

Land Tenure and Biodiversity: An Exploration in the Political Ecology of Murang'a District, Kenya

A. Fiona D. Mackenzie

This paper situates the relationship between biodiversity and land tenure in the complex interrelationships between the local and the global. Through a case study of Murang'a District, Kenya, it explores how power is exercised through struggles to define rights to land in highly complex situations of legal plurality and how these struggles in turn interrelate with issues of land management, including biodiversity. Gender, cross-cut by class, is a deeply contested arena of social differentiation, and the outcome of struggles for land, labor, and the product of labor have significant implications for the maintenance of biodiversity.

Key words: land tenure, biodiversity, gender, political ecology, local knowledge, Kenya

Following the signing of the United Nations Convention on Biological Diversity in 1992, biodiversity has become a salient component of international discourse and, as discourse, a key means through which power relations at the global level are redrawn (Escobar 1996, 1998). The struggle over intellectual property rights and plant breeders' patents is one dimension of this and the focus of substantial research (Mooney 1996; Posey and Dutfield 1996; Crucible II Group 2000, 2001). In the struggle to establish whose knowledge counts and in the effort to promote the conservation of biodiversity globally, those people who depend on the maintenance of biodiversity for their livelihoods are increasingly recognized as central players. Yet despite global recognition of the need for research at the local level, research into the relationship between tenurial rights to agricultural land and biodiversity has been neglected (Howard-Borjas 2002).

In sub-Saharan Africa, questions of land tenure have long been the subject of attention with respect to debates about the "efficient" use of land, yet early studies frequently failed to recognize, or else dismissed, the complex sets of rights and responsibilities, of individuals and collectivities, through which tenure issues were defined. More recently, research in sub-Saharan Africa has recognized that small-scale farmers, producing often for the purposes of subsistence as well as exchange, are responsible for maintaining the genetic diversity of their crops. But such studies have gener-

ally ignored the part played by property rights and those issues concerning control, access, and use of land. In particular, there has been a lack of consideration of how people—differentiated, *inter alia*, by class, gender, generation, marital status, race, ethnicity—negotiate rights of access and control of resources to foster or undermine plant genetic diversity.

This paper seeks to move research forward by suggesting ideas for conceptualizing the relationship between land-based property rights and biodiversity at the local level, drawing primarily on fieldwork conducted in Kenya in the mid-1980s and literature pertaining to sub-Saharan Africa. The paper focuses on relations between the political and the ecological at the local level but argues that research into the relationship between tenurial practice and land use, and thus biodiversity, must engage iteratively with the complexity of relationships through which the "local" intersects with the "global." As Michael Watts and Richard Peet (1996: 266) have demonstrated, the local may not be completely displaced by the global in an age of "market triumphalism," but neither does it exist in isolation from it. The promotion or otherwise of genetic diversity at the local level is entwined with social, economic, and political relations at far larger scales of inquiry. Ecological issues, including biodiversity, are multiscale (Bryant 1998) and intricately connected with political issues at multiple scales.

The theoretical ground for this proposal is informed by what may broadly be termed poststructural political ecology. Recognizing both the advances and limitations of such work as that of Piers Blaikie and Harold Brookfield (1987) and Michael Redclift (1987), more recent research, inspired in part by postcolonial and feminist theorization of difference and discourse theory, has extended earlier work in political ecology by exploring relations of power and knowledge as articulated through discourse in the relationship between

A. Fiona D. Mackenzie is a professor in the Department of Geography and Environmental Studies at Carleton University, Ottawa, Ontario, Canada, and the Arkleton Centre for Rural Development Research at the University of Aberdeen, Old Aberdeen. I wish to acknowledge research support from the International Development Research Centre, Ottawa, through a sabbaticant award. My particular thanks go to Kathleen Flynn Dapaah and Sheri Arnot for their assistance in identifying key literature.

people, land, and economy, and by examining the construction of nature in social struggle (Braun and Castree 1998; Escobar 1996, 1998; Neumann 1998; Peet and Watts 1996; Watts 1998). In common with earlier work, the approach recognizes that how people relate to each other and to the environment is affected by and affects their relationship to the means of production, including land, forests, and livestock. It also recognizes that such relationships are historically constituted and connected to other geographical scales of analysis. This approach suggests, further, that the relationship between people and, for example, land, may be understood not only through the analysis of material relations of production, but that the materiality of such relations is bound up with the symbolic resources or frameworks of meaning through which people define and legitimate their rights to land and through which they resist others' attempts to appropriate. It explores how "nature" is socially constructed as people negotiate rights to land collectively or as individuals.

