

The political ecology of disease as one new focus for medical geography

Jonathan D. Mayer

Departments of Geography, Medicine (Infectious Diseases), Family Medicine, and Health Services, Box 353550, University of Washington, Seattle, WA 98195, USA

I Introduction

The introduction of political economy to geographical studies has also led to the development and integration of *political ecology*. This once controversial approach has been applied mainly to agricultural systems, food systems and human–environment interactions more generally. Its controversy was rooted in the resistance to the integration into cultural ecology of political economy and its associated concepts. Seldom has the political ecologic framework been used to understand patterns of health and disease. Because the political ecologic framework is very powerful in focusing attention on the interaction between political interests, social institutions and human–environment interaction, it has great potential in leading to a greater systemic understanding of health and disease. One of the messages of political ecology and political economy more generally is the need to understand phenomena in their contexts.

II Contextual understanding and medical geography

One of the most robust and profound approaches to analysing disease in the context of human–environment interaction is that of disease ecology, as originally articulated by May (1958) and subsequently updated by others. Basic to the disease ecologic approach is understanding how humanity, including culture, society and behaviour; the physical world, including topography, vegetation and climate; and biology, including vector and pathogen ecology, interact together in an evolving and interactive system, to produce foci of disease. Disease ecology is inherently integrative and synthetic, and provides an illustration of the potential for geography to unite the physical and social worlds, a claim which the discipline has made for decades but which is rarely seen outside medical geography, natural hazards research and cultural ecology.

Because of its emphasis on culture and environment, disease ecology also demands contextual understanding. May (1954), usually considered to be the most important originator of disease ecology, stated that it is a combination of human activity and 'natural' characteristics of the environment that explain the distribution of disease and disease foci in populations and cultures. What May established is the importance of the material aspects of culture in disease complexes, and of human–environment interaction as a progenitor of disease. Hence, his following statement, which is basic to understanding in traditional disease ecology:

... from the waters the people get their food, also their cholera, their dysenteries, their typhoid fevers, their malaria; from the earth they get their hookworm; from the crowded villages they get their tuberculosis and their yaws; from the type of housing they have been forced to adopt they get their plague and typhus; and from the food which earth, temperature, and rain produce, their protein deficiencies, their beri beri (May, 1954: 428).

Disease ecology is also based on the concept which May originally formulated that, for disease to occur, it is necessary for some agent and host to come into mutual contact at the same time and in the same place. It therefore becomes essential to understand the social, cultural and political factors which influence disease; the environmental characteristics which influence and frequently determine the nature of host–agent interaction; and the behavioural dimensions of individual or group susceptibility to disease. Although May developed the disease ecological framework for infectious diseases and diseases of malnutrition, there is no reason why it should exclude 'chronic' diseases such as cardiovascular disease, cancers, neurological diseases, which all have political, social, economic and cultural contexts which are essential to understand in a full explanation of those diseases.

While one of the clear implications of disease ecology is that disease must be understood in a broad context, May himself did not develop this argument specifically, although contemporary disease ecologists seek a contextual understanding of disease. One of the basic tenets of the medical social sciences, public health and, increasingly, of medical practice itself is that disease and health cannot be understood without also comprehending the social and psychological contexts of disease. The 'biopsychosocial' model, developed by Engel and his colleagues, postulates that organic disease bears reciprocal relationships with psychological and social influences, broadly taken (Engel, 1977; 1980; 1982). Just as this context of disease influences the disease process itself, so disease can influence its broader environment. Disease affects individual and group behaviour; this has been true for millennia (McNeill, 1976) and remains true for contemporary pandemics such as AIDS.

Public health, the other medical social sciences and medical geography also emphasize the importance of context, following a tradition advocated by Hippocrates (Dubos, 1965). The Hippocratic tradition dominated clinical medicine until the advent of the germ theory of disease and the doctrine of specific etiology in the late eighteenth and early nineteenth centuries. Soon after, it served as the focus of the public health movement in Germany, France and elsewhere. Illness was seen as a consequence of environmental influences and pathological processes.

More recently, there has been a resurgence of emphasis on understanding context. One typical statement is that 'Studies of health and disease . . . have increasingly recognized the limitations of research and policy analysis which focus narrowly on the biological determinants of disease . . . Such approaches ignore the multiplicity of geographic, climatic, economic, and political factors that effect [*sic*] disease patterns' (Packard *et al.*, 1989: 405). Furthermore, an epidemic 'presents a unique blend of eco-

logical circumstances and social responses that develop within highly specific political, economic, and cultural contexts' (Risse, 1988: 34). This, indeed, is precisely one of the messages of disease ecology.

What has not been included in the traditional understanding of disease is how these ecological approaches must be synthesized with other approaches which emphasize power and politics, as implied above. Political ecology accomplishes exactly this sort of understanding which is essential in apprehending the relations and factors which are linked synthetically with the maladaptation which underlies disease. Political ecology has been integrated into the mainstream of development theory, to the extent that political economy has been accepted. One dimension which has been virtually ignored in development theory, at least as applied in geography, is that of health and disease. This is surprising, almost to the point of being incomprehensible, since these factors are so basic in human welfare and suffering. The integration of power into the understanding of disease dynamics has thus been neglected from several dimensions, and this article represents an attempt at developing a framework for such integration.

III The current status of medical geography

Medical geography has followed the major trends in geography in general. It comprises two major traditions: studies of health services delivery and studies of disease patterns, including disease ecology (Mayer, 1982). The latter tradition includes both a spatial component, fitting into the locational tradition of positivistic geography (Mayer, 1990) and also includes an ecological tradition, emphasizing the relations between people and the environment. The latter emphasis is closely linked with cultural ecology.

