

# 13 *On the poverty of theory: natural hazards research in context*

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From the specific form of material production arises a specific relation of men to nature.

Karl Marx (1967)

We must take seriously Vico's great observation that men make their own history, that what they can know is what they have made, and [to] extend it to geography.

Edward Said (1978)

For too long the ruling classes have attributed to 'Nature' ... the inequalities and sufferings for which the organisation of society is responsible.

Sebastiano Timpanaro (1975)

I have quite deliberately chosen as a title for this chapter a recent book by Edward Thompson (1978) whose substantive interests must seem, at first glance, far removed from the geographic study of natural hazards. Thompson's polemical treatise is in fact part of a volatile debate in British historiography (see Anderson 1980) which specifically raises problems surrounding the nature and place of fact in intellectual enquiry, the appropriate concepts for the understanding of social and historical processes and the distinctive object of historical knowledge. As such *The poverty of theory* is a work of epistemology which emphasises that our knowledge is critically shaped by the preoccupations we bring to it, that we interpret the world within the limits of a historically conditioned imaginative vision, and that theory and concepts cannot therefore be taken for granted. It is precisely this series of questions that constitute the starting point for my evaluation of natural hazards research. I wish to suggest that in a critical examination of this work we should broaden our horizons and begin with the epistemology and concepts of society and nature; that is with the broad problematic into which hazards must be situated. I argue that hazard theory has been framed by concepts and assumptions which carry a historically specific view of nature, society and man and hence, by extension, of the relations between them. This colours the entire corpus of hazards work. In trying to provide such a critical elaboration I wish to place the content of this volume into the wider body of social theory of which geographers have all too frequently been narrowly and distantly

In delimiting natural hazards research I pay special attention to work with a cross-cultural bent and particularly those studies which address hazard occurrence, genesis and effect in the Third World. In doing so I necessarily engage the enormous volume of work in the cognate field of human-cultural ecology since, especially over the past five years, there has been much theoretical interchange. While I appreciate that the work on hazards in the less developed countries hardly constitutes the entire body of hazards research, the issues I raise are entirely apposite and relevant to the field as a whole. Indeed, Kates' (1971) human ecological perspective and White's (1974) questionnaire methodology have been applied *grosso modo* in First and Third Worlds alike.

In the light of my agenda, this chapter has five major sections. The first examines the epistemological and conceptual underpinnings of man-nature relations in general; the second analyses the critical concept of adaptation as a motif pervading both hazard and cultural ecological research. The third section specifically investigates geographic hazards work in light of my theoretical concerns, particularly the prevalence of cybernetic views of social systems and the individual rationality approach to hazard behaviour. The fourth proposes an alternative materialist epistemology and theory with special attention to the dual foci of labour (social relations of production) and intersubjective meanings in the society-nature relation. And finally, part five is an empirical case study which attempts to apply these materialist postulates to the drought hazard among peasants in northern Nigeria.

### *Epistemology and the human-environment problematic*

A proper starting point for the study of environmental hazards is the epistemology and conception of nature itself (see Gollidge 1979). A great deal of the conceptual and theoretical questions posed by the natural hazard paradigm emerge from the broad epistemological context in which such work is ultimately grounded. This should come as no surprise because, as Gregory Bateson pointed out long ago, epistemological premises which predicate all intellectual labour are notoriously sticky and colour all theoretical practice. I shall examine three authors - Anthony Wilden, Andrew Sayer and Karl Marx - whose work is of great practical significance in understanding the relevance of epistemology for both a critical evaluation of hazards work and also for situating such work into the wider realm of contemporary social theory. I cannot hope to do justice to the enormity of this task; but I would like to raise *explicitly* what is at best only implicit in much of what passes as hazard research, namely the manner in which we know and the reliability of 'environmental knowledge', the nature of the object(s) of knowledge and the social situation under which knowledge and the object of knowledge is produced. All this is to say that we cannot take for granted the relationship between people and nature, between knowing subjects and objects of study or between theory and fact.

I should like to begin with the work of Anthony Wilden (1972) and in particular his observation, following Whitehead, that much of social science is still living on the intellectual capital accumulated from the 17th century. It was, of course, precisely during this period when 'nature' became materially and ideologically commoditised, an object of control and domination (Leiss 1974, Merchant 1980). Coeval with the transformation of nature and science was a fundamental restructuring of social relations emerging from new forms of commodity production, in short from a nascent capitalism. Wilden sees the use of a Newtonian-Cartesian science - of the world as constituted by self-regulated closed systems - as rapidly imported into the mainstream of biological and social science where it still resides and flourishes. In his own words:

'In a word, science, ideology, and economics all became united around a conception of the individual and the organism (cf. Freud, Claude Bernard, Piaget) as isolated systems, governed like billiard balls by "forces" ("instincts" in psychology and ethology), all on the same plane of being, all separate from their environment(s) and from the various levels of the general environment. Organism, atom, and person became ontologically and ideologically equivalent - and explained by overt or covert mechanical metaphors. The "free" individual was in fact - and still is - a metaphor of her or his status as a commodity in the marketplace.'

(Wilden 1979, p. 77).

For Wilden epistemology is principally a question of distinction, of, as he puts it, 'where you draw the line'; accordingly, the line drawn, for instance, between 'organism' or 'human' and the 'environment', is one such epistemological distinction. In this case it has arisen in part from the solipsism of Descartes, but like all lines it is a necessary fiction. This type of punctuation or boundary distinction is essential in a methodological sense, but such imaginary or socially constituted oppositions (a) become real for those who employ them and (b) can serve inappropriate and often exploitative ends. Of course Wilden cannot lay claim to this insight since it was William Blake who observed over 150 years ago that 'Nature hath no outline but Imagination has'. As Blake understood so well, these epistemological issues should not be taken lightly, but unfortunately few geographers read 'The Marriage of Heaven and Hell'.

Sayer (1980) in a brilliant contribution does, however, start precisely from this epistemological juncture. He posits that geographers have in fact had little to say on these subjects largely because a positivist science sees 'such vague subjects as the essential character of people and nature ... as "metaphysical" and/or meaningless or at least irrelevant' (1980, p. 20). The naive, empiricist view of nature as a constellation of physical 'facts', unambiguously observable and unified through a positivist deductive method, welded together the entire body of social and natural sciences. To the extent that geographers took a stance on what were seen to be metaphysical issues

the belief in a neutral observation language led in a *de facto* way to the recognition of a commonsense epistemology as the basis for all knowledge. In this way, parochial knowledge was based on taken-for-granted assumptions, eternal verities which remained largely unexamined. Burgess (1976) has rightly suggested that the failure explicitly to address or problematise fundamental categories such as nature or the individual in geographical discourse has resulted in an extraordinary eclecticism. The people-nature debate accordingly oscillated between idealism and crude materialism, between determinism and possibilism, and between 'a naturalisation of humanity and a humanisation of Nature' (see Smith 1979, Smith & O'Keefe 1980).

Why, then, would heady discourses be pertinent to a discussion of the merits of hazard research? In short I would like to suggest that, following Sayer, we must recognise the essential and necessary unity of society and nature and that 'to start in the conventional manner with such a separation followed by a listing of interactions would be to prejudice every other aspect of the exposition' (Sayer 1980, p. 22). Properly defined, nature is internally differentiated and the subject matter of human ecology is accordingly interactions with nature (Sayer 1979), what Wilden (1972, p. 220) calls 'messages-in-circuit'. At this point Wilden and Sayer come together, for this internal differentiation perspective leads inexorably to a discussion of *inaction* shared between humans and nature and those which are particular to humans; where, in other words, one draws the line. These epistemological lines are controversial (Timpanaro 1975) and in geographic work some fundamental attributes of social life are misrepresented. Deterministic conceptions of people and nature reduce humans to objects in which their role as subjects and agents of history, as conscious, active and intentional producers of social relations and material conditions, is irrevocably lost. While much of recent cultural human ecological or hazard work has moved beyond a crude determinism or possibilism, the question of epistemological assumptions remain. I shall argue that such endeavours nevertheless posed the people-nature relation in a manner which partially misrepresents human life. Specifically I believe that much conventional work rests on building blocks inherited from biology and cybernetics. This ecosystemic approach, broadly defined, blurs and obfuscates the character of inneractions and erodes the irreducibly social character of human life to atomised individuals or organisms – albeit rational decision makers or Simonian satisficers – whose status is roughly synonymous with that of a top carnivore. This biological lineage can, I shall argue, be identified through the critical role which the concept of *adaptation* holds in most human cultural ecological work.

### *Adaptation as a frame of reference*

In this section, I would like to make two basic arguments with respect to the general body of environmental research of which hazards is specifically part.