Methodologically, this paper draws on a case study carried out by the author in Murang'a District, Kenya, over a five-year period in the 1980s. It included participant observation and the collection of personal narratives from elderly Kikuyu women and men. People who were interested in recalling their agricultural histories were chosen from a range of socioeconomic strata. They were identified through the creation of a network that moved out from the extended family of the interpreter with whom I worked. Owing to the political sensitivity of the questions I was asking about land and labor, I was cautioned that there was no alternative. This research was supplemented at the local level by analysis of the Land Register, coffee cooperative documents, and key interviews with local government officials and members of women's groups. To extend the research historically and to connect with the "global," archives in Nairobi, Edinburgh, Oxford, and London were consulted. These included colonial records, government documents, records of the Church of Scotland Mission, and anthropological treatises.

The methodology adopted was one of discourse analysis, juxtaposing different accounts and sources of information, thereby teasing out the silences or making visible the contradictions. By this means, processes through which the relationship between the political and the ecological is created were explored and the connections between power and resistance and power and knowledge were analyzed. People's experiential ecological knowledge and land use practices vary according to political positionings and negotiation of such axes of social differentiation as gender, class, age, and marital status. This approach allowed for the investigation of complex social relations, where people are differently positioned vis à vis the land in terms gender, class, age, or marital status.

In this paper, I examine, in turn, biodiversity, rights to land, and rights to labor and its product to draw out conceptual issues germane to examining the relationship between land tenure and biodiversity. The penultimate section of the paper attempts to move research forward through a series of questions concerning land to which individualized rights are claimed,

land where common property rights are held, and where there are collective rights to land under individual control.

Whose Biodiversity?

Recognizing that small-scale farmers have nurtured plant genetic resources over the millennia, it may be useful to begin an exploration of the relationship between biodiversity and land tenure by examining the concept of local ecological knowledge and then to consider how such knowledge relates to global discourses of biodiversity, conservation, and sustainability. Various names such as *metis* (Scott 1998), local traditional knowledge (Ingold and Kurttila 1999), or nomad science (Deleuze and Guattari 1996), the concept is contrasted with what is generally referred to as scientific explanation (Scott 1998:323-328).

Common to these conceptualizations of local knowledge is the view that such knowledge is better defined in terms of skills and experience than as a set of identifiable facts or principles that can be applied to specific situations. James Scott (1998:313), for example, defines *metis* as "a wide array of practical skills and acquired intelligence in responding to a constantly changing natural and human environment." Such skills are learned through practice and are applied with subtlety in particular local situations. *Metis*, writes Scott (1998:316), is "plastic, local and divergent." For Ingold and Kurttila (1999:2, 6), local traditional knowledge is "generated in the practices of locality"; it is "inseparable from actual practices of inhabiting the land." It consists of skills "regrown in each generation through training and experience in the performance of particular tasks" (Ingold 2000:5), rather than a stock of knowledge or an unchanging cultural heritage that is passed down intact from one generation to the next—an artifact that can be separated from the context of its production. Local knowledge as a skill implies no separation between people and nature, but rather "a fundamental unity of people and land" (Hornborg and Kurkiala 1998:9) or, in Ingold's (2000) language, an ontology of dwelling.