The same debates and changes which have been, and are, evident in contemporary human geography are increasingly evident in medical geography. This is not to suggest that all or even most medical geographers are vociferous in these debates.

I argue here in favour of a new approach to medical geography. This approach complements existing approaches, and does not exclude other approaches. This new approach – the political ecology of disease – is best understood in the context of recent changes in the field of medical geography.

Reviews of medical geography which have appeared in this journal in the past few years have included the importance of global and comparative perspectives in medical geography (Jones and Moon, 1992), new techniques and concepts in disease mapping, and the proliferating concept of need for medical services in the context of health care provision (Jones and Moon, 1991). The links between the geography of health and social theory have been described in a succinct and excellent synthesis (Kearns, 1995). Of great significance is the new emphasis of place and locality in medical geography. Health risks cannot be considered in a context independent of time and place, deeply imbued with the people who are enmeshed in and define those places and localities (Hayes, 1992). Political economy and structuration theory both emphasize the importance of human agency. It is exactly human agency which is at the heart of political ecology.

Locality and place, it has been suggested, should be intrinsic to medical geography (Duncan *et al.*, 1993; Kearns and Joseph, 1993; Dyck, 1995). Kearns and Joseph (1993) argue for a mutual understanding and synthesis of geometric space and contextual place. This has been further developed by Kearns (1993) who suggested that there is,

or should be, a 'postmedical' geography of health which would place medical geography firmly under the rubric of social geography. This suggestion led to a vibrant exchange and debate concerning the issue of whether this might be an overly restrictive view of medical geography (Mayer and Meade, 1994). Mayer and Meade's logic is that if medical geography, or the geography of health, is considered to be exclusively 'social', then the danger is that it would exclude many of the studies which integrate human activity, biology and the environment.

This is an inappropriate place to try to resolve this debate further, since the focus of the argument here is on the contours of the political ecology of disease. It may even be that using the political ecology of disease as one set of foci is a way to reconcile the two viewpoints – that, on the one hand, there is a need for a 'postmedical' geography and, on the other, that a restructured medical geography which is social is too restrictive. The ultimate test of whether the approach suggested here can serve as such a synthesis will be determined by several years of observing and shaping its utility in explaining the multifaceted factors which influence disease, and which are, in turn, influenced by disease.

Thus, medical geography has, in the past few years, incorporated recent discussions of social theory in human geography as a whole into its domain. Issues of power and influence could have been important in this work, but have, in fact, been subordinate to less tangible facets of power, in the form of underlying social and institutional structure as a set of influences on human agency. It is to social power, in a human–environment context, that this discussion now turns.

IV Disease, politics and power

Health services researchers have been interested in political issues and power for several decades. Rosenberg (1988) decries the lack of integration of political considerations in the analysis of health care systems, arguing lucidly that the most common approach in the geography of health care has been to ignore political context completely. However important this is in medical geography, Rosenberg does not consider the disease ecology tradition of medical geography. Brownlea (1981) suggests a framework for 'political epidemiology', suggesting that epidemiological questions are bound up in politics, and that politics must be incorporated into epidemiology for a full understanding. Brownlea, however, does not consider *disease ecology*, with its important emphasis on human–environment relations, in the contexts of culture, society, behaviour and other social and environmental factors. Thus, Brownlea falls short of considering political ecology. While political conditions have been incorporated, to some degree, into the health services tradition of medical geography, in the 'disease' tradition of medical geography, politics and power have been ignored.

Political influences on disease were not specifically mentioned by May and have been only sporadically applied to understanding disease distribution and diffusion by disease ecologists (Meade, 1976). However, the ecological context should encourage such study. Turshen (1977: 48) criticizes May for neglecting to consider politics (she uses 'medical ecology' as a synonym for disease ecology):

Medical ecology thus asserts a relation between environment, disease, and man, but selects only biological and socio-cultural factors as relevant . . . By dismissing political and economic factors as irrelevant, it suffers from a failure to consider the relation of people to their environment in all its complexity. As with ecology and biology, the methodology of medical ecology is too limited to solve the problems of public health.

How are we to evaluate this critique of disease ecology? In one sense, it is quite valid, because May's original formulation of the ecological tradition does not mention politics and power explicitly. However, neither are political action and interests excluded implicitly or explicitly. Formal political action or less formal action based upon group and individual interests may be included under the general rubrics of culture and society, which are both emphasized by May. Moreover, May's writings must be taken in context. He was a clinician and not a social scientist, and he wrote at a time when few were dealing with public health issues as broadly as he was. May's work served and continues to serve as the basis for a dynamic and evolving set of concepts of disease ecology, and many of the subsequent disease ecologists have incorporated the political dimension into their work.

One example of how political interests are incorporated into ecological studies comes from Fonaroff's (1968) work on malaria in Trinidad. With the transition to a cash economy in this industrializing society, people who had been agriculturalists, growing mostly cacao, began to seek employment from large and small employers. However, wages were inadequate to meet their economic needs, and they continued to cultivate cacao and other crops on their land. The temporal structure of employment was such that the workers were free to work in their fields at either end of the work day. This meant that they were often in their fields at dawn or dusk – precisely when the anopheline vectors are most likely to take blood meals. As a result, malaria transmission was facilitated, and there was a notable increase in the occurrence of malaria in Trinidad. The government was encouraging capital investment, commercial farming and industrialization, with the aim of economic development. Thus, workers were virtually forced into the fields and were incidentally exposed to malaria. A combination of political action, economic investment, human behaviour and the environment all contributed to the increase in malaria.

