good reason for such cynicism, there appears to be another possibility. Siverts (1972) recounts what has happened to the Aguaruna Jivaro Indians of northeastern Peru under the pressure of governmentsponsored colonization by coastal and highland *civilizados*. The Aguaruna have been, in many cases, disappropriated of their lands by incoming settlers, who themselves must show permanency of occupancy upon settlement of their *parcelas*. Yet, he also observes (Ibid., pp.

73-74):

The 'legal' requirement of permanent settlement only to attain a parcela has forced some Aguaruna to stay put in a particular locality. Other groups have concentrated in village-like settlements, hoping by this measure to bring about legal recognition of a common landholding - a reservation.

He prefaces this observation with a caution, for which the Aguaruna have long been aware but can no longer heed, given the invasion of their territory (Ibid.):

Too long residence in one particular area by too many people, may prove detrimental not only to the system of garden rotation, but also put strains on the supply of wild fruits and house-building material. If for some reason the durability of the thatch is reduced by several years [which has been attributed to intensive DDT spraying], the demand for fresh yarina is bound to exterminate permanently this palm in the whole neighborhood.

In summarizing the general effects of 'civilized' expansion in eastern Peru (and, for that matter, in all the nation-states fringing the Amazon basin),⁴ Varese is sensitive to this alternative to outright loss of land, but (1972:9-10; cf. Bodley n.d.; Smith 1974; and Arcand 1972):

The expansion of the internal frontier imposed by the extraction of rubber, and presently imposed by the production of wood, hides, and animals, cannot be considered as a demographic frontier, but rather is an economic frontier, with repurcussions on the types of settlement and dispersion of the tribal and rural groups of the tropical forest. Extractive expansion, unlike the establishment of farms, does not aim specifically at the occupation of native territory for the permanent and decisive installation of human nuclei. The frontier which corresponds to this expansion is almost always economic and not demographic.

. . . When the resources are exhausted, the front of expansion withdraws and completely disappears. The same thing is happening at present with the exploitation of wood: when all the timber-yielding trees of an area are cut, the little demographic frontier consisting of the foreman and his labourers retreats and disappears. Only in some cases, when the area of extraction is situated near a highway or has good river communications with a center of population, can it be taken over by agriculture or cattle-raising, in which case a permanent demographic frontier is established. Extractive activities have not produced a working class, and even less a social class with class consciousness. They have contributed and are contributing to the detribalization of native groups through a process of proletarization and ethnic disintegration or dissolution which furnishes the labour market with a cheap source of labour, highly mobile from the geographic point of view, subject to temporary work based on contracts, the 'barter-credit' system or day labour, and who in many cases abandon land which is suitable for agriculture. On the contrary, the farm system . . . sets up a permanent demographic economic, ideological and cultural frontier. In this case, the white society appropriates the native territory, and if possible also native labour through detribalization. The fundamental difference between this situation and that occurring under the extractive process is that here the tribal groups have almost no possibility of keeping there territory. In all the forest areas where the farm system has been consolidated (such as the central forest, the eastern forest of Cuzco, and the Valley of the Huallago), the native groups have been detribalized and absorbed as agricultural labourers, or have retreated to marginal areas, abandoning their land to the expansion of the white society. In some cases, a few local native groups have kept pockets of land within regions totally occupied by settlers, but the land which they have succeeded in saving is so reduced in area that their entire economic and social system has had to be modified and adapted to a situation of dependence on and symbiosis with the settlers.

With so much said about the Amazon basin and the problems which have been posed for resident stateless societies by national and international activities, attention may now be briefly turned to New Guinea.

New Guinea and Pax Australiana - Cargo Cults, Cash Crops, and Permanent Poverty

If judged by its immediate outcome, contact by the nationstate with stateless societies of the Melanesian area appears to have proceeded in a manner entirely different from contact with stateless societies in the Amazon basin. The reasons for this difference are not immediately apparent and require some discussion, particularly when one is faced with the suspicion that contact was virtually sought by many New Guinea societies (e.g. see Sorenson 1972).

It serves to recall at this point that, with the diffusion of the sweet potato to New Guinea from various landfalls touched by the Europeans in their so-called "Voyages of Discovery", New Guinea populations soared in their numbers upon adopting the cultivate. As a general consequence, New Guinea "filled-in", population densities increased in local areas, shifting cultivation cycles were foreshortened because of land shortages, grasslands were thus generated, and warfare over land became endemic. Warfare forced a concentration of people for protection and brought about the need for intensification of subsistence labor. The situation was timely for the entrance of any agents who might curtail intensive warfare and increased work.