Ingold and Kurttila (1999:17) distinguish this conception of local knowledge from "modern traditional knowledge," defined as that knowledge that may claim to be traditional but which is "enframed in the discourse of modernity." For Escobar (1996:56), it is through this second way of conceptualizing local knowledge that nature is capitalized in its postmodern form. In contrast to the capitalization of nature in its modern form, where nature is "defined and treated as an external, exploitable domain," a process that, as Escobar (1996:47) demonstrates, proceeds through the deployment of "expert," "scientific" discourses of modernity, the postmodern form of ecological capital has to do with "a new process of capitalization, effected primarily by a shift in representation [whereby] previously 'uncapitalized' aspects of nature and society become internal to capital." This second form of ecological capital proceeds not only through "the symbolic conquest of nature," for example through the establishment of biodiversity reserves, and recognition of local communities as "'stewards'

of nature,” but also through “the semiotic conquest of local knowledges” (Escobar 1996:57). As Escobar (1996:57) goes on to explain, local knowledges are valued, but only to the extent that they have utilitarian value; they are viewed as “something existing in the ‘minds’ of individual persons,” for example, elders, “about external ‘objects’ (‘plants,’ ‘species’), the medical or economic ‘utility’ of which their bearers are supposed to transmit to us.”

In this construction of local knowledge (i.e., modern traditional knowledge), people and communities are clearly recognized, for example by those seeking to establish biodiversity reserves, as “the source and creators of value—not merely as labor or raw material” (Escobar 1996:57), a process achieved through such discourses as those of sustainable development and biodiversity (ibid.:63). In contrast to the modern and exploitative form of ecological capital, the postmodern form of ecological capital is thus conservationist. It recognizes that production of local knowledge is critical for ensuring the sustainability of biodiversity, and local people, in communities, are seen as stewards of the land and of its biological diversity. But in this conceptualization, local knowledge is extracted from the environment in which it is created. It is not conceived as part of “a complex cultural construction, involving movements and events profoundly historical and relational” (Escobar 1996:57). Its significance is reduced to the economic. And nature becomes something “out there” that may be collected, “reinvented as environment so that capital, not nature and culture, may be sustained” (Escobar 1996:49).

In contrast to a bio-imperial discourse of plant genetic diversity through which ecological capital in its postmodern form advances, recent research on social movements in Latin America has suggested that a discourse of biodiversity—defined here in terms of “territory plus culture” (Escobar 1998: 12)—may open up sufficient space for an alternative discourse, one that resists being subsumed by the demands of global capital. This alternative draws heavily on notions of local knowledge identified above, predicated on an integral relationship between people and nature. It reorients discussion of biodiversity—and sustainability—by privileging “local principles of autonomy, knowledge, identity, and economy” (Escobar 1998:13).

Before considering tenurial conditions through which biodiversity is supported, it is important to consider what “local” means when local knowledge is referred to and ideals of biodemocracy invoked. All too frequently, the notion remains unproblematized. Whereas in sub-Saharan Africa there is gender-differentiated responsibility for agricultural production in smallholding systems, it is vital to recognize women’s primary responsibility for supporting genetic diversity (Leach and Fairhead 1995; Opole 1993; Rocheleau 1991, 1995; Thomas-Slayter and Rocheleau 1995; Worede and Mekbib 1993). It is also essential to recognize that local agricultural systems and communities are crosscut by other axes of social differentiation—of class, age, ethnicity—and that such differences, multiple and shifting, “fractured and fracturing” (Laurie et al.

1999) as they are, affect people’s experiential knowledge and thus land use practices that in turn affect plant genetic diversity. Rocheleau (1991, 1995), for example, has shown, not only the degree to which women and men in Kathama, Machakos District, Kenya, have distinct environmental knowledge, and the degree to which there has been “a feminization of rural environmental science” with increased rates of male migration to urban centers, but also how, in times of drought, poorer women rely not just on their deep agricultural knowledge, but also their political and social skills in accessing resources—private plots or public lands controlled by men. Local knowledge of biodiversity, no more than global discourse, exists beyond the purview of politics. It is parlayed into existence through the play of social relations.

Struggles Over Land: The Case of Murang’a District, Kenya

A key finding of Rocheleau’s research is that women’s rights of access to and control of land are not commensurate with their responsibilities for agricultural production or ecological sustainability. In this context, a central concern in understanding the relationship between tenure regime and biodiversity is to ask not simply what set of property rights promotes biodiversity, but whose rights are secure under which system of tenure and how this, in turn, influences land use practices that maintain plant genetic diversity.