Another example comes from Meade's research (1976) on land development in Malaysia. There, the government clear cut jungle to facilitate the construction of rubber plantations, including those owned by large foreign corporations. The ensuing plantations required that the arboreal cover be much less dense than the natural jungle. As a result, the sun reached the ground cover, which was dotted with small stagnant pools of water. These are ideal conditions for anopheline breeding – conditions created by economic and political interests. In addition, workers were hired to work on the plantations, and this brought them into contact with the rapidly increasing anopheline population. Malaria transmission was facilitated in this sense, and there was an ensuing increase in the incidence and prevalence of malaria. In this case, it was the unintended consequences of land development and a changing system of employment that created the increased frequency of malaria.

Both the aforementioned studies came out of the ecological tradition, and both implicated changing economic and political circumstances as factors which contributed to an increase in disease. Neither study developed a theoretical framework for incorporating political and economic interests into the ecological framework and into human-environment interaction. Yet it is clear that both studies are clear examples which answer Turshen's critique, and both may also be taken as prototypical analyses which, as we shall see, can serve as the basis for a political ecology of disease. Thus, the disease framework, as originally articulated, does not explicitly include political action and interest; however, it is a framework that has proved to be flexible enough to allow political-economic considerations to be included in ecologically based studies.

V The environment and disease ecology

In disease ecology, broadly taken, 'the environment' is an inclusive term, and refers to 'external economic and social forces that influence the functioning of the local system' (Grossman, 1981: 222). What Grossman (1981: 222) writes about the environment in the context of agricultural transformation and economic development is equally true of the environment in the context of disease:

Thus, the overall political economy of the region, the prices paid for primary products produced by villagers, government regulations, credit agencies, and opportunities for wage labor outside the community are important elements of the local system's external environment. On the other hand, the physical and biotic components within a village territory are part of the natural environment within the local ecosystem.

The main points are twofold. First is the necessity of understanding the context of disease. Secondly is that the environment should be interpreted very broadly, and there should be no doubt that 'environment' refers to more than the physical environment in both instances. Considerations of power, class and politics can be incorporated easily into the ecological framework in that they can be subsumed under the broader categories of culture and society. In other words, May lays the framework for the political ecologic study of disease, although he does not pursue this theme himself.

VI Political ecology

1 The nature of political ecology

The main strength of political ecology is that it integrates cultural ecology and political economy into one coherent analytical framework. The most frequently cited definition of political ecology was articulated by Blaikie and Brookfield (1987: 17) in their studies of land degradation: 'The phrase "political ecology" combines the concerns of ecology and a broadly defined political economy. Together this encompasses the constantly shifting dialectic between society and land-based resources, and also within classes and groups within society itself.' Though political economy, in the sense used by Blaikie and Brookfield, has been influenced greatly by Marxist thought, it need not and has not been restricted to Marxist approaches. Political economy here is derived from Peet and Thrift's (1989: 3) definition, where it encompasses

... a whole range of perspectives which sometimes differ from one another and yet share common concerns and similar viewpoints ... economy is understood in its broad sense as a social economy, or way of life, founded in production. In turn, social production is viewed not as a neutral act by neutral agents but as a political act carried out by members of classes and other social groupings ... while political economy refers to a broad spectrum of ideas, these notions have focus and order [as] ... part of a general, critical theory emphasizing the social production of existence.

Thus, land developers, politicians and other groups are seen as pursuing self-interest in the broad sense, and political economy is therefore concerned with issues of power, influence and authority. Thus, the context of political ecology emphasizes 'that human-environment relations at local, regional, and global scales can be understood only by analyzing the relationships of patterns of resource use to political economic forces' (Grossman, 1993: 348).

The roles of individual and collective action are of great importance in political ecology. It is, furthermore, *not* to be confused with environmental determinism; although political ecology does deal with human-environment interactions, by no means does

it even imply that these interactions are unidirectional. It simply acknowledges that groups, social processes and political processes are affected by the environment and environmental change (Bryant, 1992). This is an argument which is central to cultural ecology, disease ecology and natural hazards research as well. In one of the few attempts to apply political ecology to disease, Turshen (1984: 17) suggests that 'political ecology ... gives central importance to human agency in the transformation of the complex, interacting web that characterizes the environment'.

The earliest use of 'political ecology' which I have been able to find was by Turshen, in an article entitled 'The political ecology of disease' (Turshen, 1977) which laid some of the intellectual foundations for her subsequent work with disease in Tanzania (Turshen, 1984). The substance of her work will be discussed subsequently. However, the publication of her 1977 article contradicts Grossman's observation (1993: 364) that the term 'political ecology' originated in the 1980s. Grossman also notes that the substance of political ecology was contained in one of his earlier articles which links cultural ecology and economic development (Grossman, 1981). This is true, since he sought to answer the question of 'What happens to the subsistence system, a vital link between people and the natural environment, during the change from subsistence to cash earning?' (Grossman, 1981: 220). One of the factors which he considered explicitly is the role of colonial policy in agricultural transformation, within the framework of cultural ecology, which he took to include a broad range of factors.