At the turn of the 19th century, European trading companies were operating on the coast and so too were the missionaries, who traded goods and brought the natives into the fold, respectively. Such contact brought with it, as well, a stark contrast in material wealth and power. Consequently, there began the millenarian movements or cargo cults which, while varying in degree of elaboration, embody an attempt by a stateless society to rationalize an otherwise incomprehensible and unacceptable gap in access to wealth and power between itself and "civilized" society.⁵ Associated with cultist-thinking was a decided envy for all that was "civilized" in national society, which was made all the more decided by the difficulties imposed by local population pressure upon resources. There followed, from this envy, a willing acceptance of anything material which could be fit congruently into the local scheme of

things; as demonstrated, in particular, by steel axes and spades.

Salisbury (1964:2; cf. 1962) mentions that steel tools began to reach parts of the interior of New Guinea in the 1930's through an intertribal trading network which was tied to European settlements on the coast. Such tools (and, indeed, the sweet potato) preceded the "white man" who introduced them. In effect, these tools enabled the use of created grasslands, which were considered unexploitable with stone tools because of their imposing root systems, thereby temporarily easing population pressure upon resources. Such a relief brought with it further population growth, land shortage, and warfare. Then came the Australian government representatives, who began inching their way into the New Guinea interior to pacify what were termed "Australian protected persons", at the end of World War II. In discussing the Fore, whose administrative control was announced in 1957, Sorenson notes (1972:362):

The receptive Fore reaction to Western presence was, in part, the result of historical timing of the Australian arrival. Warfare had become a serious and disagreeable problem; yet indigenous political and social mechanisms for handling it had only begun to develop. The arrival of the Australian patrol officers permitted an immediate solution; and the Australian presence, by being the essential element in the peace (as well as the conduit bringing cloth, steel, salt, and medicine), was considered millenarian. This greatly facilitated the introduction of other key changes, such as public roads, government courts, trade, and new concepts of social and economic organization. But the readiness with which new ideas and materials were adopted and adapted to Fore life also depended on the high degree of individual freedom possible in the egalitarian Fore society. The new challenges and opportunities which came with Western presence were readily seized by the individual Fore, who were already accustomed to exploratory and innovative behavior.

Similarly, Howlett (1973:58) asserts that in the Goroka Valley (in which Australian settlers arrived at the end of the 1940's), "The Gorokans themselves were eager to have Europeans settle among them." Such settlers, it should be added, came to lease land for the development

of coffee plantations under encouragement of the Australian Administration policy. Such policy was formulated at both the general and local level. The former was said to be ". . . based on the principle of minimal dislocation of the [indigenous] people, both in a geographic and in a cultural sense" (Ibid., p. 257) and was

. . . aimed at developing the resources of the Territory to provide a rising standard of living for the whole population and to create a viable economy. . . The advancement of indigenous agriculture to improve food supplies, to bring about a more efficient use of village land and increase the production of cash crops, is given a high priority by the Administering Authority. . . Because of the nature and distribution of the Territory's resources it is clear that, in the short term at least, agriculture must continue to provide the basic income required for the economic advancement of most of the people [Annual Report, cited in Ibid.].

The latter was conceived in terms of "partnership" between Gorokans and Europeans, about which Finney has commented (quoted in Ibid.):

'Partnership' between Europeans and New Guineans was a concept . . . to justify a seemingly anachronistic attempt to establish a plantation system in the fertile but heavily populated valleys of the Highlands. The settlers were after land . . . and a chance to develop a profitable coffee industry. In return they offered the Highlanders, their 'partners', an opportunity to enter the market economy as plantation workers, as suppliers of vegetables to plantations, and as coffee growers themselves.

Howlett (Ibid., p. 259) contends that with pacification, despite the happiness with which it was received, the rationale of traditional life disintegrated, especially for the men, because those concomitants to tribal warfare (e.g. the planning and strategy of campaigns, negotiations with allied groups, guard duty, manufacture of weapons, and victory celebrations) disappeared. This factor, together with the need for cash to pay taxes for road construction and maintenance and introduced goods and services, are the basis for Howlett's deduction

(Ibid., p. 260):

. . . that Gorokans readily adopted the new crops and other items from the inventory of European culture not only because . . . they admired the achievement and exercise of all forms of power, but because these innovations also filled the new vacuum in tribal life, at least for the men.

To fill this "vacuum", she observes that the Gorokans undertook two kinds of cash crop production (Ibid., p. 261):

. . . those which can be produced in the short term or in small areas, interfering minimally with traditional patterns of land tenure and use, such as vegetables, groundnuts, passionfruit, and tobacco, and coffee, which as a perennial and a tree crop has no counterparts in the traditional complex. Those crops in the first category provide the grower with problems of marketing rather than production; coffee poses problems in both cases; the scale of production is relevant to all cash crops.