Land tenure in sub-Saharan Africa is more usefully conceptualized in terms of rights of access and control than of ownership (for an overview see Platteau 1996; Shipton and Goheen 1992). The notion of ownership, as H. W. O. Okoth-Ogendo (1978, 1989) has demonstrated, reflects Eurocentric values and practices and exists only where there is exclusive control of land and where land has, basically, sole value as a commodity. Property rights in Africa, he suggests, are more accurately understood as complex systems of interlocking rights, each right reflecting the power allocated to individuals for a particular purpose. Each person holds a “bundle of rights” related to specific functions such as cultivation, grazing, or the collection of firewood. And each function carries with it “varying degrees of control exercised at different levels of social organization” (Okoth-Ogendo 1978:63).

Distinguishing between rights of access and control and recognizing the complexity, elasticity, and overlapping nature of such rights, leads to a more nuanced understanding of the relationship to land of people differently positioned with respect to gender, age, wealth, or ethnicity, for example. This distinction is also vital, Okoth-Ogendo (1978:508) argues, in understanding how women’s proprietary right in many societies was recognized under customary land law. The separation between rights of access (use rights), the right to allocate (understood by the right of control), and the subordination of the latter right to the economic functions to the former, secured women’s “proprietary position” (Okoth-Ogendo 1978:508) in economies that depended so heavily on their labor.

The distinction is also critical in exploring questions of security of tenure, which, particularly in situations where customary law prevails, rest on the resolution not only of rights of access and control within the household, but also of the latent tension between interests of the collectivity and of the individual. Tenurial rights frequently have to do not just with rights of individuals to particular parcels of land, but also rights to land held in common (i.e., land that falls within the territorial jurisdiction of the kin group). These categories of rights may change seasonally or over time as agricultural land reverts to fallow or bush (Leach 1994). Rights to common land may also change through various individual tenure-building practices. Thus, for example, rights to gather nontimber forest products to which the collectivity has use rights may be altered by bringing specific trees or wild food and medicinal plants under individual control—either through clearing the vegetation around them or, in the case of wild plants, by transplanting and domesticating them (Leach 1994: 149-153). Further, in understanding tenure relations, it may be necessary to recognize that farmers differentiate between land and tree tenure and that there are frequently sanctions against women planting trees where these are considered territorial markers.

These rights may be customary, but, as substantial research has demonstrated, that does not mean they are beyond the realm of political struggle. Historically deep analyses of customary law in Africa give incontrovertible evidence of the degree to which custom provided the symbolic resource, or the discursive means, through which people struggled for control of land under colonial rule. People, differentiated by class and gender, claimed custom as a strategic and symbolic resource in the local struggle over land as this contest inter-related with the colonial state's efforts to legitimate its rule (Chanock 1985; Glazier 1985; Moore 1986). My research in Murang'a District, an area of smallholdings in Central Province, Kenya (Mackenzie 1998), illustrates how customary law prior to, as well as during, colonial rule was part and parcel of social change and political struggle.

Prior to colonialism, security of tenure in Murang'a depended on the resolution of two sets of tensions. The first was between individual and collective rights to land of the (male) kinship group and the second was between women, as wives and producers but nonmembers of the kin collectivity, and men, nonproducers (as far as basic crop production was concerned) yet members. Rights to land were, in both situations, subject to negotiation. Under colonial rule, customary law provided the means through which individuals or groups, differentiated by race, class, and gender, negotiated access to and control of land. Contradictory recreations of customary law allowed, on the one hand, the state to alienate African land for settler agriculture. Here, customary law became an "ideological screen of continuity," a "language of legitimation" (Chanock 1985:59, 4). It may have provided the political space through which Africans resisted colonial rule, but the reworking of customary land law by African men privileged not only male rights to allocate land, but also the interests of

wealthier men. As use rights were silenced in this dominant discourse of customary tenure, poorer men lost out, but so did women. Their use rights became increasingly invisible in the growing conflict defined by race and class. It was not a matter of women's, or of poorer men's, total exclusion from rights sanctioned by custom, but their tenurial security decreased and customary land law then provided the symbolic means through which they constructed a discourse of resistance. Customary law was and remains a means through which people, differentiated *inter alia* by race, class, gender, or age, assert rights to land. Rights to land under such law are malleable and manipulable and are continuously recreated in the resolution of conflict (Mackenzie 1998).