Common themes which recur in political ecologic analysis include the need to set a problem or phenomenon into its broader social and economic context, and the need to relate both the phenomenon and its socioeconomic context to a variety of scales ranging from the local to the global. However, equally important is that the setting for political ecology is at the very local scale. Therefore, what is maintained is that there are connections and influences which transcend any particular scale. The local scale, which is usually the focus for political ecology – and hence the term 'regional political ecology' – should be connected explicitly to the national and the global scales. This is virtually identical to the central tenet of the locality debate, wherein it is held that large-scale social and economic changes, trends and structures are realized at the local scale, and that it is important to connect the local to the broader social and economic trends (Bassett, 1988; Black, 1990). While Black (1990) suggests that extraneous structures and activities impinge on local affairs, it seems more appropriate to argue that because scale is an artificial construct, what happens at one scale is not extraneous to occurrences at another, but rather that all scales are mutually enmeshed.

Other characteristics which are implicit in the political ecological approach include the importance of historical analysis in understanding local dynamics; the effects of state policies and activities on the local scale; and the effects of local changes in human–environment relations on the structure of social relations (Bassett, 1988). Historical analysis is important to understanding structural changes over time, and is part of the process of putting phenomena in context. The effects of state policy and action are inherent in political economy, and are therefore also a major concern of political ecology. The same is true for the influences of social relations at one level on social structure at another level.

In sum, the major innovation of political ecology in general is that it unites two powerful traditions of geography: cultural ecology and political economy. Until the development of political ecology, most of the themes mentioned above were not explored within the framework of cultural ecology. Similarly, human–environment

relationships which are so basic to cultural ecology were not analysed from the vantage point of political economy. Political ecology therefore forges a creative and necessary link between two disparate modes of analysis. It should be noted that some of the examples which follow *may* seem to be less subject to human agency than examples which have dominated political ecology until now. This is necessarily so, because in addition to being a psychosocial phenomenon, disease is also a biological phenomenon; this is why the biopsychosocial model presented earlier is an important step in the chain of logic of this article.

2 Political ecology and capitalism

The relationships between the political, economic and social characteristics and relations, on the one hand, and the environment, on the other, need not be confined to capitalism and colonialism. However, the majority of studies in political ecology are within the context of critiques of colonialism and capitalism, and their effects both on the environment and on the people who live in the social, cultural, political and economic contexts of that environment.

Since disease ecology developed partly out of cultural ecology, and because human-environment interactions are basic to understanding disease, it is surprising that political ecologists have not explored questions of health and disease. Yet, as Turshen (1984: xi) lucidly argues:

Most analyses separate ecological change from malnutrition, political struggle from epidemics, and social upheaval from health and healing. None consider the relation of ecological, political, and social aspects of disease to the economic change wrought by colonialism and capitalism.

While the emphasis on colonialism and capitalism is only one instance of how disease may be approached from a political ecologic view, Turshen's statement is more generally applicable. Mortality and morbidity owing to disease are barely mentioned by those espousing political ecology, yet disease has been and remains a profound aspect of human existence.

3 Political ecology and health: implicit connections

Though political ecologists have analysed famine and the agricultural effects of land degradation, the connection has not been made that they are, in fact, also implicitly dealing with morbidity and mortality. Not only do diseases of malnutrition, including pellagra, beriberi and kwashiorkor, result from famine but also widespread starvation to death is the ultimate consequence of drought and, more slowly, of ecologically insensitive agricultural activities which result in land degradation. Thus, for example, two of the most exciting and provocative political ecologic studies do not discuss disease and mortality. Hecht and Cockburn (1989) write of the causes of deforestation in the Amazon, but do not consider some of the health effects of deforestation. As important as this work is, one wonders how ignoring the health implications of deforestation inevitably leads to incomplete understanding of this crucial dimension of human welfare. Watts (1983) certainly considers mortality owing to starvation, but not as a central focus of his otherwise absorbing study. Again, human mortality and morbidity are subordinated to less distasteful reminders of human frailty. Bryant (1992), in his comprehensive and useful review of political ecology, complete with literally hundreds of

references, does not even *mention* mortality or disease at all, and does not even mention health in his research agenda for political ecology. His conclusion, seen from the perspective of medical geographers, seems to specify a perfect context for a merger of disease and political ecologic studies, therefore enriching both fields with greater breadth and understanding. Bryant (1992: 28) writes:

A more systematic definition of the research agenda is thus urgently required. Emerging at a time of intense environmental change, Third World political ecology attempts to integrate environmental and political analysis to illustrate how these two activities, helping to shape human destiny, are interrelated, and more importantly, how the one cannot be fully understood without the other. It is in the recognition and analysis of this interdependence that Third World political ecology could make its most crucial contribution.

Is there no place in political ecology for the crucial and overwhelmingly important analysis of disease, mortality and health? Clearly there is such a place, and the next sections of this article establish the contours of how health and disease can fit within this framework, thereby enhancing the analytical power of both.

VII A framework for the political ecology of disease

1 Framework

Political ecology is a useful perspective for gaining an understanding of human–environment interactions. It considers the ‘hidden agendas’ of individuals and groups in a political context, as well as the social forces and struggles over resources and sociopolitical power. It thereby adds the importance of human agency to traditional cultural ecology – something which is lacking in the original formulations of cultural ecology by Steward (1955) and others. Of primary importance to Steward, and to most cultural ecology, is the notion of individual and group adaptation and adaptive processes (Grossman, 1977). This has proved to be a very productive approach and has led to new insights in both geography and anthropology, including medical geography and medical anthropology (e.g., McElroy and Townsend, 1989). What traditional cultural ecology is lacking is the explicit considerations which are inherent in political economy. What, then, are some of the main dimensions which could guide the development of the political ecology of disease?