She notes that, in 1960, settlers largely stocked their stores with imported foods, such as canned sweet potatoes from the US (despite the fact that 90% of the cultivated land in the Gorokan Valley was planted in sweet potato) and vegetables air-freighted from southern Australia, yet the Gorokans depended entirely on the European community for the marketing of such short-term crops. She also notes that cash crops like tobacco, groundnuts, and passionfruit were earmarked for distant markets, especially southern Australia, "where [they] must compete against local production in protected markets. With no guarantee of outlets or stable prices, the production of these crops has suffered varying fortunes," (Ibid.).

The preferred production of coffee has led to several problems which Howlett believes are not readily apparent to the Gorokan producers (Ibid., p. 262):

Among them are the long-term commitment of land (up to 30 years for coffee) at the expense of subsistence types of

land use; customary patterns of inheritance, with the likelihood of subdivision of plantings among heirs; the difficulty of maintaining quality controls and yields; disposal of the harvest; and price fluctuations on international markets.

For a number of reasons, upon which she elaborates, the concept of "partnership" which was to shroud the undertaking of coffee production (as well as other cash crops) became less and less relevant. In brief, she notes (Ibid., p. 264):

The costs of establishing the plantation, the period of several years before a return can be realized, and the later decline in prices meant that a number of the original settlers were unable to continue production. In less than ten years after the first settlement, over a third of the plantations had changed hands, and another five were either on the market or about to be. Individual owner-operators were gradually replaced by corporate ownership with hired management. . . . In the process, the ideals of partnership became temporarily defunct. The personal relations which typified the first years of European settlement broke down; the new owners or managers were resented by the villagers who now had less to gain and less to offer. In particular, the improvement of roads allowed the Europeans to be more independent of their Gorokan neighbors. The villagers, as well as their lands, became alienated.

With the development of roads, the Gorokans were provided a means for employment beyond their own home territory. Coupled to this development was the Highlands Labour Scheme which, while headquartered in Goroka, regulated the recruitment and conditions of employment of native highlanders for plantation labour and war reconstruction in coastal areas. Apparently, Gorokans were only temporarily drawn away as migrant labourers. However, other native groups were at the same time drawn into the Goroka Valley to work on European-owned plantations. She deduces that the preference by Europeans for non-local labourers involved (Ibid., p. 265):

. . . the high risk of frequent absenteeism of local labourers to attend clan affairs; the feelings of many planters, whether of the first or second 'generation', that they would be involved in wider commitments and demands than those usual between employer and employees for example, that the traditions of reciprocity in the clans would be applied unequally to them; and the fact that men from other parts of the highlands were considered less 'sophisticated' than the Gorokans, and therefore more tractable, and cheaper, as workers.

Yet from modest monies earned through indigenous coffee production, as well as through labor on distant and some local plantations, some villages in the Goroka Valley were able to pool their capital and invest it in several coffee-buying and -processing concerns under the guidance and management of local Europeans in the spirit of "partnership". Unfortunately, heavy Gorokan investment in coffee industry, and the devotion of large tracts of land to coffee production, was placed in a tenuous position by a 1968 policy statement of the Department of External Territories (quoted in Ibid., p. 271):

The [development] programme is based essentially on the agricultural industries and proposes rapid advances in plantings of slow-maturing tree crops. . . in view of marketing problems, no additional plantings of coffee are planned for the [five year] programme period.

Howlett (Ibid.) adds, "By this proviso, Gorokans are in effect excluded from the present development programme" and proceeds to evaluate what the development of dependence has wrought on the Gorokans (Ibid.):

Avenues of social and political progress will rapidly become cul-de-sacs unless paralleled by economic progress. Gorokans are now reaching a threshold of frustration: they have virtually maximized such opportunities for modernization as were made possible under local conditions by the initial inputs, and have limited scope for further economic advancement. With the restricted local resources, a growing population, inadequacy of the general policy and the failure of the local policy, they will be forced to play an increasingly marginal role within the prevailing [global and regional economic] system. Succeeding generations will no doubt bring to their efforts an unwelcome additional dimension, that of disillusionment born of past experience. If it is true . . that peasants frequently are suspicious of authority and innovation, fatalistic, conceive of a limited good, lack future orientation, and so on, the Gorokan experience helps explain how such negative traits become established.

Significant in Howlett's conclusions is the fact that the Gorokan population is growing, and at an increasing rate. She attributes this fact to the removal of such demographic controls as tribal warfare, female infanticide, and the absence of certain kinds of medical knowledge. The removal of such controls will be examined in the next section. She discusses the dilemmas which attach themselves to such growth. First, she (Ibid., p. 268) asserts, "Land availability limits the scale of agricultural enterprises," whereupon it follows that the continued addition of people further reduces land availability. Second, she notes (Ibid.), ". . . land resources are [currently] inadequate to support more than a handful of Gorokans at anything like the contemporary European standard of living," despite the fact that (Ibid., p. 271):

Consciously or otherwise, the villagers have been given unrealistically high expectations of their prospects. They have been served the exemplar of European standards of living, and have been led to believe in the possibility of rapid progress.