Customary land law does not simply disappear with the introduction of freehold tenure or the establishment of contract production regimes. Research in Murang'a, based on my collection of oral agricultural histories and the analysis of archival material, demonstrates that the new system of tenure—the consolidation of land and then its registration in individual freehold title, imposed by a colonial regime in the 1950s—does not preempt existing rights. Rather, what emerges is a complex picture in which people contest rights to land by drawing—as exigency demands or as financial resources dictate—on whichever legal resource they can. And while it may indeed be the case that women's tenurial security is compromised in situations of legal plurality, and that even where they hold a title deed, they may not be able to exercise tenurial rights to land they "own," evidence suggests that women are highly resourceful in securing their rights (Mackenzie 1990; also, see Davison 1988). Two instances, drawn from personal narratives collected in Murang'a in the 1980s, indicate something of the complexity of the struggle.

In the first, Wacheke and her dying husband recognized her vulnerability in maintaining rights to the land when only their three daughters and no son had survived childhood. Her husband's stepbrother, Bibia, had sold his inheritance soon after land reform and wanted to acquire this land for his son. He was ready to claim it, on his stepbrother's death, on the grounds of "customary" practice (i.e., of ensuring that the land remained in the patriline). To prevent Bibia from "snatching" the land, Wacheke and her husband decided that she should "marry" a woman with sons. An elderly man explained the political import of this practice of becoming a female husband as follows:

If, for example, Kamande's mother, [my wife], doesn't have a son, but only you, a daughter, who will marry and go away, that will be the end of our name. If we wish to retain our name, we can marry a girl and have her here and she can bear children with whoever she wishes. After our death, she would keep everything. Nobody could get this from her. Or, a woman could marry a girl after the death of her husband.

Wacheke thus evoked a customary idiom, that of a female husband, to counter the constant maneuvering of her brother-in-law

to gain control of the land to which, after her husband's death, she held the title deed. She explained that, after her husband had died, despite marriage to a woman with sons and the title deed, the struggle had been constant. She had managed to retain rights to the land but had been unable to give land to a married daughter, Nyambura, who lives in Ukambani but lacks land. Such a gift was promised by Wacheke's husband, but Wacheke dare not give Bibia grounds for further claim to the land, in this case because the gift would be construed as a loss of kin territory.

In a second instance, Wanjiku, a woman then in her early 40s and a school principal, wanted to invest some of her savings in land registered in her name. She and her husband had previously combined their earnings to purchase 4.45 hectares to add to the 3.6 hectares that had been allocated to her husband by his parents on his marriage. Her husband had insisted that the land purchased from their joint savings be registered in his name alone. With persistence on her part, and after much dispute, he agreed that 0.1 hectare would be registered jointly in both names. Although she has (relatively) well-paid employment and two sons, as well as three daughters, Wanjiku is conscious of her insecurity; with savings invested in land registered in her husband's name, she would have no recourse to this asset in the event of divorce. Thus, in 1982, she negotiated with a female friend to purchase 1.2 hectares of land on her behalf at some distance from her home. It had been difficult to save for this purchase as her husband insisted she disclose all her finances to him, without reciprocation. Unfortunately, her husband learned of the proposed purchase and he warned against engaging in such dealings again.

Wanjiku also spoke of her maternal grandmother who, as a widow, had managed to register land in her own name at the time of consolidation, an uncommon occurrence. Her grandmother gave this land (i.e., the title deed) to the daughter, Wanjiku's aunt, who had looked after her as she grew older. But the subclan then fought to reclaim the land on the grounds it belonged to the subclan and thus had to be subject to male lines of inheritance. To maintain rights accorded her through freehold tenure, the aunt was trying to re-register the title in the names of two friends as well as her own name. She considered that although she would no longer be able to claim exclusive rights to the land, the subclan would find it much more difficult to fight three women than one.

With respect to rights to land where contract farming has been introduced, research again suggests that women's security of tenure is threatened. In one dramatic example of the extension of irrigation in Jahaly-Pacharr swamps, The Gambia, women were unable to exercise their rights to the rice harvest even when, subsequent to their protests, irrigated land was registered in their names. As Judith Carney and Michael Watts (1990; also, Carney 1996) show, men were able to turn customary rights pertaining to the distinction between individual and household land and labor to their advantage through their manipulation of specific customary idioms, thus taking control of the products of women's labor, rice.