One of the first guidelines is that the political ecology of disease, like political ecology in general, should demonstrate how large-scale social, economic and political influences help to shape the structures and events of local areas. In cultural ecology, for example, ‘human ecological research is most fruitfully conducted at the micro scale’ (Grossman, 1977: 135). Local adaptation and effects are important in understanding disease dynamics (Hughes and Hunter, 1970). Hughes and Hunter (1970: 452) emphasize the importance of understanding disease within the dual frameworks of modernization and ‘sociopolitical developments’ at the local level. Thus, the importance of locality is crucial to understanding the political ecology of disease.

At first glance, it is tempting to rely on Turshen’s work, since one of her articles is entitled ‘The political ecology of disease’ (1977) and her book on the subject is *The political ecology of disease in Tanzania* (1984). Indeed, these works suggest some very important ideas which should be incorporated into the political ecology of disease, yet her research falls short of providing a template for political ecologic analysis in the context of disease. With the exception of May’s work, she does not deal extensively with the basis and application of cultural ecology to disease, and her emphasis is much

more on introducing the political economy of development into the context of health and disease. None the less, her thinking adds a great deal to understanding disease in a colonial context.

Turshen considers the effects on one country of broader, more global social and economic forces, and also considers the impact on Tanzanian history and society of diseases which appear endemic to the area, such as trypanosomiasis. Yet this analysis falls short of that of McNeill (1976) whose work is notable for considering the broad influence of disease on the course of human history and, in an explicitly geographical context, of Knight (1971). These authors, and Desowitz (1981), all argue that trypanosomiasis has had a huge impact on sub-Saharan Africa along the 'tsetse belt', by making human habitation virtually impossible in endemic areas because of the preferential biting of cattle by the tsetse fly, and because of the transmission of human trypanosomiasis in endemic regions. The former means that a major supply of food, milk and subsistence is precluded, and the latter suggests that the tsetse is a more direct threat to human health. These factors all result in a relative depopulation of endemic areas. Turshen, however, does not consider the ecological origins or consequences of the human and cattle forms of trypanosomiasis. She also makes little use of the central concept of adaptation, or of the broader framework of disease ecology, and seems unfamiliar with the rich work in disease ecology.

2 HIV and AIDS

That the importance of locality is crucial in understanding the political ecology of disease is clear in the case of AIDS. For example, in their study of the effects of AIDS on Uganda (one of the countries most severely affected by AIDS), Bond and Vincent (1991: 6) contend that to understand the impact of AIDS, it is necessary to understand 'the macro-dimensions of political economy and the micro-conditions of specific contexts'. This is a recurring theme in political ecology, and should be one in the political ecology of disease. This is a particular manifestation of the 'new regionalism', where it is necessary to understand places and the influence of places at all different scales, and to appreciate, furthermore, the interconnectedness of scale, and the mutual relations between the local, regional and international scales. In the Rakai region of Uganda, for instance, surveys demonstrate that over 75% of the prostitutes are HIV positive, and that international truckers – some of the major exploiters of prostitutes – also have very high HIV seropositivity rates (33%). Thus, the imposition in Rakai of high AIDS prevalence rates reflects the interconnectedness of this apparently isolated region with the rest of the world, through increased connectivity, since international truckers appear to be crucial in the transmission of AIDS in this region. This echoes the interconnectedness and spatial context of localities. Bond and Vincent (1991: 128) found that

... in Uganda in 1988 an international spatial orientation that minimizes the north and northeast even while it extends the purview of the south to the Middle East, Europe, and the USA ... AIDS, especially, is a further renewal of international ties and, at the same time, the circumscription of local particularistic relations. Too heavy a burden for the existing system to maintain, AIDS has brought southern Uganda into the international community.

This integration into the broader international arena is obviously at immense human and societal cost.

Within the USA, however, HIV may isolate populations both socially and geographi-

cally. A controversial panel of the National Research Council reached the surprising conclusion that whereas AIDS has affected most aspects of society in high prevalence areas in Africa and elsewhere, AIDS has not fundamentally altered major American institutions, and populations with a high prevalence of AIDS remain isolated from the rest of American society. The panel concludes that though AIDS has affected the USA, any major institutional effects were already occurring prior to the spread of AIDS (Jonsen and Stryker, 1993: 7).

The interdisciplinary panel examined many social institutions, and their report caused a great deal of controversy. How could this panel come to such a surprising conclusion? The panel addressed this question explicitly, and concluded that a combination of complex and stable social institutions, along with a relatively low prevalence rate for a major epidemic, account for the lack of lasting and profound effects on social institutions. Moreover:

... another major reason for this limited response is the concentration of the epidemic in socially marginalized groups ... HIV is concentrating in pools of persons who are also caught in the 'synergism of plagues': ... poverty, poor health and lack of health care, inadequate education, joblessness, hopelessness, and social disintegration continue to ravage personal and social life ... many geographical areas and strata of the population are virtually untouched by the epidemic and probably never will be; certain confined areas and populations have been devastated and are likely to continue to be (Jonsen and Stryker, 1993: 7).

What the panel is arguing, then, is that much of American society remains relatively unaffected by HIV since the virus is highly concentrated in socially marginal groups. These groups are also spatially isolated, and highly concentrated in certain small areas within major cities.