Although geographic work on hazards has often been seen as a separate realm of enquiry associated with decision-making models (see Burton *et al.* 1978), it is clearly aligned with the phalanx of work which broadly falls under the title of human-cultural ecology or ecological anthropology. This kinship has developed as geographic hazards work embraced cross-cultural and Third World subject matter (Kirkby 1974). My first point is that, even in diachronic analyses, people and nature are seen as discrete entities – culture and environment – in which the latter is seen as limiting, non-dynamic and generally stable. Anderson (1973, p. 203) has commented on this division in light of the functionalist bias in human ecology, a point to which I will return later:

'The structural-functionalist approach and its dominant strategy of analysis encourage the treatment of ecology (generally meaning "environment") as a discrete component among other institutional components. Thus most ethnographies or problem-oriented studies begin with a chapter on the physical environment – the gross natural setting of the socio-cultural investigation. Since the contents of the chapter are seldom referred to subsequently, we infer that such information is viewed as a backdrop, discretely separated from the primary components of the study.'

In spite of the claims of Winterhalder (1980), who has rightly pointed out that this conception of nature can be improved by increasingly sophisticated description of the environment – spatial heterogeneity, patchiness, temporal patterns, resilience, stability and so on – by positing a static polarity, the direction of subsequent analysis is inevitably limited. What emerges is a rather mechanical, billiard-board view of the world in which individuals, organisms, populations and critical environmental variables interact or interfere. What is lacking conversely is (lumped together in the category 'culture' or 'man') the highly complex *social production of material life*.

The second point, which follows logically from the first, is that the pattern of interaction is conceived along neo-Darwinian lines (see Alland 1975, Durham 1976, Vayda & McCay 1975). This is made most explicit in the early work of Vayda and Rappaport (1967) when they suggest that societies can be conceptually treated like any other biological population in a web of ecosystemic relations. The character of 'man-environment interactions' is then seen through the particular biological optic of adaptation. Once again Rappaport (1977) makes this clear when he talks of human society as one form of living system; like all living systems, processes of adaptation – or adaptive structure – inhere within them. In his own words, 'I take the term adaptation to refer to the processes by which living systems maintain homeostasis in the face of both short-term environmental fluctuations and, by transforming their own structures, through long-term nonreversing changing in the composition and structure of their environments as well' (Rappaport 1979, p. 145). It is at this point that the intellectual conduit between biology and systems theory becomes clear. Ecological anthropology in particular has adopted a *cybernetic view of*

adaptive process in social life. Specifically, social systems are seen as *general purpose systems* whose goal is nothing more than survival; that is, they can be conceived as a class of 'existential games' in which there is no way of using winnings ("payoff") for any purpose other than continuing the game for as long as possible' (Pask 1968, p. 7). From the perspective of human-environment relations, the specific form of interaction follows the general model of Slobodkin and Rappaport (1974) on orderly adaptive structure which possesses fundamental organisational and temporal characteristics: 'successful evolution requires the maintenance of flexibility in the response to environmental perturbation and that this flexibility must be maintained in the most parsimonious way. The parsimony argument is that organisms must not make an excessive or unnecessary commitment in responding to perturbation, but at the same time the deeper responses must be ready to take over to the degree that the superficial responses are ineffective' (Slobodkin & Rappaport 1974, p. 198). At the instant of perturbation a series of responses is triggered which can be ordered in terms of activation time and commitment of resources. The gradation of responses with respect to time also orders them in terms of depth of commitment. As a theoretical focus, then, adaptation became cybernetic, organised and hierarchical since 'all biological and evolving systems . . . consist of complex cybernetic networks' (Bateson 1972, p. 13).

An advantage of adaptation so defined is that it allows one to talk sensibly of dysfunction or maladaptation, which has been a major shortcoming of cultural ecology. Rappaport (1977), of course, sees maladaptation as those factors internal to systems which interfere with their homeostatic responses. They reduce survival chances since they constitute impediments to an efficient and parsimonious response to stress or environmental hazards. In light of the structural qualities of adaptation, maladaptation can, then, be seen as a class of pathologies or anomalies in the hierarchical and cybernetic functioning of all living systems. Response may be too slow or too rapid, systems may be overcentralised ('hypercoherent') or oversegregated; subsystems may come to capture ('usurp') high-order systems; the autarky of subcomponents may be eroded (see Flannery 1972). In short, what Bateson takes to be the fulcrum about which successful adaptation revolves, namely flexibility, has been in various ways structurally inhibited.

All this has taken us a long way from the early cultural-human ecology of 'human niches', adaptive radiation, and human ecological succession. This I would suggest was inevitable if only because the early simplistic ecological models were obviously incapable of handling societies in transition, where formerly autarkic systems were being incorporated into a global economy. At any rate the work by Morren (see ch. 15) and Waddell (1975) on response systems, and of Vayda (1974, 1976) and Rappaport (1977) on purportedly maladaptive systems, has clearly deepened our understanding of transactions between societies and their environments. Indeed, Vayda and McCay (1975) have advocated a hazards research approach to the study of human ecology

which for the first time explicitly weds cultural ecology with natural hazards through the concept of adaptation. Emphasising its similarity to Darwinian selection theory and its stress of the efficacy of responses, this new hazard focus avoids the obvious pitfalls of a theory which is preoccupied with energy as the critical interface.

In spite of the obvious advances of the 'new ecology' (Robson 1978, Orlove 1980, Rappaport 1979), it is clear that new difficulties have emerged as anthropologists and geographers move away from relatively isolated communities to the study of social groups in transition. These problems are, I believe, derived directly from a theoretical starting point which sees society as a type of self-regulating, self-organizing living system isomorphic with nature itself. '[This] theoretical practice might be called "ecology fetishism". Nothing cultural is what it seems; everything is mystified as a natural fact which has the ostensible virtue of being basic . . . Marriage becomes an interchange of genetic materials . . . society a population of human organisms and cannibalism a subsistence activity' (Sahlins 1976, p. 88). This is not the place to enter into a protracted critique of new developments in human-environment relations, but I should like to raise two criticisms which are of signal importance, not least for the study of hazards. First, the cultural ecological model is functionalist in the sense that institutions and behaviours emerge as rational; their utilitarian purpose is to fulfil prescribed functions with regard to the maintenance of populations in a human ecological niche, that is to say with *survival*. Persistence, then, was a measure of adaptation. This, however, raises some tricky questions. Not only does a purely utilitarian view of social life deny culture - anthropology loses its object as Sahlins (1976, p. 90) puts it - but in the process adaptation becomes teleological. In other words, adaptive processes are framed by their survival function; they are defined in terms of their results. If this is not the case, the central problematic becomes either uninteresting or simply a truism. 'To say that a society functions is a truism but to say that everything in a society functions is an absurdity' (Levi-Strauss 1963, p. 13). This adaptive-cybernetic view of functional and self-regulated living systems leaves two sorts of residues; first, something vastly more simple than the actual 'adaptive processes' could account for the phenomenon under study (Bergmann 1975). And secondly, systems (including social systems) need not be cybernetic in order to be systems.

'Systems need not be cybernetic in order to be systems. Cybernetic systems are specific in that they are managed and regulated hierarchically. The systems to which I refer, and which I think are the normal case for human social systems that are not self-conscious entities, are those in which there are numerous processes and tendencies that are basically contradictory to one another. There are, of course, numerous limits that are never exceeded, but for reasons that have nothing to do with any regulatory procedure with respect to those limits.'

(Friedmann 1979, o. 259).

The second criticism pertains less to the theoretical poverty of functionalism and adaptation in social systems, than its ideological basis. This raises the spectre of the conception of mind and man (Friedmann 1979). Sahlins (1976, p. 90) for instance noted that ecological studies displace the notion of mind from the realm of humanity to the ecosystem. This is clearest in the work of Bateson (1972, 1978) for whom 'the individual mind is immanent but not only in the body' (1975, p. 436). Mind is a regulated totality organised as a central hierarchy from the lowest life forms to ecosystems that constitute the universe. This Hegelian view is, of course, embodied in the orderly adaptive structure which inheres in all living systems. Rappaport and Bateson in particular see mind as a type of metaphor and homology for their adaptive framework; control hierarchies, therefore, consist of graduated regulators, the more abstract regulators occupying a critical role in social systems. This is why abstract, non-specific 'commands' such as religion are critical for the adaptive context of social systems (Rappaport 1979).