At issue here are not only rights to land, although these are clearly central to the renegotiation of the conjugal contract, but also rights to labor and to control of the product of labor expended on that land. I turn now to examine these issues, before relating them, in turn, to a discussion of practices that support plant genetic diversity.

Rights to Land, to Labor, and to the Product of Labor

Analysis of the politics of labor in the production of coffee in Murang'a District reveals the degree to which the household has become a deeply contested site where rights to land, labor, and the product of labor are constantly subject to negotiation. On the basis of evidence that documents the insecurity women face with respect to these rights, particularly those from poorer households, which are in the majority, I argue that it is essential to conduct research that connects these issues to those of the long-term sustainability of the soil and the maintenance of biological diversity.

Coffee was introduced in Murang'a as part of the Swynnerton Plan (1954), and colonial agricultural officers targeted its production to men. Nevertheless, officials noted that within a few years women formed the majority of coffee growers—16,000 of the total 26,000 growers—a proportion that has increased substantially in recent years with exceptionally high rates of male outmigration, reaching 75 percent in some areas. A crisis in the early 1980s, caused by the continuing drop in the quality of coffee exported from the district, brought to light the degree to which the lack of secure remuneration for women had led them to decide not to prioritize the harvesting of coffee on their own holdings (Mackenzie 1995).

The problem centered on the way coffee processing and marketing is organized, through 16 coffee societies, each a member of the Murang'a District Farmers' Cooperative Union (MDFCU). As membership in the cooperative is based on title to the land, men are in the great majority of official members, constituting 89.9 percent of members in the case of the Njora Coffee Growers' Cooperative Society (total membership 5,784 in 1984) and 83.2 percent in the case of Irati (total membership 3,221 in 1984). It is they who receive payments for coffee delivered to the societies and, as became clear, frequently did not pass money on to their wives, who had labored on the crop.

Women's response to the lack of remuneration for their labor, in a situation where they generally held sole responsibility for meeting daily household needs, was to withdraw their labor. This withdrawal became more acute as the effects of structural adjustment programs undertaken by the state following agreements with the World Bank were felt at the local level. With an increased emphasis on export earnings from coffee, costs were shifted from the paid to the unpaid economy, and social relations became increasingly polarized (Elson 1994; also, Elabor-Idemudia 1991; Meena 1991;

Onimode 1991; Wagao 1990). Women from resource-poor households who did not receive adequate compensation for their labor on coffee were particularly vulnerable. Resistance was both individual and collective. At the individual level, or as families, women and children could be seen boarding trucks in great numbers during the picking season for the short journey to coffee estates in Kandara and Makuyu Divisions of Murang'a or to Kiambu District. By working for wages on the estates, they were able to secure remuneration for their labor.

Women also renegotiated the conjugal contract by invoking the customary idiom of *ngwatio*, a practice that, in the past, had centered on reciprocal labor arrangements; for example, working as a group in turn on each others' farms during peak labor periods. But now the groups sold their labor power for a wage, able to command a higher wage by picking coffee collectively than would otherwise have been possible. In more formal *mabati* (literally, metal roof) groups, which had begun as rotating savings and loans societies in the late 1960s, women in the 1980s also turned increasingly to activities designed to earn an income that they, as individuals, could control (Mackenzie 1987).

The response of the MDFCU to the decline in coffee quality in the early 1980s was to encourage members to change from individual (male) accounts to joint (spousal) accounts at the four savings and credit sections (SCS) of the union. The success of this initiative may be gauged from the fact that, between 1982 and 1984, 40.8 percent of the accounts at the one SCS where research was conducted, Maragua SCS, had changed from individual (male) accounts to joint accounts. The senior savings clerk explained the wide discrepancy in the percentage of joint accounts among the six coffee societies belonging to this SCS—from 17.1 percent in the case of Njora to 55.4 percent and 79.2 percent, respectively, for Irati and Thanga-ini—on the grounds of far higher rates of male out-migration in the latter two areas. Although these figures do not in themselves guarantee that women will be able to exercise the control they need over the proceeds of their labor, they do suggest at least a degree of success in reconstituting gender relations in their favor through negotiating the politics of coffee production.