The ultimate irony, then, is that whereas AIDS has apparently resulted in greater integration with the rest of the world in a geographically isolated area of Uganda, the opposite is true in the USA. In a country with manifold economic, political and social connections with the rest of the world, AIDS is isolating affected marginalized groups to an even greater extent than they already are. If AIDS is a great integrating force within developing countries, its effect, as illustrated by a local study in New York City conducted by the NRC panel, is exactly the opposite. It is further marginalizing the already marginalized.

The preceding analysis shares a major criterion with political ecology: it deals with local effects of geographically widespread phenomena. In addition, however, though it was not explicitly considered by the National Research Council, it is important in the context of political ecology to ascertain the causes, both intentional and unintentional, of social isolation and marginalization. Urban settings are not the conventional setting for political ecologic analysis. However, if the emphasis of cultural ecology is redefined to include human ecology in general, in urban as well as rural contexts, then it is possible to broaden the whole scope of the political ideology of disease from the traditional agrarian environment of political ecology.

3 Newly emerging and resurging infectious diseases

Disease can be an unintended consequence of development, agricultural or land-use policy. For example, one of the most fascinating but only partially understood questions of disease ecology is why certain diseases which have neither appeared nor have been noticed can suddenly emerge in an environment. This is a major focus of scholarly research and of popular scientific journalism (Garrett, 1994; Wilson *et al.*, 1994). This

is a vitally important area of future research (Kimball and Mayer, 1996; Mayer and Kimball, 1996), and at least two major interdisciplinary research groups – at Harvard University and at the University of Washington – have been formed to address the multifaceted challenges of disease emergence and re-emergence. Many of the relevant questions are inherently geographical, and include land-use change, transportation and the potential for rapid disease diffusion, and the growth of settlements into periurban areas. The National Center for Infectious Diseases at the Centers for Disease Control and Prevention, in the USA, publishes a new journal, *Emerging Infectious Diseases*, which attests to the immediacy of the problem of disease emergence.

What is the logic in suggesting that many of the issues in emergence are geographical? It is quite likely that there are many disease nidi in tropical rain forests that will not emerge until people come into contact with those specific environments. This has been postulated for numerous tropical haemorrhagic fevers, and it is widely suggested that this is what happened in the emergence of AIDS. In the developed world, the same principles are true. For example, one of the newly recognized diseases is Lyme disease. It was first described in Old Lyme, Connecticut, but, in retrospect, as ascertained by serologic studies on stored blood samples, it has been present for many decades in Europe. The mechanism of emergence depends upon the expansion of human settlement into previously uninhabited or sparsely inhabited settings, partially as a result of population growth, but also as a direct result of land-use policy. In the USA, as suburban housing developments have encroached upon forested land in areas where Lyme disease is known to be endemic – Connecticut and the northeast, the upper mid-west and northern California, Oregon and southern Washington – May's conditions for disease occurrence (the coincidence in time and space of agent and host) become fulfilled. Thus, people come into contact with ticks harbouring the aetiologic agent (a spirochete), and this probably accounts for the increasing prevalence of Lyme disease in the USA. Less directly, housing prices, government policy, zoning and other societal factors cause Lyme disease – if 'cause' is broadened – to the same extent as *Borrelia burgdorferi* causes Lyme disease. Reforestation of deforested areas has also been implicated in the spread of Lyme disease – again, a result of government policy: 'The emergence of Lyme Disease . . . is intimately tied to changing land use patterns that date back over the past two centuries', reports a National Research Council–Institute of Medicine study. It continues: 'people began to visit and to live in forested, rural areas, a trend that continues today. The resulting proximity of people, mice, deer, and ticks promotes human infection by the Lyme spirochete' (Lederberg *et al.*, 1992: 72–73). Land-use policy in the USA, as elsewhere, is influenced by governmental zoning practices, capital accumulation by land developers and the suburbanization of mostly affluent populations. These are all distinctively political as well as social processes; land use and land development at the periphery of metropolitan areas have their own distinctive circuits of capital. The emergence of diseases can frequently be traced to intentional or unintentional social policy, political decisions and profit-driven land development decisions.

Of equal concern in disease emergence are diseases which are only peripherally related to land-use changes, but which are the results of human action in the physical and biological environments. These diseases have tremendous implications for local surveillance and intervention. They include the geographical clustering of tuberculosis and its integral relationship to AIDS, the development of multidrug resistant tuberculosis and other urban respiratory diseases. This is an area of future research for the

Washington group. Because of the relationship of water supply, water consumption, sanitation and agriculture, all of which are the results of political and economic decisions, recent outbreaks of waterborne intestinal diseases such as cryptosporidiosis in Milwaukee, which affected an estimated 420 000 people, and in other areas, which have had lower attack rates, airborne diseases such as new strains of cryptococcal meningitis, and foodborne diseases such as *E. coli* 0157:H7, which causes death, in some instances, owing to renal failure (haemolytic uremic syndrome) are all issues of immense importance in urbanized and 'developed' societies. The development of anti-microbial-resistant strains of pneumonia in the community, and of even more severe pathogens in hospital environments (these 'nosocomial infections' include vancomycin-resistant enterococci or VRE, and methicillin-resistant *Staphylococcus aureus* or MRSA) are effectively beyond antibiotic treatment; there is no remedy available for these pathogens. This is the result of human use of medications, physician prescription practices and the activities of pharmaceutical companies in two distinct ways: first, the investment of enormous capital in successful advertising for the anti-microbials to which resistance is developed and, secondly, by their lack of development of new anti-microbials which could address the problems of resistance, owing to lack of profitability.