In transcending the mundane to the ethereal realms of mind it seems we have drifted still further from hazards, but I am arguing that it actually strikes to the very core of the concerns of this volume. Let me simply raise three concerns that reflect the centrality of these views in hazards research. First, to the extent that systems do not work in the face of hazards or stress, i.e. they are *not* adaptive, it is simply because regulatory hierarchies are mixed up or non-orderly. In the parlance of the cultural/human ecologist, there is 'hyper-coherence' (overcentralisation) or 'usurpation' (lower-order goals take over high-order regulators), and so on. This is a function of industrialism, of technology or errors in thinking, and of 'attitudes in occidental culture' (Bateson 1972, Rappaport 1977), and hence a new value system is required. But the nature of the socioeconomic system is rarely addressed. Secondly, nature and ecosystems are seen as well regulated sets of interlocking programmes, messages and energy flows with which man, and particularly primitive man, is and was one. Anthropological work illustrates that human practice interdigitated with the cybernetic principle of the larger ecosystem, a regulation somehow grasped through religion. But with the evolution of more complex societies nature is somehow contradicted; the age of Rousseau is superseded by an industrial ideology which is intrinsically maladaptive. Our civilisation, with its linear purposive thinking, contradicts the self-maintaining, circular nature of the ecosystem (Bateson 1972). And thirdly, the structure of human activity—hence of the conception of 'man'—assumes a characteristically cybernetic form; culture becomes, as Sahlins (1976, p. 90) puts it, the self-mediation of nature; it is simply a systematically governed form of human response. This is clear in Bateson's favourite illustration of man-nature interaction: 'Consider, a man felling a tree with an axe. Each stroke of the axe is modified or corrected, according to the shape of the cut face of the tree left by the previous stroke. The self-corrective (i.e. mental) process is brought about by a total system, tree-eyes-brain-muscles-axe-stroke-tree; and it is this total system that has the characteristics of immanent mind' (Bateson 1972, p. 317).

What, then, is the significance of these derivations? I believe that they underwrite much of hazards research in geography and other disciplines and that they are in a fundamental sense highly problematic. In short, maladaptation, or the inability to accommodate hazards, is not simply a question of hierarchical control systems which are there but misused, or quite literally messed up. Equally adaptation is not only or even primarily a question of values or ideology in which change is a programme based on control, rules, principles and regulation rather than socioeconomic structures. And not least, man-nature relations are not *a priori* cybernetic; to return to the motif of Bateson, humans never simply chop wood. Rather humans enter into a specific relation with the wood 'in terms of a meaningful project whose finality governs the terms of the reciprocal interaction between man and tree' (Sahlins 1976, p. 91). This is for Sahlins a cultural project, a symbolic order of intersubjective meanings, in which nature is harnessed in the service of culture. But it is above all *social* and it necessitates material *production*; as Marx put it, animals collect but only humans produce 'through the appropriation of nature by the individual within and through the mediation of a definite form of society' (Schmidt 1972, p. 68). But this production is not simply survival, for societies survive in a *specific, historically determinate way*; they reproduce themselves, albeit as systems, but also as certain kinds of men, women, classes and groups, not as organisms or aggregates thereof. Friedmann (1979) is very probably correct in seeing the cybernetic vision as ideological, wholly appropriate to our context of industrial and bureaucratic capitalism.

I would like to suggest that the cybernetic-adaptive systems perspective is the legacy from which the human ecology of hazards also suffers; it has defined the man-nature problematic for much of this work in a manner which leaves it open to the criticisms I have just levelled. There is a sense in which social systems, however, have never been adaptive; that the assumption of a *priori* cybernetic regulation may be appropriate for individual human organisms but *not* for social systems which are accumulative, contradictory and unstable. In the following section, I will examine briefly how hazards research has attempted to deal with these unique qualities of social systems.

### *Hazards in context*

Roughly thirty years ago, largely under the auspices of Gilbert White, a field of geographic natural hazards research was conceived. Initially directed to the amelioration of flood-control problems in the United States, the project has expanded to include a plethora of 'natural' and man-made hazards and the collective wisdom has been drawn together in two major works by White (1974) and Burton *et al.* (1978). This is not the place to rehearse many of the well founded criticisms of this work (Torry 1979, Waddell 1977, O'Keefe & Wisner 1975). Suffice it to say that many of the forays into cross-cultural investigation were especially parochial; the rigid and, on reflection, extraor-

dinarily naïve questionnaire design (White 1974, pp. 6–10) which provided the foundation for International Geographical Union sponsored research in the less developed countries was characteristic of the crude scientism, the ethnocentrism and the atheoretical basis of the hazard project as originally conceived. As is clear in retrospect, these field studies were ahistoric, insensitive to culturally varied indigenous adaptive strategies, largely ignorant of the huge body of relevant work on disaster theory in sociology and anthropology, flawed by the absence of any discussion of the political-economic context of hazard occurrence and genesis, and in the final analysis having little credibility in light of the frequent banality and triviality of many of the research findings (Waddell 1977).

The theoretical and conceptual poverty of the last decade's work emerges, I think, from two epistemological tendencies. The first pertains to the conception of the human-environment transactions, that is the status of nature and its transformation through human practice. And the second is the invocation of rationality as the peculiar optic through which individual and social behaviours are brought into focus. Put differently, it is the undisciplined conceptions of the nature of individual and society, which of course strikes to the very heart of all social theory, that has acted as a fetter on the past three decade's labours. And yet as much as it is firmly embedded in social science proper, hazards research has operated with a rather simple human ecological model (Kates 1971), loosely cybernetic in form, which purports to explain the widespread irrationality of exposure and response to environmental perturbations. Ironically, the Kates-White-Burton paradigm is predicated on an assumption of individual purposeful rationality expressed through a tripartite cybernetic structure: (a) hazard perception, (b) recognition of alternatives-adjustments, (c) choice of response. As Walker (1979, p. 113) has put it, however, this model is manifestly inadequate to explain human behaviour and a strategic diversion is constructed around it. Responses to hazards are arbitrarily categorised as purposeful and non-purposeful, with the latter further subdivided into incidental, cultural and biological adaptations; the theoretical significance of this taxonomy is far from clear, however. Following Herbert Simon, individual behaviour is seen as boundedly rational in which human agents, circumscribed by imperfect knowledge, perceive and act upon the world. Faulty perception and inappropriate psychological propensities (for example, the gambler's fallacy) are given analytic priority in the explanation of ineffective hazard response.

On balance, this human ecology model vacillates between individual and social causes of behavioural irrationality. Much of the work demonstrates unequivocally that social context and political economy mediate individual perception. Yet in spite of the recognition by Kates, White and others of the strategic import of social causality, they have no social theory capable of addressing social process, organisation or change. To return to the epistemological motif of our earlier discussion, the social and individual side of the 'human-environment equation seems to waver inconclusively between

two positions. The first, based on a sharp disjuncture between humans and their physical environment, sees society as aggregates of individual decision makers in a fashion which enables Chinese communes and US corporations to be juxtaposed 'with little sense of the profound differences between modes of social organization' (Walker 1979, p. 113). There is a sense in which, in this view, individuals are atoms, society is irreducibly individuated and structureless, and hazard theory emerges as a none too sophisticated type of Linnean taxonomy. As Smith and O'Keefe comment, 'This dualism does not surpass the subject-object distinction of nature and society and so reduces scientific inquiry to an examination of two forms whose essential natures are given. More frequently, disaster vulnerability is analysed as if nature is neutral so that the environment is hazardous only when it "intersects with people"' (Smith & O'Keefe 1980, p. 37). Maladaptation in society, to the extent it is discussed at all, simply becomes a type of cybernetic malfunction, mistaken perception, imperfect knowledge, or inflexible decision-making apparatuses.

The second approach – characteristic of more recent work on Third World communities in hazardous environments – collapses internal into external nature. This is clearest in the synthesis between anthropology and geography (see Morren's chapters in this volume) which explicitly employs the adaptation problematic discussed earlier. Vayda and McCay (1975) advocate a hazards research approach emphasising a similarity to Darwinian selection theory and particularly the efficacy of adjustments; that is, with emphasis on factors important to the response of the system to stress, rather than on those relating to its cause. In many respects the very best of the recent work on hazard exposure in Third World societies has emerged from this synthesis (Waddell 1975). The increasingly sophisticated attention to ethnoscience and people's knowledge as the basis for hazard response (Richards 1978, Wisner 1981); the recognition that the 'closure' of autarkic communities has been progressively eroded by their incorporation into global market systems, which has important implications for the loss of regulatory autonomy in relation to the physical environment (Clarke 1977); and the emphasis on constraint rather than choice in hazardous environments, on the loss of social or individual flexibility and on distortions in the temporal order of decision making (Grossman 1979) – have all vastly strengthened the brittle theoretical basis of much early work. Not least in this regard has been the renewed attention to the unit of analysis in response systems, the temporal sequencing of adaptive responses, the importance of the sociocultural context and the admittedly ill-specified 'external system', the long-term resiliency of social systems (Holling 1973), and on intellectual movement away from the preoccupation with energy relations and material flows (Vayda & McCay 1975).