Third, coupled to the contradiction between decreasing land availability and pursued European standards of living, many Gorokans will view land as a factor of production in the alien terms of reference of a monetized economy. Howlett incisively argues (Ibid., p. 269-270):

The sale of land between Gorokans has rarely occurred, and the formal conversion of land tenure is very recent and thus far minor. So far, no Gorokan is landless. However, a demand for individualization of tenure must be expected to arise and to grow. Without such security, the ownership of perennial crops may be imperilled, and land may not be used as loan collateral. Customary [i.e. usufructuary] land tenure is widely considered an obstacle to development under Western systems. But it may be anticipated that if land becomes a commodity by the granting of individual title, some Gorokans will inevitably amass fairly large holdings. Others will become landless. Without skills, these will be obliged to resort to tenancy or migration. . . Inherent in the rise of landlord and landless groups is the evolution of a class structure. Any trend toward social stratification in the past was inhibited because wealth and power were largely dessolved with the passage of each generation. But the use of money now provides a means whereby surplus production can be converted into forms which can be stored and accumulated. Wealth and the new forms of power can now be transmitted to succeeding generations. While the possibility of becoming and remaining wealthy holds obvious advantages for some, it also holds the seeds of real poverty, unknown in the past, for at least part of the population.⁶

National Penetration of New Guinea and Amazonia - Some Similarities

Despite what appears to be a marked contrast in the nature of contact between stateless societies in New Guinea and Amazonia, there remain certain similarities which should not go unnoticed. To understand these similarities is to understand the lesson that New Guinea holds for the future of Amazonia. These similarities are not readily apparent, however, and as a means to make them more apparent, it will serve to briefly recount the differences of contact in these two areas.

From the New Guinea example, it is clear that outright removal of native territory by members of national society has not been so much a problem as in the case of the Amazonian example. Rather, the major problem in the former case has been one of rapid population growth. To be sure, the problem of rapid population growth confronted stateless societies in New Guinea prior to the actual appearance of representatives of national society, although it is instructive to recall that the introduction by Europeans of the sweet potato and, more recently, of steel tools, appears to have promoted the rapidity of population growth. The actual appearance of Europeans (inland from the coast) initially included government patrol officers and religious missions who brought with them the laws of the state and the tenets of a Christian dogma. One may deduce from current population growth patterns among contacted stateless societies (which have now become dependent upon the state) that the activities of patrol officers and missionaries have promoted rapid population growth further to that which preceded contact. Warfare over land was effectively curtailed by the mere presence of patrol officers, thereby removing a factor of mortality. Patrol officers and missionaries distributed prophylaxis, as well as antibiotics, vaccinations, immunizations, vitamins, and the like, thereby prolonging life for a greater number of people. And missionaries dispensed notions about the sanctity of a human life and proper forms of sexual union, thereby altering reproductive practices.

It may well be that acceptance of these notions is the most significant factor in the current explosive nature of population growth in New Guinea. And here it may be argued that the missionized New Guinean society was predisposed, because of pre-contact strains on local resources and a local perception that no local solutions were capable of overcoming such strains, to accept and incorporate such notions as part of a package of benefits originating from "civilization". After all, did not the missionaries appear well-endowed and all-powerful? Coupled to the acceptance of such notions, as well, was a catechismic coercion that the wrath of God would be unleashed on any one of the flock who did not remain on the "chosen" path. Of course, this is only speculation on how and why contacted stateless societies came to Christianity. The fact remains, however, that many such societies have become Christianized. It is therefore important to further speculate how the acceptance of the peculiarly Christian notions of the sanctity of a human life and forms of sexual union might promote a high birth

rate.

It was argued earlier that stateless societies normally exhibit a moderate fertility-mortality regime. Moderate fertility is maintained by means of child spacing which follows from prolonged lactation. It was noted that prolonged lactation has only an inhibitory effect on pregnancy. In the case of a birth prior to the weaning of an older sibling, the newborn is killed so as to allow a sound diet for the suckling infant until it is ready for the intake of solid foods. But infanticide is contrary to Christian fundamentals which view life and its sanctity as beginning at birth and even before. As a consequence, the Christianized society is prohibited by the beliefs which it has incorporated from an important means for moderating its rate of births. An incidental dietary effect of this prohibition is a constriction of the suckling period of an older infant (to make room for a newborn), with a consequent restriction in its time to gain maternal immunities and concentrated nutrients. It was also indicated earlier that stateless societies commonly practice polygyny, provided that a man can muster sufficient materials for bride prices. Such a form of sexual union is yet another way of limiting potential births. However, it would seem that non-monogamous unions are not in keeping with either Christian or secularly national prescriptions, and are thus discouraged. Without abortion, infanticide, polygyny, and other birth restrictive practices, it seems logical that moderate fertility rates are increased.