Other unintended consequences in developing countries are also frequently responsible for increasing the prevalence of many diseases. Some of these increases are predictable, but government organizations are willing to pay this price in the name of economic development. Hughes and Hunter (1970) suggest that the ecosystem is significantly altered by development projects, and that those projects frequently create the conditions for the spread of diseases. They argue that development projects 'must be *ecologically-informed* in a total sense. There must be a *comprehensive* regard for consequences of many different kinds, physical as well as social, and the relative *cost* in terms of effects other than those intended by the program should be made apparent and assessed' (Hughes and Hunter, 1970: 450). They write specifically of how disruption of ecosystems can result in disease:

The point we are trying to make is a simple one, namely, that programs of economic or agricultural development, population relocation, industrial construction – any program which either deliberately or inadvertently changes pre-existing relationships between man and any aspect of his environment (geographic, biological, social, or psycho cultural) – must be viewed as the forging, as it were, of a new 'ecological contract' ... which usually has hidden costs (Hughes and Hunter, 1970: 479).

There is no shortage of examples to illustrate this point. Following the construction of the Aswan Dam, the upriver lake which was formed provided an ideal environment for the snails implicated as intermediate hosts in the transmission of schistosomiasis. In addition, the size and cultural appeal of the lake and inlets increased human contact with the water. The result was a pronounced increase in the incidence of schistosomiasis. In other areas – areas that are more forested – when dams are constructed the increase in malaria is notable because the development projected created the appropriate ecological conditions for the disease, in much the same way as the increase of malaria in Malaysia following the establishment of rubber plantations. Echoing Hughes and Hunter's analysis, Packard *et al.* (1989: 477) caution about some of the unanticipated and negative health costs of development projects:

Industrial development in Africa, as in Europe and America, has carried with it significant health costs ... a ... comprehensive management of industrial health costs ... must ... include an assessment of the impact which industrial development and the creation of an industrial workforce has on ecological relationships, environmental conditions and patterns of sickness and health in the areas surrounding industrial centers.

Packard *et al.* cite toxic waste, land-use changes and other factors as frequently resulting in a decrease in agricultural productivity and an ensuing decline in the nutritional status of the population. We are reminded that behind industrial development is intentional human activity, frequently by the government or sanctioned by the government: 'any attempt to fully understand industrial health problems in Africa must look beyond these immediate causal linkages and examine the wider political and economic forces which determine the shape of industrial development' (Packard *et al.*, 1989: 477). The settings within which this understanding may be gained are frequently 'defined by the social relations of production' in which a struggle is defined between the interests of the workers and peasants and the owners of capital (Packard *et al.*, 1989: 492).

VIII Discussion

1 Implications of the political ecology of disease for future research

The political ecology of disease provides one new and intricate framework for the synthesis of many social and environmental causes and consequences of disease. Its utility will ultimately be judged by how useful it is in explaining and interpreting disease in its societal and environmental frameworks. As suggested earlier, an area of tremendous concern and much contemporary emphasis is that of the emergence and re-emergence of infectious diseases in developed and developing societies. How have politics, power and human–environment interactions shaped disease emergence in specific locations and places? What further examples of this phenomenon may be identified? How have they influenced noninfectious diseases? How has the 'epidemiologic transition' been influenced by these factors? Is there a political ecology of health as well as a political ecology of disease? The latter is consistent with Kearns' suggestion for a 'postmedical' geography of health. In a phenomenological and experiential sense, how do political factors mediate the experienced life worlds of specific locations and places, particularly for those who are ill or infirmed? These are all areas which seem fruitful as future directions in the development of the political ecology of disease as one new approach in understanding public health issues from a geographical and from a social perspective.

2 Conclusion

Understanding, in the context of public health, medical geography and the social sciences generally, frequently emerges as new ways of thinking are merged and synthesized with older, more established modes of analysis. Such has been the case with political ecology, which synthesized political economy and cultural ecology into a very powerful combination. The same may be true of disease ecology and political ecology. As Packard *et al.* (1989: 406) conclude, 'if the rigor of epidemiology in describing patterns of health and disease in space and time can be joined with the power of political economy in describing the way social relations of production are changing, the understanding of health and disease will increase greatly'. The challenge for this sort of analysis is there. It is time to integrate and synthesize further.