And yet in spite of these advances, the new hazards work suffers from the limitations of much ecological anthropology (the 'new functionalism' as it is sometimes called), the epistemological and theoretical problems of which I have already discussed. In fact, what is most exciting in this work is precisely that which threatens to break out of the rigid adaptation or human ecological

framework; take Clarke's work for instance, 'As society and economy are enlarged in the course of development, as communities trade autarky for access to a wider range of goods and services, new and coarser patterns of resource evaluation and selection replace old, finer patterns. Specialisation replaces diversity; economic risk is added to natural risk' (Clarke 1977, p. 384). The foci for Clarke are essentially political-economic, highlighting the subsumption of local production systems, largely through exchange and commodity relations, into a global economy. And I believe that this provides the groundwork for another approach to human ecology. Put differently, I would like to suggest that the forces and social relations of production constitute the unique starting point for human adaptation which is the appropriation and transformation of nature into material means of social reproduction. This process is both social and cultural and it reflects the relationships to and participation in the production process. For our purposes, this does not delegitimise the study of Melanesian carrying capacities or hazard responses in Botswana, but situates these questions in a new context:

'Nevertheless, it is important not to allow an empiricist concern for operationalization to eliminate a consideration of fundamental issues of political economic analysis. From this latter perspective, the production focus dovetails directly with problems of access to and/or control over the means of production in a given society; and, most importantly, how the total product of that society is allocated among various groups within its population. With the exception of certain simple band or tribal societies, this kind of inquiry inevitably leads into a study of the political power structure and social ranking or stratification'. (Cook 1975, p. 41).

### *Labour, nature and social reproduction*

In Marxist scholarship, nature as somehow separate from society has no meaning. This is not simply to suggest that nature is mediated through and related to social activity, but rather that, in both historical and practical senses, nature resides at the locus of all human practice. People rely on nature for the fulfillment of basic needs; that is to say, the first premise of all human history is the production of material life which always involves a relation between producers and nature, what Marx calls the labour process. There is, then, an irreducible unity between society and nature that is differentiated from within. The socially active producer '[c]onfronts the material of nature as one of her own forces. He sets in motion arms and legs, heads and hands, the natural forces of his [sic] body, in order to appropriate the material of nature in a form suitable for his own needs. By thus acting through this motion on the nature which is outside him and changing it, he at the same time changes his own nature' (Marx 1967, p. 177). With this 'metabolic' view of man and nature (Schmidt 1971, pp. 76-7) Marx introduced a new under-

standing of the relation between what had been conventionally seen as a static polarity. The content of this metabolism is that 'nature is humanized while men are naturalised' (Schmidt 1971, p. 78) in historically determined forms. The whole of nature is socially mediated as society is simultaneously mediated through nature as a component of total reality. As Alfred Schmidt observed in a book on the concept of nature by Marx, 'Labor power, that "material of nature transferred to a human organism," acts on the materials of nature which are outside man; it is therefore through nature that nature is transformed. Men incorporate their own essential forces into natural objects which have undergone human labor. Through the same process, natural things gain a new social quality as use-values, increasing in richness in the course of history' (Schmidt 1971, p. 78). Nature, then, is historically unified through the labour process.

In contradistinction to human ecology, which has tended either to humanise nature or naturalise man, a materialist perspective on society and nature is dialectical and internally related (Ollman 1974). I would like to suggest that Marx's metabolic metaphor provides a richer conceptual frame for both human-cultural ecologists and specifically for the study of hazards. Following Sayer (1980), this involves two critical concepts: (a) labour and (b) intersubjectivity. With regard to the former, labour can be seen as the intentional and active transformation of nature for survival; that is, the motion of man on nature produces use-values for consumption. But labour is more than a simple change in the form of matter; it is a process in which man and nature participates, in which humans 'start, regulate and control the material re-actions between selves and nature' (Marx 1967, p. 177); in which by acting on the external world and changing it, man changes his own nature. At the same time, the transformation of nature can only work with its given materials; human practice cannot transcend the laws of ecology, only the form in which these laws express themselves. It is, rather, the social structure which 'determines the form in which men are subjected to these [natural] laws, their mode of production, their field of application, and the degree to which they can be understood and made socially useful' (Marx, in Schmidt 1971, p. 98). While nature can only be ruled in accordance with its own laws, the labour process which transforms it is social in several important respects. First, labour presupposes understanding of nature's mechanisms and this knowledge is clearly neither innate nor given but is socially acquired; as Sayer (1980, p. 29) observes, knowledge required from the appropriation of nature is never unmediated reflexion but 'always uses means of production in the form of existing knowledge'. And secondly, as Marx (in Bottomore & Rubel 1963, p. 155) himself noted, 'In the process of production, human beings do not only enter into a relation with Nature. They produce only by working together in a specific manner and by reciprocally exchanging their activities. In order to produce, they enter into definite connections and relations with one another, and only within these social connections and relations does their connection with Nature, i.e. production, take place'.

In the abstract, then, labour is the active and effective relation between society and nature; labour is transformative and social but in its historic mission it also changes the social relations themselves. Labour as the relation between people and nature is, however, historical in two senses: first, we must ask what kind of labour, or labourer, or labour process? There is no historical inevitability why interaction with nature is mediated through slave or serf or wage relations. But in any given period, the metabolism of humans and nature is locked into an historically determinate structure of social relations (Sayer 1980). And secondly, this metabolism is historical in the same sense that it is not voluntarist, for 'Men make their own history, but they do not make it just as they please . . . but under circumstances directly encountered, given and transmitted from the past' (Marx 1972, p. 10). In laying stress on human agency, on history, on the non-teleological quality of social systems and on the structured social relations, a materialist perspective clearly does not simply translate into Carl Sauer's notion of 'man as an ecological dominator' which is such a strong thread in the web of contemporary human ecology.

The second concept raised by Sayer, and which I shall only touch upon very superficially, is intersubjectivity. Precisely because human life is irreducibly social, interaction within society is meaningful; that is, 'the social is grounded in the production, negotiation and use of intersubjective meanings' (Sayer 1980, p. 22). As knowing subjects, then, we all operate on the basis of understanding; human action is *constituted* by intersubjective meanings. Though they need be neither correct nor coherent, these meanings are bound up with language, action and institutions; in short, with the practices and material constitution of society. Meanings are, as Taylor (1971) observed, essentially modes of social relation. While this raises a host of germane questions on the relations between knowing subjects, between theory and society, and so on, I simply want to point out that the conception of the relation between society and nature can be constitutive and reflective of prevailing social relations. This is, of course, precisely the point made by Sahlins and Friedmann in their critiques of the ecosystemic view of adaptation.

What, then, is the significance of the materialist perspective for adaptation and the study of hazards? A focus on labour as the embodiment of the people-nature relation affirms the critical importance of social context. But in particular circumstances labour is refracted through the prism of *specific* social relations of production:

'The manner of appropriation of Nature, i.e. the form of our metabolism with Nature, is determined by the social relations, chiefly to do with ownership and control, and these forms of appropriation have the effect of reproducing those social relations. The separation of workers from the means of production means that their appropriation of Nature is governed by the interests of capitalists, and in turn this serves to reproduce the workers as wage-labourers because it does not give them the control of the means of production to enable them to become anything else, and it reproduces the

capitalists as the owners and controllers of production. Therefore there is a necessary relation between the form of appropriation of Nature and the social relations of production'

(Sayer 1980, p. 29).

It is critical, however, that we move beyond the social relations of production *per se*; in conjunction with the forces of production – that is the totality of the technical conditions of reproduction – these social relations constitute a mode of production. Each mode contains within it certain contradictions and tensions, which emerge from the labour process and which provide the basis for the social reproduction of the entire society. In other words, labour is one moment in what Friedmann (1976) calls a total system of reproduction. Among an African peasantry this would involve the reproduction of the productive (agricultural) cycle, the reproduction of the productive cell (the household), and its social relations of production (see Meillassoux 1981). Godelier has posited the importance of a dynamic conception of the conditions of social reproduction which is entirely congruent with our discussion of labour and intersubjectivity:

'Chaque niveau d'organisation sociale a des effets spécifiques sur le fonctionnement et le reproduction de l'ensemble de la société et par voie de conséquence sur les rapports de l'homme avec la nature . . . – c'est seulement en tenant compte du jeu spécifique de tous les niveaux du fonctionnement d'un système économique et social que l'on peut découvrir la logique du contenu et des formes des divers modes de représentation, des diverses formes de perception de l'environnement' (Godelier 1974, p. 124).

Accordingly, for Godelier adaptation 'désigne avant tout la logique interne de l'exploitation des ressources et les conditions de reproduction de ce mode d'exploitation'. This definition implies that adaptive processes are (a) not uniquely constrained by nature but also by the social relations of production and (b) often have a contradictory character which emerges from the labour process itself. Robson (1978, p. 326) is correct when she argues that, if adaptation is to designate a compatibility between society and nature, these mechanisms must have specific social forms and be elaborated in terms of the conditions of social reproduction of society. If environmental relations are, then, instances of the labour process, hazards can (as I shall argue in the following section) be seen as moments or crises in the system of social reproduction.

*Drought and the simple reproduction squeeze: a case study in northern Nigeria*

Odious images of Islam have an embarrassingly longstanding lineage in the West. It is, then, entirely appropriate that Roder and Dupree (1974), in a

by the ruling class, was not a dominant characteristic of the productive system. Craft production and petty commodity production generally, emanating from within the household structure, was, conversely, a widespread phenomenon throughout Hausaland. The state controlled the means of coercion, provided protection for the peasantry and travelling merchants, organised large-scale labour projects and acted as a guarantor in times of needs. Within this tributary formation, peasant security in the face of a hazardous climatic environment was secured through a network of horizontal and vertical relationships and reciprocities which were embedded in the social relations of production.