Increased fertility rates would seem acceptable to the Christianized society, which would also seem to expect an associated increase in its material wealth, as a consequence of Westernization or

modernization, to accommodate its growing population. Howlett suggests that modernization has not realized the expectations of the growing contacted society. Modernization has however broadened the horizons of the contacted society and has sent its members into the outside world to gain the means of livelihood which they cannot find at home under crowded conditions. What this means, in effect, is that increasing numbers of people in contacted societies are alienated from formerly universally accessible means of production, and are thus sent, untrained, down roads to a flooded manual labor market where the "captains of industry" are at liberty to maximize their profits by minimizing the wages they pay to their easily-replaceable laborers. Unfortunately, this aspect of modernization is not readily apparent to Christianized societies which have forsaken former controls on their reproductive practices for lulling promises of more food, more goods, and more opportunities for more people.

In Amazonia, outright removal of native territory is the most blatant problem which confronts contacted stateless societies, in addition to their outright murder and decimation by such epidemic diseases as measles, influenza, and the common cold. One might expect therefore that no similarities exist between Amazonia and New Guinea. However, certain trends are coming to light which suggest that those Amazonian societies which have weathered or will weather the madness of genocide and the sadness of introduced contagia will be faced with a situation which approximates that which made New Guinean societies so agreeable to the coming of "civilization". This situation is currently developing in two ways.

First, stateless societies in the interior of the Amazon basin

are being confined and/or relocated in "parks" or reservations. As mentioned, these reservations suffer from cartographic mobility when they are discovered to contain or stand in the way of attributes in demand by national society. Notwithstanding this aspect, they hold the potential for being fixed with some degree of permanency. What is notable about such reservations is that they are in the main smaller in area than the original territory of the society confined therein; additionally, more often than not, more than one society is confined to such reservations. Second, stateless societies which inhabit the fringes of the basin are having to face a governmentally-sanctioned, as well as spontaneous, invasion of their lands by colonists and have no option but to make claims to national governments for those parts of their territory which remain as yet uncolonized. In both cases, these societies are being hemmed-in and in such a way as to place stress on their food acquisition systems, the most common of which has been the subject of analysis herein. And here is where the subtle similarities between New Guinea and Amazonia begin, for there is evidence that some of the now confined contacted societies in Amazonia are exhibiting rapid population growth. Siverts (1972:11), for example, cites estimates for the changing size of the missionized Aguaruna Jivaro population. One set of estimates indicates a 1964 population of 6,737 and 1970 population of 11,200; another set indicates a 1970 population of 18,000 and 1972 population of 20,000. In light of the preceding analysis of the shifting cultivation system, it hardly needs emphasizing that such extraordinary growth is bound to place severe pressure on available resources under existing Aguaruna exploitation techniques. Two questions may be posed here. Will the Aguaruna, for want of locallyevolved solutions to locally evolving problems, find themselves forced

to adopt the apparent solutions of the *civilizados* who are all the while encroaching on their territory? Will the subsequent adoption lead to a situation akin to that which now exists in the Goroka Valley in New Guinea?

Populations appear to be growing in established reservations as well, and even in the exceptional Xingu National Park where religious missionaries are prohibited. Xingu poses an interesting example of Brazil's integrationist policy, which has been modified by the unrelenting protectionist policy of the Villas-Boas brothers, who have been maverick FUNAI overseers of the "park" since its inception in 1961.⁷ The "park" covers 22,000 square kilometers and accommodates 13 ethnic groups, totalling 1500 people. Within the "park" are two posts. According to Junqueira (1973:14-15):

The main activity of the 'posto' is the care for the Indians' physical health. The assistance programme comprises disease and epidemic control, as well as measures to increase food resources, and is aimed at improving the Indians' health and preventing depopulation. . . Furthermore it introduces new farm products and techniques which can help to increase food production and to enrich the Indians' diet.