Together with such research as that of Alison Evans (1989) in Zambia, Judith Carney and Michael Watts (1990) and Richard Schroeder (1999) in The Gambia, and Catherine Dolan (2001) in Meru, Kenya, the Murang'a study demonstrates the complexity and negotiability of rights and responsibilities where economic survival is at stake. Yet none of this research explores the implications of intensified conflict over local resources for issues concerning sustainability of the resource base, soil, or biodiversity. It is not difficult to draw out the possible implications of intensified crop production for the market—a deepening of intrahousehold struggle that accompanies this action, frequently accompanied by the growing casualization of women's labor, and the increased demands on women's labor time under structural adjustment programs—for issues of ecological significance.

My research in Murang'a (Mackenzie 1995) suggested that sustainable management of the soil was bound up not only with the level of wealth or poverty of the household, but also with how successfully women (with primary, and often exclusive, responsibility for agricultural production) were able to secure rights to land and labor. The research suggested that the option value (Blaikie 1989) of maintaining the soil through labor-intensive practices, such as mulching or green manuring, may decline, and that women may compromise their knowledge as farmers in the effort to meet immediate household responsibilities. Their deep and ecologically precise knowledge of a particular place may be threatened as a result of such choices. It may also be threatened as genetically uniform crops such as hybrid or composite maizes displace those crops they have bred for ecological specificity and as there is a decline in "the spaces between" (Rocheleau 1995: 12)—hedgerows, the edges of paths or roads, or areas of woodland or grass found among the cultivated plots—where women used to gather wild foods. Ritu Verma's (2001) recent research supports these observations, showing unequivocally how politically embedded are the everyday practices of soil management. In the context of Maragoli, Western Kenya, she deepens the analysis by demonstrating how people differentiated by gender, class, age, marital status, and position with respect to life-cycle, negotiate rights to land, labor (on and off the farm), and the product of labor, and how struggles concerning these rights, caught up themselves in processes of macroeconomic change, play themselves out with respect to land use and management practices.

Toward a Framework for Research

Recognizing that the relationship between land tenure and biodiversity cannot be divorced from the broader political economy,¹ and with reference to the more general question concerning whose rights are secure under which tenurial regimes and how this influences land use practices associated with plant genetic diversity, the following questions are proposed to move forward research on, and conceptualization of, the relationship between people, land rights, and biodiversity. For heuristic purposes, the questions are divided into three sections: land to which individualized rights are claimed; land to which rights are held in common; and land under individual control to which there are collective rights. Discussion of the methodological issues that arise from this proposed framework follows.

Land to Which Individual Rights are Claimed

As rights of use and control of land change with increasing individualization of tenure, to what extent, if any, have people changed practices of land use that in the past may have ensured the maintenance of crop genetic diversity? To what extent do any new practices contribute to enhancing crop biodiversity? In attempts to exert individual rights to

land, what tenure building practices are employed? Who can employ them? To what extent is the planting of specific crops or trees part of a strategy of tenure building? On what symbolic resources do people rely in trying to assert these rights? What are the implications of such measures for increasing biodiversity in a particular area?

In situations where the state promotes the expansion of crop production for export, or where the production of a crop such as rice or maize is singled out as a priority in meeting urban food requirements, what strategies do people choose to minimize risks? Do these strategies affect practices that previously ensured the maintenance of biodiversity? In this context, research by Robert Netting and Priscilla Stone (1996: 53) shows that by producing both for subsistence and for the market, Kofyar farmers in Nigeria “necessarily discourage specialization and propagate agrobiodiversity under circumstances of increasing resource scarcity and higher population pressure.” They show how agrobiodiversity is valued because it reduces risk and provides a measure of insurance, it contributes to long-term resource productivity, and it allows for the optimal use of available labor. Guyer (1996) and Kandeh and Richards (1996) also provide evidence of benefits with respect to biodiversity under situations of social and economic change, including intensification of production associated with commodification and an increase in population.