A necessary historical starting point in light of this brief resumé of social relations in the Sokoto Caliphate is the recognition that extreme climatic variability, particularly drought, is and was an intrinsic part of nature in northern Nigeria and indeed throughout the semi-arid Sahelian desert edge. The recursivity of drought – and hence of the possibility of famine – is reflected in the historical landscape of Hausaland which is littered with references to drought and the great famines (*babban yamma*) of the past. The dialectic of feast and famine or drought and flood is a recurrent motif in Hausa society and it occupies a significant cognitive position in the collective mentality. Not only is there a complex and subtle lexicon which pertains to rainfall variability, but this same climatic content is embodied in the most significant cultural and artistic forms such as praise epithets, folktales, fables and historical anecdote.

In light of the recursiveness of rainfall and harvest variability, it is to be expected that rural communities were in some sense geared to environmental risk. Take the following comment from Raynault (1975) describing 19th-century Nigerian Hausaland:

'Faced with precarious natural conditions indigenous society was able to place into operation a series of practices, individual and collective, which permitted it a margin of security . . . traditional techniques of storage permitted grain to be stored for relatively long periods . . . which made possible the constitution of reserves . . . after the harvest the seed destined to be planted the next year as well as the quantity of grain necessary for the subsistence of the group during the planting season were placed by the clan head in a large granary which could not be opened until after the first rains'.

The relation between the labour process and drought extended, then, beyond the sophistry of Hausa agronomy which included sorghum-millet intercropping, moisture conservation techniques, and the exploitation of ecologically varied micro-environments into the social realm. In particular, the social relations of production defined the socioeconomic context of hazard occurrence and notably the possibility of drought-induced food shortage. The emphasis on the role of kinship and descent grouping generally was one way in which risks were diffused and collective security instituted. Among the non-Muslim Hausa the descent group referred to as the clan segment func-

study of drought among Hausa peasants in Muslim northern Nigeria, should discover that farmers see themselves at the mercy of the elements and in the hands of God. In their own didactic words, 'They know that drought can come again in any year and that its occurrence cannot be predicted . . . When faced with drought or other natural disasters . . . their chief response is to pray to God' (Roder & Duprec 1974, p. 118). Rather than an invocation of the fatalistic hand of Islam – of peasant irrationality derived from the ideological hegemony of religion – I shall argue that the starting point must be the labour process and the knowledge and intersubjective meanings which emerge from the social basis of labour. In short, the optic through which hazards – and in this case drought – are examined is that of the social relations of production specifically in a peasant society in transition. In the case of northern Nigeria, I shall endeavour to show that the articulation of a precapitalist mode of production with a global capitalist system, largely under the aegis of the colonial state, explains the changing character of peasant production and in particular the current vulnerability of rural producers to environmental hazards for which they are conceptually prepared. It is precisely the inability of some peasants to respond – in other words, to reproduce themselves – under conditions of environmental risk that characterises the transformation of the social relations of production in Hausaland. In this sense one can quite legitimately talk of structural maladaptation in peasant society in northern Nigeria.

*Historical perspective* By the close of the 18th century, what is now northern Nigeria consisted of a largely Islamised population in terms of its norms and values, whose rulers were also Muslim but whose legitimacy as a dynasty was based on an ancient pre-Islamic *iskoki* belief system. From these social and political tensions, emerged the Jihad or Holy War of 1804, led by a revolutionary cadre – the *jama'a* – committed to the overthrow of an old *sarautu* system. The Holy War heralded a new form of political organisation (the emirate system) and a larger unified polity (the Sokoto Caliphate) which welded together 30 emirates covering 388 485 km<sup>2</sup>. The Caliphate survived for almost 100 years from the accession of Usman dan Fodio as Amir-al-muminin at Gudu in 1804 to the death of Sultan Ahmadu at the hands of the British colonial forces at Burmi in 1903.

The basic unit of production in the 19th century was the household, perhaps embracing sons, clients and slaves in an extended domestic structure in which the householder organised production and distribution and paid taxation. Households were often subsumed in communities controlled through the agency of village heads whose responsibility extended to land sales and village adjudication. A proportion of the peasant surplus was expropriated by a ruling class in the form of either labour, grain, or cash. The office holders had tenure over 'fiefs' given by the Emir, though they usually resided on private estates worked by slave, client and hired labour; they could also demand corvée labour from villages within their territorial jurisdiction. Slave labour, though crucial to the functioning of the large estates operated

peasant life somehow optimally adapted and ultra-stable, a world of benevolent patrons and welfare-minded rulers. The Caliphate was, of course, a class society predicated on a determinate set of social relations in which surpluses were canalised from the countryside to the cities. Rather, I simply wish to suggest that some institutions, mechanisms and practices – indeed some of the most prosaic attributes of peasant society – embodied in the Sokoto Caliphate, provided a measure of security and buffered households from the worst effects of variability in rainfall and food supply. The security arrangements were grounded in and inseparable from the architecture and constitution of the social relation of production and were indeed instrumental in the reproduction of society at large.

*Drought and colonialism* Colonialism in northern Nigeria was a process of incorporation in which pre-capitalist modes of production were articulated with the colonial, and ultimately the global, economy. This articulation was principally affected through the colonial triad of taxation, export commodity production and monetisation. Although colonial hegemony left peasant producers in control of the means of production and instituted minimal technological change, the process of incorporation did necessitate a transformation in the conditions of production. To the extent that pre-capitalist elements in northern Nigeria were eroded by colonial integration, the adaptive capability of Hausa communities and the margin of subsistence security accordingly changed. In the process, peasant producers – particularly the rural poor – became less capable of responding to and coping with both drought and food shortage. Traditional mechanisms and adjustments disappeared, the extension of cash cropping undermined self-sufficiency in foodstuffs, a dependence on world commodity prices (for cotton and groundnuts) amplified an already high tax burden, and households became increasingly vulnerable to environmental perturbations such as drought or harvest shortfalls. This vulnerability and marginality is highlighted in four major famines which occurred during the colonial period in 1914, 1927, 1942 and 1951. I cannot hope to do justice to the complexity of the process of colonial integration in northern Nigeria, nor its effects on the structure of peasant production, both of which are treated at great length elsewhere. Rather I will sketch some of the pertinent aspects of the changing conditions of production – particularly the extraction of surplus value and the dénouement of moral economy – and draw some tentative links to the increasing hazardiousness of peasant livelihood.

The new colonial administration sought through taxation to divert as much of the surplus formerly extracted by the ruling élite to their own coffers. Taxes were reorganised but for the most part remained at the same level and in some cases revealed sharp increases to compensate for the declining revenue of the élite. More traumatic, however, was the move to collect tax in cash, not grain; effective by 1910, not only did this undermine the zakkat-based grain reserve but it determined the penetration of a generalised modern currency into indigenous economic systems. Furthermore, taxation had profound and

tioned precisely to this end; '[The segment] has but one function: when the grain stores of one household are exhausted, its head may borrow grain from another [segment] household and repay that grain at harvest without interest' (Faulkingham 1971, p. 123). At an ideological level, the redistributive ethic was reiterated through a Muslim dogma which saw gift-giving as obligatory for the rich and the office-holders. At another level, other formal institutional mechanisms incumbent upon the ruling élite served to free resources from the rich to the peasantry. The communal work group was a case in point in which foodstuffs were released during the critical pre-harvest period. A rather more elaborate instance was the institution of *sarkin noma* (lit. king of farming), who was elected by virtue of his capacity to produce in excess of 1000 bundles of grain. In essence, it was an attenuated variant of the North American 'potlatch' in which prestige accrued through the ceremonial distribution of resources. The office of *sarkin noma* entailed on the one hand a redistribution of foodstuffs through the harvest festival and on the other it was 'the ultimate defense against famine: when the grain in any gida is exhausted, the residents may obtain an interest free loan of grain from the S. noma's bins, to be repaid at harvest' (Faulkingham 1971, p. 81).

In a society predicated upon an absolute hierarchical segmentation between rulers and ruled, it is hardly surprising that the upper echelons of political authority in 19th-century Hausaland were expected to act as the ultimate buffers for the village-level redistributive operations. The responsibilities and obligations of the village heads were quite clear in this respect and, when their capabilities were over-ridden in cases of extreme seasonal hardship, the next level of the hierarchy (the fief holder) was activated. In Katsina Emirate, for example, the district heads often kept grain at several centres throughout their district and frequently in villages where they may have acted as patron to a number of clients. These graduated responses terminated with the state structure itself which used the grain tythe for central granaries for organised redistribution during famine periods.