References

- Bassett, T.J.** 1988: The political ecology of peasant-herder conflicts in the northern Ivory Coast. *Annals of the Association of American Geographers* 78, 453-72.
- Black, R.** 1990: Regional political ecology in theory and practice: a case study from northern Portugal. *Transactions, Institute of British Geographers* NS15, 35-47.
- Blaikie, P. and Brookfield, H.** 1987: *Land degradation and society*. London: Methuen.
- Bond, G.C. and Vincent, J.** 1991: Living on the edge: changing social structures in the context of AIDS. In Hansen, H.B. and Twaddle, M., editors, *Changing Uganda: the dilemmas of structural adjustment and revolutionary change*, London: James Currey, 113-29.
- Brownlea, A.** 1981: From public health to political epidemiology. *Social Science and Medicine* 15D, 57-67.
- Bryant, R.L.** 1992: Political ecology: an emerging research agenda in third world studies. *Political Geography* 11, 11-36.
- Desowitz, R.S.** 1981: *New Guinea tapeworms and Jewish grandmothers: tales of parasites and people*. New York: Norton.
- Dubos, R.** 1965: *Man adapting*. New Haven, CT: Yale University Press.
- Duncan, C., Jones, K. and Moon, G.** 1993: Do places matter? A multi-level analysis of regional variations in health-related behaviour in Britain. *Social Science and Medicine* 37, 725-33.
- Dyck, I.** 1995: Hidden geographies: the changing lifeworlds of women with multiple sclerosis. *Social Science and Medicine* 40, 307-20.
- Engel, G.L.** 1977: The need for a new medical model: a challenge for biomedicine. *Science* 196, 126-36.
- 1980: The clinical application of biopsychosocial models. *American Journal of Psychiatry* 137, 535-44.
- 1982: The biopsychosocial model and mental education. *The New England Journal of Medicine* 306, 802-805.
- Fonaroff, L.S.** 1968: Man and malaria in Trinidad: ecological perspectives on a changing health hazard. *Annals of the Association of American Geographers* 58, 526-56.
- Garrett, L.** 1994: *The coming plague: newly emerging diseases in a world out of balance*. New York: Farrar, Strauss & Giroux.
- Grossman, L.S.** 1977: Man-environment relationships in anthropology and geography. *Annals of the Association of American Geographers* 67, 126-44.
- 1981: The cultural ecology of economic development. *Annals of the Association of American Geographers* 71, 220-36.
- 1993: The political ecology of banana exports and local food production in St Vincent, eastern Caribbean. *Annals of the Association of American Geographers* 83, 347-67.
- Hayes, M.V.** 1992: On the epistemology of risk: language, logic, and social science. *Social Science and Medicine* 35, 401-407.
- Hecht, S. and Cockburn, A.** 1989: *The fate of the forest: developers, destroyers, and defenders of the Amazon*. London: Verso.
- Hughes, C.C. and Hunter, J.M.** 1970: Disease and 'development' in Africa. *Social Science and Medicine* 3, 443-93.
- Jones, K. and Moon, G.** 1991: Medical geography. *Progress in Human Geography* 15, 437-43.
- 1992: Medical geography: global perspectives. *Progress in Human Geography* 16, 563-72.
- Jonsen, A. and Stryker, J.**, editors, 1993: *The social impact of AIDS in the United States*. Washington, DC: National Academy Press.
- Kearns, R.A.** 1993: Place and health: towards a reformed medical geography. *Professional Geographer* 45, 139-47.
- 1995: Medical geography: making space for difference. *Progress in Human Geography* 19, 251-59.
- Kearns, R.A. and Joseph, A.** 1993: Space in its place: developing the link in medical geography. *Social Science and Medicine* 37, 711-17.
- Kimball, A.M. and Mayer, J.D.** 1996: Emerging infectious diseases of public health threat to the northwest. *Washington Public Health*, in press.
- Knight, C.G.** 1971: The ecology of African sleeping sickness. *Annals of the Association of American Geographers* 61, 23-44.
- Lederberg, J., Shope, R.E. and Oaks, S.C. jr.**, editors, 1992: *Emerging infections: microbial threats to health in the United States*. Washington, DC: Institute of Medicine, National Academy Press.
- May, J.M.** 1954: Cultural aspects of tropical medicine. *American Journal of Tropical Medicine and Hygiene* 3, 422-30.
- 1958: *The ecology of human disease*. New York: M.D. Publications.
- Mayer, J.D.** 1982: Relations between two traditions of medical geography: health systems planning and geographical epidemiology. *Progress in Human Geography* 6, 216-30.

- 1990: The centrality of medical geography to human geography: the traditions of geographical and medical geographical thought. *Norsk Geografisk Tidsskrift* 44, 175–87.
- Mayer, J.D. and Kimball, A.M.** 1996: *The northwest as a focus for newly emerging diseases*. Seattle, WA: University of Washington Center for Studies in Demography and Ecology.
- Mayer, J.D. and Meade, M.S.** 1994: A reformed medical geography reconsidered. *Professional Geographer* 46, 103–106.
- McElroy, A. and Townsend, P.K.** 1989: *Medical anthropology in ecological perspective* (2nd edn). Boulder, CO: Westview Press.
- McNeill, W.H.** 1976: *Plagues and peoples*. New York: Anchor Books.
- Meade, M.S.** 1976: Land development and human health in west Malaysia. *Annals of the Association of American Geographers* 66, 428–39.
- Packard, R.M., Wisner, B. and Bossert, T.** 1989: Introduction. *Social Science and Medicine* 28, 405–14.
- Peet, R. and Thrift, N.** 1989: Political economy and human geography. In Peet, R. and Thrift, N., editors, *New models in geography*, London: Unwin Hyman, 3–29.
- Risse, G.B.** 1988: Epidemics and history: ecological perspectives and social responses. In Fee, E. and Fox, D.M., editors, *AIDS: the burdens of history*, Berkeley, CA: University of California Press, 33–66.
- Rosenberg, M.W.** 1988: Linking the geographical, the medical and the political in analysing health care delivery systems. *Social Science and Medicine* 26, 179–86.
- Steward, J.H.** 1955: *Theory of culture change*. Urbana, IL: University of Illinois Press.
- Turshen, M.** 1977: The political ecology of disease. *Review of Radical Political Economics* 9, 45–60.
- 1984: *The political ecology of disease in Tanzania*. New Brunswick, NJ: Rutgers University Press.
- Watts, M.** 1983: *Silent violence: food, famine, and peasantry in northern Nigeria*. Berkeley, CA: University of California Press.
- Wilson, M.E., Levins, R. and Spielman, A.** 1994: *Disease in evolution: global changes and emergence of infectious diseases*. New York: New York Academy of Sciences.