On the face of it, these activities are laudable, although here one might ponder the effect of the introduction of the sweet potato in New Guinea and recall that this reservation is areally-fixed. Junqueira adds (Ibid., p. 18):

To ensure the survival of the Indians does not only mean to care for their physical health. Just as the Upper Xingu Indian was affected by disease brought by civilized man, he was also affected by metal tools. Firearms, axes, hoes, etc. obtained by barter, plunder or received as presents entered into the cultural pattern of Indian life and today are part of his working tools. In 1970 all the Kamaiura handicraft was made with the aid of civilized tools. This has created new needs which cannot be satisfied with the Indians' technical resources and therefore it now falls upon the 'posto' to regularly supply all the Indian groups with the metal tools they need. Along with metal tools

which are essential for the native's work, other articles have reached the Upper Xingu population and are today supplied by the 'posto': porcelain beads, nylon fishlines, fishhooks, chemical dyes for cotton yarn, shaving blades, A list of requests from Indians to the management etc. of the 'posto' in 1965 contained the following items: From the Mehinako Indians: large knife, hoe, ax, spade, scythe, hammer, thin fishline, hooks, sinker, gunpowder, primer, shirt, trousers, macaroni, umbrella, battery, flashlight bulb, matches, red cotton yarn, scissors, shaving blades, small knife, drill, adz, sugar, small log. From the Kuikuro Indians: large knife, ax, hoe, scythe, matches, red clothes, comb, mirror, fishhook, fishline, scissors, shirt, shorts, large kettle, and ammunition. The Upper Xingu Indian depends on some of these items for his survival; he can no longer go without the large knife, the hoe, the metal ax. The efficiency of those tools has been proved by the increase in productivity and the consequent lesser effort needed for productive work.

Here one might ponder the impact of steel tools in New Guinea and recall again that this reservation is areally-fixed. With local populations within the reservation already growing and adopting foodstuffs (as cultivates and as prepared) and tools which are likely to promote rapidity of growth, in addition to the FUNAI prevention of inter-village warfare and promotion of health measures, it seems likely that pressure on what might appear as areally-extensive resources will soon mount. Complicating this internal population growth problem is the likely importation of newly-pacified stateless societies, such as the Kreen-Akarore. In response to an interviewer's question about what should be done to prevent the decline of the Kreen-Akarore, the Villas-Boas brothers responded (Fuerst 1973:28):

To transfer the Krenakrore, as quickly as possible, to the Xingu Park. Inside the Park, we have always been able to avoid such fatal issues. For, in the end, the greatest danger awaiting the native population lies in the invasions of their land and in their consequent contamination with disease. One Indian does not really pose a danger to another.

If resources are over-taxed, one might take exception to their final

contention.

Little has been mentioned with regard to ideological alterations among Xingu residents, as they might affect their reproductive behavior. With the absence of missionary activity, one might expect that such practices as abortion and infanticide might be undertaken. However, under current exploitation techniques whose productivity has been augmented by introduced tools and techniques and supplemented by imported foods (e.g. macaroni), one may deduce that such practices are not necessary. What is disturbing here is that once population pressure mounts, as it seems likely in light of the New Guinea example, these population control mechanisms may not be depended upon but rather the "posto" will be expected to reduce such pressure through food handouts. The pattern of dependency has already been established, as indicated by the goods and services already distributed by the FUNAI posts.⁸ So to what does the Xingu example conceivably resolve?

It may be speculated that with mounting population pressure and concomitant foreshortening of the shifting cultivation cycle, land will become less productive, as a result of degraded environmental conditions, with reduced yields per person. As a consequence, resident native groups will seek food from the FUNAI posts, which will in turn attempt to aid in the intensification of native food acquisition techniques. To forestall the effects of fixed-plot horticulture in a perennially warm and moist habitat (forced by the absence of fallow land), such as pest infestations, weed invasions, and nutrient depletion, native groups will be introduced to pesticides, herbicides, and fertilizers. Additionally, they may be introduced to high-yield crop varieties which tend to be susceptible to diseases and heavily tax

available soil nutrients. The costs of these introductions may well be subsidized by FUNAI, although it seems more likely that native groups will have to somehow meet the costs themselves. Cash crops may thus be introduced to defray such costs. And so will begin the path to peasantization and, eventually, migration to urban centers, as suggested by the Goroka Valley case.

Summation: A Hypothetical Structure for National Penetration of the Shifting Cultivation Society

Contact between societies of a vastly different nature, such as between stateless society (relying on a shifting cultivation system) and institutions, agencies, and socioeconomic classes of the national political economy (seeking "development"), involves an overwhelming number of processes and yields a series of contradictions which must be resolved by the contacted society if it is to survive. In the final analysis, however, the stateless society must accede to external circumstances to resolve the ultimate contradiction of too rapidly growing a population and too rapidly declining a resource inventory. These external circumstances are found in the market economy, which must be entered as the only resolution to the ultimate contradiction so as to acquire money for the purchase of food and other goods (for which wants and needs have been created by contact) and for the payment of taxes which accompany the introduction of services and infrastructural additions. Because wages and prices are established under the tenets of capitalism in places and by people far removed from the formerly stateless, now state-oppressed society, entry by this society into the market economy constitutes a total sacrifice of autonomy and exacerbates the diminution of material well-being which fostered such entry.