The pre-capitalist form of the labour process among Hausa peasantry in relation to drought has much in common with what Thompson (1971) calls the moral economy of the poor. Scott (1976) has in fact suggested that moral economy is in fact characteristic of peasant communities generally which are organised around the problem of risk, security and the guarantee of a margin of security. Scott calls this margin a subsistence ethic which can be seen as a general proclivity towards risk aversion in agriculture ('safety first'), a tendency towards mutual support ('the norm of reciprocity') and an expectation of minimum state support ('the moral economy'). Put rather differently, Hausa households in the 19th century were largely engaged in the production of use-values; the simple cycle of household reproduction was in this sense a natural economy which involved a series of horizontal and vertical ties between households – rather than market relations – institutionalised in the moral economy, i.e. the realm of intersubjective meanings, norms and rules. All this is not to suggest a Rousseauian pre-capitalist nirvana, a glorified

direct implications for hunger itself. First, unlike the indigenous Hausa fiscal system, colonial taxes were regular, reasonably predictable and *rigid*. The inflexibility accordingly took no account of the realities of Hausa life: late rains, poor harvests, seasonal hunger, and a precarious environment subject to perturbations such as locust invasion or epidemics. The severity of colonial taxation contrasted sharply with an indigenous system which, though far from being innocent of extortion, made an attempt to graduate taxes according to existential circumstances. Secondly, the *rising* of tax collection assumed a colossal importance. This was especially the case throughout the principal cotton-growing areas where annual taxes were gathered prior to the cotton harvest, leaving the rural cultivator little choice but the sale of grains when prices were lowest or alternatively vulnerable to the clutches of the moneylender. And thirdly, the taxation system was inseparable from the colonial policy of the extension of commodity production and cash cropping into the countryside. It is quite clear in this respect that in northern Hausaland groundnuts were the principal tax-paying crop, which perhaps goes a long way to explaining the apparently 'irrational' behaviour of a peasantry which produced more groundnuts when the commodity price had actually fallen. More generally, of course, the 'groundnut revolution', meant a decrease in the area devoted to foodstuffs, increasing subjection to the vagaries of the world commodity market, and the ever-present threat of indebtedness at the hands of middlemen. It is precisely in this way that the nature of seasonal hunger changed in terms of both its dynamics and the predicament of those who find themselves suffering from its effects. The net result tended to be that seasonal hunger on a local or regional scale devolved into fully fledged famine, as was the case in 1913-14, and set a precedent for the colonial period generally.

Despite the commercial setback of the 1913-14 famine, the groundnut revolution picked up momentum and became emblematic of the subsequent expansion in the produce trade. Through this process of commoditisation and the increasingly important role that money came to acquire, it is hardly surprising that the new forms of indebtedness arose. This is especially so in the case of the co-evolution of the '*yan baranda*' system and of the cash crop economy. The '*yan baranda*' constituted the lower orders of the export crop-buying hierarchy, receiving cash advances from European firms via their buying agents. These sums were in turn lent directly to the producer who pledged his crop to the agent. The interest on such loans was frequently in the order of 100% and for the producer at least was the initial step into a cyclical debt trap. It is precisely in this manner that urban and merchant capital penetrated the countryside and it illuminates the way in which a domestic unit is drawn into an external merchant network. As Shenton and Freund so nicely put it, 'the most successful traders stood at the apex of a hierarchy of credit and clientele that rested on the shoulders of village middlemen, living in the interstices of a colonial economy dominated by the European firms' (Shenton & Freund 1978, p. 13).

The deepening involvement with commodity production and cash crops naturally impinged upon the social organisation of agricultural production itself. Claude Raynault (1975) has shown how, in the groundnut zone of Niger, this has taken the form of the dissolution of traditional estates, an escalation in land sales and the generalisation of hired farm labour. Changes in the sociology of production were coupled with the cycle of rapidly commodities, especially cloth, which articulated with the cycle of rapidly inflating prices for ceremonial exchanges on the one hand, and the chain of indebtedness on the other. Stresses consequently were imposed upon the corporateness of the rural world: the old responsibilities and obligations became less binding, communal work largely disappeared, and the extended family became less embracing and hence increasingly incapable of buffering individuals in crisis. In the densely settled areas, the extreme land shortages heralded larger food deficits and heightened vulnerability to seasonal changes. The household showed the first signs of fission, and collective security had lost its original meaning; social and familial solidarity appeared to be dissolving and the gift lost its original significance. The peasantry were torn from a social matrix of kin affiliation and obligation, and the existential problem of subsistence became subservient to marketing behaviour. In short, the social nature of the subsistence system and the qualities of the moral economy were severely ruptured. Reciprocity and solidarity, and hence the nature of inequality, itself had changed.

The general point I wish to make is that post-1903 the margin of security for the Hausa peasantry came under siege. The colonial administration, only too aware of the dangers of overconcentration on cash-crop commodities, a heavy tax burden and the spectre of starvation, tended to be in the final analysis ambivalent or to overestimate the resiliency of the peasantry. The outcome was, in contrast to the previous century, that Hausaland suffered from three major famines in 1913-14, 1927 (1931 in much of Niger) and 1942, and whose occurrence reflected an increasingly artificial character in the sense that climatic variability became less crucial in the actual genesis of food shortage. This artificiality reached its apothecosis during the early 1940s with a famine whose structural properties bore a striking resemblance to the Bengal famine of 1943.

The point that I wish to emphasise is that colonialism broke the cycle of reproduction of peasant households. The reproduction of the Hausa farming family became contingent upon the continued production of export commodities; as Bernstein (1978) put it, the reproduction of the conditions of commodity production became 'internalised' in the household reproduction cycle. The necessity for cash ensured a greater devotion to cash crops, especially during periods of low export prices and an inevitable participation on the part of the rural poor in the merchant-credit system. Falling export prices were experienced by households as a deterioration in the terms of exchange which meant either a reduction in levels of consumption or an intensification of commodity production, or both. This has been referred to as 'the simple

reproduction squeeze' (Bernstein 1978, p. 63) and is one facet of what Scott called the 'margin of subsistence security'. As ever larger areas were devoted to cash crop production at the expense of foodstuffs – and this was especially pernicious for the rural poor in closely settled areas who were cultivating small holdings and experienced severe labour constraints – the reproduction squeeze deepened and both hunger and indebtedness assume increasing importance:

'The more commodity relations and acquisition of a cash income become conditions of reproduction, then shortfalls in production and/or income can lead to a cycle of indebtedness. Studies of peasant economy in a number of capitalist social formations have demonstrated the phenomena of "starvation rents" (the payment by poorer peasants of higher than average rents to secure a plot of land for minimal reproduction needs), and of peasants selling their food crop after harvest in order to meet immediate cash needs, and subsequently having to buy food at higher prices. Similar in principle to the latter is the practice of crop-mortgaging (to richer peasants, local traders or larger-scale merchant's capital) in order to acquire cash in the case of emergencies' (Bernstein 1978, p. 63).

Hausa peasant producers thus became increasingly vulnerable to even small variations in rainfall since the margin of subsistence security had been eroded. In a very real sense, then, hazards had been redefined by the transformation in the social relations of production. Indeed, the rural poor were vulnerable to any sort of perturbation and, under conditions of agricultural stagnation which were characteristic of the colonial period, northern Nigerian producers were particularly susceptible to the usual environmental variability typical of the northern savannas. The rural poor were hyper-vulnerable for they succumbed to relatively slight oscillations in harvest quality; a 'light' harvest could herald a subsistence crisis of famine proportions, particularly if prevailing export crop prices tended to be unfavourable. As one district officer noted, the Hausa peasantry lived constantly in the shadow of famine.

*Hazards, adaptation and peasant differentiation* In the Hausa village (Kaita) in which I lived in 1977–8, the vast majority of households still owned their means of production, in spite of high population densities, land shortage and the changes wrought by colonialism. The absence of a landless class, nevertheless, should not obscure sharp socioeconomic differentiation within the community, the genesis and reproduction of which is precisely related to the appearance of wage labour, the use of indebtedness, and the dominant role of merchant's capital under the aegis of the colonial state. In light of this quantitative differentiation among peasants and the social relations of production which sustain it, the question is whether it makes sense to talk of adaptation to hazards.

Rain comes and goes, and Hausa farmers are acutely concerned with the

concrete empirical variability in annual rainfall, and agronomic practice varies in tandem with the precise pattern of precipitation. In this sense, agricultural practice is not fixed – a sort of human ecological programme – but flexible with respect to environmental perturbations. With regard to rainfall variation, suffice to say that Kaita farmers appear to have a firm grasp of those local processes which are observable in their totality within the village territory, including an acute understanding of the immediate geographical milieu; what one might refer to as Hausa ethnoscience, to use the current parlance. In the case of drought, Kaita farmers had little comprehension of – or indeed intellectual interest in – its etiology, and a variety of elicitation techniques simply revealed a vague and ill specified association with Islamic metaphysics. On the other hand, they had a remarkable, almost visceral, grasp of the empirical consequences of rainfall deficits – or surfeits – on their crops and of the prescribed ways in which the symptoms might be treated. First, Hausa farmers rarely monocrop but plant in a polycultural fashion. Two, three or four crops (usually millet, sorghum and cowpeas) are normally planted or intercropped in each field. This diversity breeds a sort of systemic stability, for each crop has rather different requirements and tolerances to drought. Research has shown how indigenous crop mixtures are risk-averse, guaranteeing an adequate return under unpredictable and variable ecological circumstances.