Such entry is the basis of peasantization, a transformation process which Howlett has referred to as the "infinite pause". Here it serves to wonder why rural populations (i.e. peasantries) in Peripheral nations of this world seem only to barely make it.

Clarke shares the above view and cogently expands upon it (1973:287-288):

To continue, with specific regard to New Guinea, the argument that development is a multi-faceted process - not all beneficial - I will here deliberately take a dark view and outline some of the detriments. Obviously, the introduction of cash cropping and the increase in population, which results from the Pax Australiana and the spread of medical services, mean increased use of agricultural land, which in turn means a shortening of the fallowing period and probable deterioration of the soil under systems of simple shifting cultivation and an intensification of labour input in the more complex agricultural systems. Associated with increasing intensity of land use is a deterioration of diet as the zones accessible for hunting and collecting diminish and a horticultural specialization in the highestyielding tubers increases. Studies need to be made as to whether or not the spreading use of imported rice and canned fish means a further nutritional deterioration, but such has commonly been the case for comparable changes elsewhere. It certainly seems likely that for many highland New Guineans the amount of protein now gained by eating protein-rich yound leaves, whose previously important place in the diet has lessened with increasing urbanization and commercialization. Increasing commercialization also means a new dependence on external sources of supplies for goods such as fertilizers, machinery, clothing, tobacco, tools, flashlights, kerosene, and so forth. The new roads, usually seen as proud and concrete symbols of advance, can also be viewed as means not only of increasing administrative control and centralization but also as mechanisms whereby New Guineans are subordinately linked ever more tightly into the Western commerical system as the produceable wealth of New Guinea, agricultural or mineral, is drawn off to the outside world. Beyond such new dependencies and the likelihood of the physical impoverishment of land and diet is the increased perception that comes with development: the expatriate simply by his presence makes the New Guinean poor. By being introduced to the external world, the New Guineans are changed from members of integral and what were most amply-fed communities to a 'backward' or 'underdeveloped' people. To assuage this new condition

missionaries and government officials urge the New Guineans to abandon their traditional sporadic employments and entertainments - some lethal but still exciting for the pleasures of unremitting toil, the result of which for many New Guineans is likely to be a still greater sense of deprivation. That a few men are relatively successful in the increasing individualization of economic activity that accompanies development means that growth of inequalities of wealth in what were in pre-contact times more egalitarian economic systems. Finally, development means a lessoned diversity both within New Guinea and in the mosaic of the world's regions. As Western influences spread through New Guinea, the previously varied ways of life and sustenance all merge into what seems in part to be a single trashy fringe of Western civilization. On the worldwide scale, the last great, self-sufficient reservoir of subsistence agricultural systems is increasingly penetrated and standardized by the ecologically unsound ideas of commercial production.

Notwithstanding what has been "gained" by the stateless society as a result of its contact by the nation-state through the aegis of "development", it is important to reemphasize what has been and is being lost. Such a reemphasis is probably most effectively provided by a group of Brazilian bishops and priests who were formerly missionaries and who have adopted, no doubt painfully, an anti-missionizing position. Their reemphasis follows from a crucial question (Biennes, et al 1974:29):

What would Brazil be if it truly relied upon the Indians, rather than attempting to annihilate them as at present? It is quite possible that many capitalist and imperialistminded Brazilians and authorities fear this question, which shows that, consciously or unconsciously, they support the extinction of these peoples who, by virtue of their possitive values, constitute a living denial of the capitalist system as well as of the 'values' of a so-called 'Christian Civilization'. Without assuming the idyllic vision of a Rousseau, we feel it urgently necessary to recognize and make public certain values which are more human, and thus more 'evangelical', than our 'civilized' values and which constitute a true alternative to our society:

(1) The native people in general have a system of using the land base for the community and not for the individual. There is therefore no possibility for the domination of some by others on the basis of private exploitation of the means of production.

(2) All production resulting from labor or the utilization of riches and, therefore, the entire economy is based on the needs of the people, and not on profit.

(3) The only purpose of the social organization is to guarantee survival and the rights of all, not just a privileged few.
(4) The educational process is characterized by the exercise of freedom.
(5) The organization of power is not despotic but shared.
(6) The native population lives in harmony with nature and its phenomena, unlike our 'integration' with various forms of pollution, and the destruction of the natural habitat.
(7) The discovery, development and existence of sex enters into the normal rhythm of the Indian's life, in an atmosphere of respect, without the characteristics of taboos or idolatry which are manifested in our society and have so much influence over it.

The actual processes of the transformation of the stateless society into a state-oppressed society are, as mentioned, overwhelming. Many of these processes have been discussed in the context of preceding chapters. Their complexity denies them a verbal reiteration. However, some attempt should be made to piece these processes together, so as to appreciate more fully the seemingly infinite threatening relationships which are played-upon or brought into being by national penetration of the autonomous shifting cultivation society. Figure 8 seeks to bring these processes together; it stands as a mass of hypotheses, many of which have been proved tenable by the preceding analysis.

As a last word, for purposes of following the flow diagram, it should be emphasized that central to the diagram is the box labeled *Deprivation Avoidance Behavior* (following Dumond, quoted earlier) with its associated choices and conditions under which those choices might be either favored or disfavored. For example, the choice to expand the territory might well be disfavored by the threat of an outbreak of hostilities with populations which lay claim to adjacent territory. It should also be added that an adjacent population in direct contact with agencies, institutions, or socioeconomic classes of the national




political economy may diffuse the impact (as in a Brownian movement) of such contact to the society in question in the diagram which may not be in direct contact. Turning now to the box labeled Food Units Available per Person, no deprivation avoidance behavior is called-for if food units are adequate; hence this alternative is terminal in the diagram. Finally, if all choices which effectively expand subsistence (yet do not require labor input increases) ultimately allow continued population growth, there must come a point when no alternative means can be relied upon to increase yields except to intensify the labor involved in food acquisition. Here, it may be noted, is the dialectic in action and the root of an internally-induced structural transformation of the shifting cultivation society. The choice to intensify is, however, conditioned by time. There must be sufficient time for experimentation all the while the shifting cultivation cycle is being foreshortened. While the result of this "voluntary" intensification is beyond the analysis of the work-in-hand, it is indicated in the diagram for completeness. The alternative to "voluntary" intensification is entrance into the market economy following contact by the national political economy. Some of the "final" consequences of this entrance are indicated in the diagram, but it should be emphasized that the purpose of this diagram is to undertake the questions of how and why entrance is so readily made, rather than to account for the endproduct of such an entrance.

NOTES

1 This table was compiled by Indigena, Inc. and American Friends of Brazil, who jointly published Supysaua: A Documentary Report on the Conditions of Indian Peoples in Brazil in which it

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appears. Preceding this table is the Brazilian anthropologists' document mentioned above. Both the table and document, which originate from different sources, are mutually reinforcing.

²According to the Latin American Working Group (1976:9), BRASCAN, a Canadian transnational corporation, assumed 92% interest in the King Ranch in 1972 from Deltec International, a US transnational corporation.

⁵The above information by no means exhausts its source. The table discusses the International Police Academy (Washington D.C.) which has trained the military police of the state of Minas Gerais. These police are said to be in charge of the Rural Indian Guard in Brazil and the Indian Prison Camp at Crenaque, Minas Gerais. It also discusses the Centro de Instrucas de Cuerra na Selva (Jungle Warfare Training Center), a 400 square mile tract of tropical rain forest near Manaus, established by the Brazilian Army and US adivsors on the model of the US Army Jungle Warfare Training Center at Fort Sherman, Panama (CZ).

⁴Watters (1971) and Crist and Nissly (1973) summarize the extent and impetus for colonization in nation-states which fringe the Amazon basin. Neither critically examine such colonization in terms of encroachment upon native territories but rather from the perspective of national integration and development.

⁵Central to understanding the significance of cargo cults is the notion that supernatural powers are intercepting the "cargo" and that one must adopt a lifestyle which will appease such powers and thereby permit their release of the "cargo". As a result, ideas about the purpose and destiny of a society are important since they define the appropriate lifestyle. The eschatological teachings of Christian mission provided ideas about purpose and destiny, which became attractive to those missionized because the lifestyle which was defined by those ideas would secure Christian cargo when adopted. For a fascinating study of cargo cults, see Worseley (1957).

⁶Studies by Lea (1965, 1973) of the lowland Abelam, who were contacted much earlier than the Gorokans, indicate accordance with Howlett's findings *and* predictions.

⁷The apparent contradiction between FUNAI policy and that of the Villas-Boas brothers is resolved by their stated desire "To keep the native population in reserves until our [national] pioneer-front is in a position to offer it a less harmful contact. This, however, is not going to happen quickly since our [national] society has not yet developed the necessary conditions to do so. As you might well know, a great part of our [Brazilian] people are still marginal in every respect. How can one pretend the Indian's integration when the front of contact itself is marginal. We therefore need an integration of the national society preceding that of the native population," (quoted in Fuerst 1973:27).

 8 Junqueira (1973:23) goes so far as to suggest that the

culture hero in the Kamaiura creation myth has been transformed into the civilized, white man at the FUNAI posts.

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