Secondly, should the onset of the rains be delayed or the distribution of rainfall be patchy, there are various forms of water conservation which can be instituted. Ridging, exploitation of seasonally damp bottomlands, and variation in the intensity of manure application, are all varied in accordance with rainfall. Should replanting be necessary in the aftermath of an early drought, the spacing of plants (*gicci*) is usually widened. And thirdly, crop mixtures are not static agronomic patterns and neither is the environment perceived as homogeneous. Hausa farmers recognise and exploit several micro-environments in addition to the predominant upland (*jigawa*). In particular, the lowland (*fadarru*) environment, which is permanently moist and occasionally flooded during the rainy season, is broken down into three distinct niches. The floodplain proper is used for rice and sorghum, the basin areas generally devoted to tobacco or sorghum and the riparian edge devoted principally to dry season irrigation and the cultivation of vegetables. This lowland area is of special import when rainfall fails or fluctuates. When the rains begin, the upland is usually planted with high-yielding millet and sorghum, and the floodplain devoted to rice and long-maturing sorghum. Should these early rains be followed by a drought – as is quite frequently the case about 1 year in 4 – replanting will make use of *different short-maturing cereals*. Equally in the lowland environments, replanting will take cognisance of the possibility of a shortened rainy season and therefore will usually entail the replacement of rice with the less water-demanding sorghums. The same process of selection occurs in the lowland micro-environments and, in the event of a poor cereal harvest, then increased attention will be paid to the dry

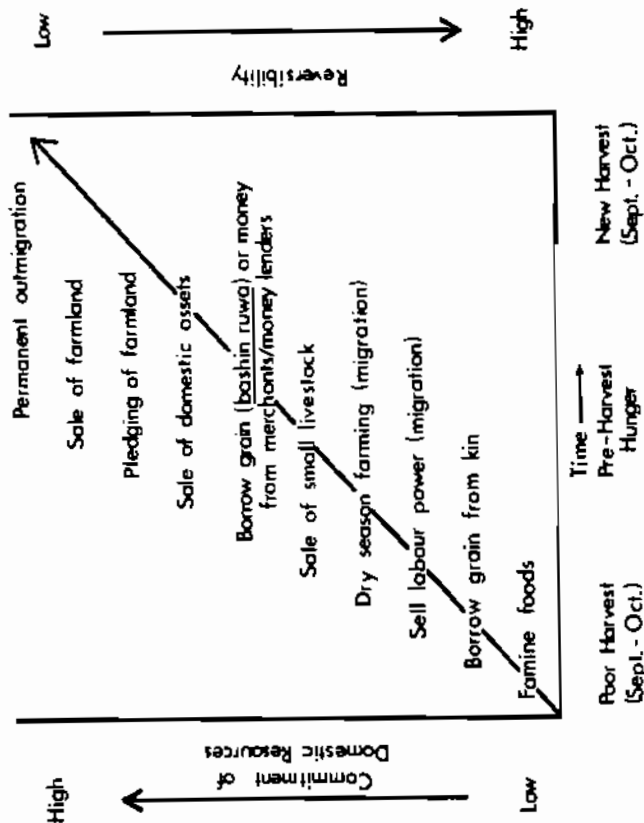


Figure 13.2 Graduated response to food shortage.

for liquidity, beginning usually with small livestock, or perhaps turn to the village trader or merchant for a loan of money or grain. Under famine conditions, starving households begin to pledge or even sell their farm holdings and, in the final analysis, resort to outmigration (see Fig. 13.2).

At an aggregate level, however, this model conveys little of the realities of drought in relation to household economy. This is precisely because the legacy of the development of capitalism in Nigeria has been to generate new patterns of interhousehold inequality. For while all households are theoretically capable of coping with various forms of stress, in practice these responses are mediated by social and economic inequality. Poor households frequently have neither the requisite seed nor the access to land to cope effectively with rainfall variability. Equally, under conditions of scarcity or poor harvests or indeed seasonal price rises in cereals, poor households are incapable of weathering economic crises. The rich households conversely have adaptive flexibility in the sense that they have access to the resources necessary to offset drought while their domestic resources enable them to maintain self-sufficiency in grain even after poor harvests. Accordingly, if one examines responses to drought-induced food shortage in Kaita village in 1973-4 certain strategies emerge (Table 13.1).

Obviously the rural poor are largely incapable of meeting the demands of a

season agriculture (*lamba*). In short, then, the different environments are articulated through a complex process of decision making which correlates with variability in rainfall (see Fig. 13.1).

In the same way that peasant farmers are agents in the appropriation of nature - of which drought is inextricably a part - so do they act in the face of likely or actual food shortage. By the rains following a poor harvest, stocks of grain are either low or non-existent and households are faced with the possibility of liquidating assets to cover grain purchases. Since the probability of food shortage is evident immediately after the harvest in September or October, families can begin to respond to the potential threat of dearth. Grain prices, even in normal years, exhibit a seasonal price rise during the wet season when domestic granaries are low; but, in the aftermath of a poor harvest, householders know full well that millet and sorghum prices will probably rise by 100-200%.

Peasant households in fact relate to the threat of shortage in a graduated sequence of responses which change as food availability worsens and prices inflate. Immediately after the poor harvest, householders attempt to generate income wherever possible - perhaps through wage labouring or craft activity - in order to cover future costs of grain purchase. As domestic stores diminish and food prices rise, families begin to look for support from their extended kin and friends. As extreme scarcity approaches, family units dispose of assets

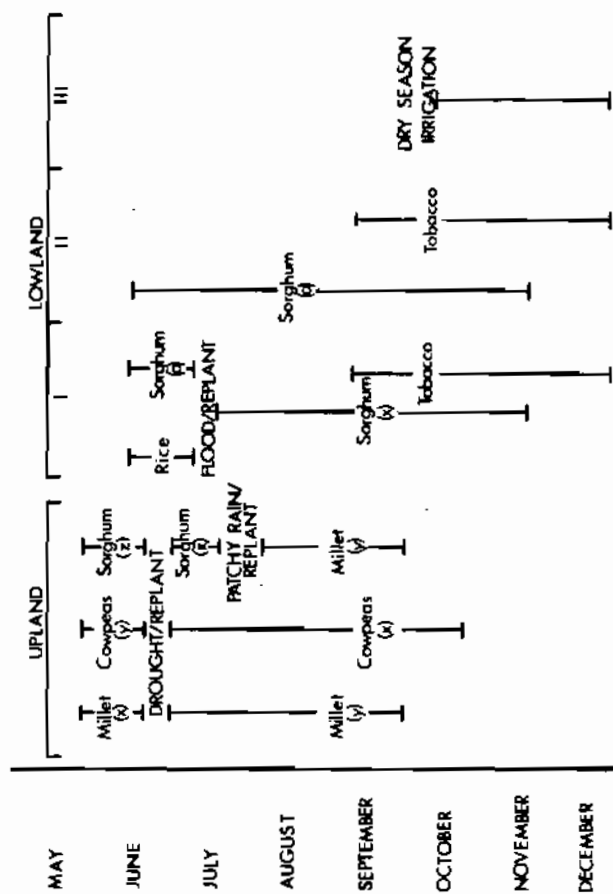


Figure 13.1 A model of farmer response to 1977 rainfall variability. The parentheses refer to crop varieties with differing maturation rates, tolerances to drought and yields.

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 Table 13.1 Responses by household heads to food shortage, 1973-4.

	R	P	R	P
purchase grain	4	91	sell grain	26
sell labour		87	buy livestock	21
sell livestock	4	61	lend money or grain	8
sell assets		47	buy labour power	51
borrow from trader or merchant		39	buy farmland	6
pledge farm		11		
sell farm		6		
migrate		5		

Note: R, rich ( $n = 56$ ); P, poor ( $n = 93$ ).

food crisis and are, therefore, especially vulnerable. Poor harvests and famines are thus social crises, for they are mediated by the existing social order and may actually amplify extant economic inequalities. In Kaita village during 1973-4 it was the poorer households who sold labour power, livestock and perhaps even land in a buyers' market, while the relatively well-to-do made the most of a favourable situation by purchasing cheap commodities and lending both money and grain. Clearly, then, in peasant communities, where socioeconomic differentiation is so pronounced, poor farmers, shackled by their poverty, are largely powerless to effect the sorts of changes that might mitigate the debilitating consequences of environmental hazards. *Hazard response is thus contingent upon the social context of the responding units and upon their situation in the productive process.* Drought is in an obvious sense refracted through the prism of community inequality and hence adaptation to hazard is a social process. For many households drought is experienced through constraint rather than choice.

A proper understanding of hazards requires, however, that we move beyond simple quantitative measures of inequality to the determinate structure of the social relations of production, as Sayer put it. Inequality in this sense is tied to the conditions in which wealth becomes capital; that is to the labour process itself. In this regard, Hausa peasants can be differentiated in the following fashion. First there are poor peasants unable to reproduce themselves through household production and who secure simple reproduction through the wage relation. Secondly, there are middle peasants who are sufficiently stable to reproduce themselves through family labour 'but in specific relations with other strata of the peasantry' (Bernstein 1978, p. 67). And thirdly, there is a wealthy or Kulak class capable of extended reproduction, that is accumulation and investment (largely in trade) through superior means of production and the purchase of labour power. For the rural poor the precariousness of the material and technical conditions of production, in conjunction with the pressures exerted by commodity production and the sale of labour, lends itself to a simple reproduction squeeze. The household is obviously vulnerable to failure in any of its material elements of reproduction. But it

is, of course, the constellation of social relations which bind households together and project them into the marketplace which determines the precise form of this vulnerability. I cannot hope to document these relations of production in any detail here save to say that indebtedness, the wage relation and pronounced inequality in landholding, are all critical. More pertinently, for the 20% of households who are semi-proletarianised, every wet season prior to harvest is a period of crisis in the cycle of reproduction. These households are barely capable of producing sufficient grain on their low-yielding Lilliputian farm holdings and they find themselves projected either into the local grain market when prevailing prices are seasonally inflated or into the hands of the village moneylender. Equally, the demand for cash to cover critical food consumption during the period of maximum mobilisation of agricultural labour pushes adult males into wet-season farm labouring, the effect of which is to delay the timing of, or entirely neglect, their own agricultural operations with the result that yields are pitifully low. At harvest, debts have to be repaid (often at usurious interest rates), taxes paid and household expenditures (i.e. repairs, marriage expenses) covered precisely when commodity prices tend to be lowest. The large farmers conversely withhold grains for a mid-season price rise which then finance the purchase of wage labour and investment in the highly lucrative cattle trade and, to a lesser extent, grains marketing and credit functions. The social relations of trade and production force many farmers to sell cheap and buy dear, to neglect or delay their own productive activities, and to plunge headlong into a cycle of indebtedness.

Drought hazard is, then, simply one instance of nature as contained in the metabolism of these peasant social relations. The labour process in Hausaland is complex precisely because peasant society is in transition. My historical presentation indicated how the colonial state and European merchant's capital fulfilled a contradictory function insofar as Hausa rural producers were partially transformed; there was, to use Bettelheim's felicitous phrase, both conservation and dissolution. In some respects, as new relations of production emerged, as the cycle of reproduction was commoditised, so was the moral economy distorted. That is, the relation between nature and society was itself partly transformed, a transformation encapsulated in the process of peasant differentiation. It is into these nascent capitalist relations in the countryside that hazards such as drought are deposited. In this case, drought is simply a moment in a cycle of reproduction the significance of which is related to the situation of each household in the productive process and in the nexus of social relations.

### New directions

I have attempted to derive an analysis of hazards from two abstract materialist postulates which grounds the relation between nature and society - the

process and the irreducibly intersubjective quality of social life. In doing so I have suggested that we must be sensitive both to the status of what we take to be environmental knowledge, the manner in which our theories in a real sense partly produce the 'facts' we analyse, and the complex relationship between concepts and the material conditions from which they emerge. By examining the theoretical peculiarities of hazards research – and its sister field of human/cultural ecology – I have attempted to situate it in terms of the epistemology and conception of man-nature relations which, I believe, have inappropriately framed environmental threats and perturbations. The analysis of drought in northern Nigeria, conversely, began with the social relations of production which has to be defined historically. I argued that drought along the West African desert edge can only be understood in an historical fashion; that is, the cycle of simple household reproduction in the 19th century and its attendant moral economy in some sense coloured hazards and calamities. Drought was put in context in terms of the prevailing social and economic architecture of 19th-century Hausaland. The impact of colonialism gradually transformed the social relation of production and hence of the relation between nature and society. I would argue that with respect to drought this was given a material expression in the almost pharaonic sequence of famines between 1900 and 1960.

The evidence adduced from the contemporary village economy indicated that, in spite of a conceptual and practical preparation for drought, the social relations of interhousehold inequity constituted the necessary starting point. But this was not necessarily so in some simple quantitative sense – there are rich and poor peasants who exhibit different adaptive capabilities – but rather because differentiation emerges from the existing labour process. That the rural poor were incapable of responding adequately to drought is, of course, consistent with the cybernetic view of maladaptation. But the crucial difference is not that households suffer intrinsically from usurpation or hyper-coherence, or linear thinking or bad values or inappropriate higher-order command statements; rather these pathologies, if they exist, emerge from the existing social relations of production. As Sayer observed, the man-nature relation is given form in a determinate structure of social relations of production and it is this which provides the locus for our study of drought. In Hausaland, these social relations are convoluted because they are, in some sense, in transition. But it is clearly the emergence of wage labour, or unequal exchange through trade, of expanded commodity production and of usury which defines this social field of force.

From a materialist perspective, then, an environmental crisis not only probes the darkest corners of relations, but throws into sharp relief the structure of social systems. The impact of a drought on human communities affords the social scientist a particular optic through which to view the functioning of the socioeconomic formation; indeed it was Marc Bloch who observed that as the development of a disease shows the physician the workings of the body so does a social crisis yield insight into the nature of the

society so stricken. In this manner, natural hazards are not simply *natural* (see quotation by Brecht, p. 7), for though a drought may be a catalyst or trigger mechanisms in the sequence of events which leads to famine conditions, the crisis itself is more a reflection of the ability of the socioeconomic system to cope with the unusual harshness of ecological conditions and their effects. To neglect this fact is to resort to a fatalism which sees disasters as 'Acts of God', placing responsibility upon nature, and in the process missing a major political point. In Nigerian Hausaland this is captured in the paradox that during the famines of the past 70 years it has been the men and women who work on the land who have perished for lack of food. Those who died were those who produced. 'The crisis created by a famine reveals the workings of the economic and social system and affords an insight into that structural violence which has the effect of denying the poorest . . . the right to feed themselves . . . The fact that . . . town dwellers can still get something to eat while the country people starve . . . is a sign of the power relation between urban and rural populations' (Spitz 1977, p. 3). This I suspect is what E. P. Thompson (1978) means when he refers to the crisis of subsistence as an 'historical category' and is clearly reflected in the comments of the Brazilian geographer Josué de Castro on Third World hazards: 'the catastrophic effects of drought and floods revealed principally the decrepit character of the prevailing agricultural structure, the shiftlessness, the improvidence and the inefficiency of the political system in force' (de Castro 1975, p. 12).

To appreciate the fact that hazard is mediated by the socioeconomic structures of the societies affected is simultaneously to recognise that 'modernisation' or 'development' has not necessarily solved the age-old problems of subsistence crises or vulnerability to environmental threats, and in some cases has actually aggravated them.

In conclusion, I would like to point out that theory, and natural hazards theory in particular, is not something ready made but, like any intellectual artefact, it has its material and ideological conditions of existence. Conventional hazards theory is also ideological in the sense that it has, to date, a sort of hegemonic role in the field which sustains historically specific views of nature, of society and of change. Ideology is ideological precisely because it presents the existing world as a litany of eternal verities. For this reason I began and conclude this essay with the observation of Timpanaro (1975, p. 17) that, all too often, prevailing power blocs attributable to nature the inequalities for which the structure of society is responsible.

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# 14 Global disasters, a radical interpretation

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## Introduction

The study of disasters is not an infant science. Examples abound of case materials, theoretical modelling and attempted global summaries. Yet, if there is a wealth of empirical data, the analytical reality behind most disaster research is hardly more conducive to a fundamental understanding of disaster than the attempts of the early physicists to explain reality in terms of four elements. Perhaps a more apposite comparison would be between the current disaster practitioners and the early medical scientists who attempted to explain disease in terms of four humours. In this chapter, we shall consider the nature of disaster in a global framework and attempt to provide a general theory of modern disaster occurrence, namely a *theory of marginalisation*.

## Definitions of disaster

Involvement in disaster by international, national and academic institutions has led to a number of implicit and explicit definitions of disaster (Westgate & O'Keefe 1976a). The implicit definitions of disaster derive from the field operations of international and national organisations, particularly from relief operations, and need not concern us in this instance. The explicit definitions are those of the academic institutions and are germane to our discussion.

The first important element to note is that disaster is an event (or series of events) which seriously disrupts normal activities (Cisin & Clark 1962).

This emphasis on normalcy highlights the need to observe *disaster as an extension of everyday life*. It also implies that an understanding of the threat of disaster is as important to the comprehension of disaster as the disaster event itself (Westgate & O'Keefe 1976b). Hewitt and Burton (1971) develop this notion of potential threat and accent disaster as a function