Recent research in the “cotton zone” of southwest Burkina Faso, although not explicitly addressing the issue of biodiversity, supports the view that intensification of production, associated with an increase in population, leads to “soil building” (Gray and Kevane 2001). Leslie Gray and Michael Kevane also argue that soil building is linked to tenure building although, interestingly, they claim that tenurial status has little bearing on a farmer’s choice to invest in soil quality. Their evidence suggests that it is those farmers with less secure access to land who invest in the soil through such practices as manuring, crop rotation, and leaving trees in fields, to improve their tenurial rights. Research by Eve Crowley and Simon Carter (2000) draws attention to the need for very precise investigation into soil management practices that vary in time and space, and to relate changes in practice to changes in people’s access to land, labor, and capital, to the ecological specificity of their knowledge, to crop preference, and to the market. One implication of their work for the study of biodiversity and tenure concerns the need for exceptionally precise, historically informed, in-depth, field research. Questions that arise from this work and that of Gray and Kevane (2001) have to do with the complex interrelationships among intensification of production, land tenure, social differentiation, soil management, and plant genetic diversity. For example, is it women or men from poorer households, who have previously had less reliance on the market in terms of obtaining seeds, who have been the principal custodians of genetic variety? If so, to what extent have recent changes in production, in soil management regime, and in land tenure affected practices associated with ensuring the maintenance of biodiversity?

Where contract farming has been introduced, what effect does such production have for the negotiation of intrahousehold rights to land and what are the implications for plant genetic diversity? Dolan’s (2001:40) study of the production of French beans in Meru as part of a strategy promoted by the World Bank to diversify agriculture in Kenya shows how horticulture, previously a domain where women could exercise control in the production of local vegetables for household use and for sale in local markets, has been “rapidly intensified, commoditized and, in many cases, appropriated by men.” What are the implications for local biodiversity as local vegetables that were previously more widely grown are increasingly displaced by beans of genetic uniformity for export outside the country?

Land Subject to Common Property Regimes

How are rights to land subject to common property regimes managed as tenure on agricultural land becomes increasingly individualized? Are collective regulatory procedures under threat because of changes in the local or broader political economy (for example, extension of hectares for the production of crops for the market)? What types of regulatory procedures stimulate conservation of biodiversity?

McKean (2000) suggests a list of attributes or principles that are critical for the success of common property regimes. These include the right of user groups to organize without interference, distinct boundaries of the resource in question, clear and enforceable rules, a “fair” rather than “egalitarian” distribution of decision-making rights, and a devolved authority structure that permits flexibility at the most local level (McKean 2000:43-48). Critical of this “bureaucratic model of common property resource management,” Frances Cleaver (2000:365) instead proposes a “moral ecological framework” where institutions are conceived as “embodiments of social process,” negotiated through cultural meanings, symbols, and values in any particular context. Drawing on research in Zimbabwe, she argues that institutions that manage common property resources are “partial, intermittent and indeed often invisible, being located in the daily interactions of ordinary lives.” Collective action, she continues, “is as often organized around reproductive as productive activities, is frequently ad hoc, variable and not necessarily output-optimizing.” Institutions created in this way, she concludes, may be “highly robust due to their interlinkages with the social and historical milieu” (Cleaver 2000:381; also, Campbell et al. 2001).

Is land held in common gaining in significance in terms of maintaining plant genetic diversity where agricultural land is under individual control and there is increased production for the market? What are the tenurial rights, for example, of gathering, both to extensive areas held in common and the places between cultivated fields or along the sides of streams or roads? Does the significance of the in-between spaces increase as larger areas of common property, such as forests, decline? How are rights to common property, including gathering rights, differentiated, by gender, age, wealth, marital

status, or by whether someone is a “member of a community” or an “outsider”? How are such rights legitimated? How do these rights vary according to the type of resource? In what ways have they changed with a decrease of land under forest or other land held in common? What are the implications of these changes for biodiversity?

Joann McGregor’s (1995) work in Shurugwi, one of Zimbabwe’s most deforested communal areas, is useful in demonstrating the degree of precision needed in research into these questions. In examining questions of species abundance in the context of deforestation, she distinguishes among different species of fruit trees, vegetables, mushrooms, and insects. She shows how tenurial rights may vary with respect to indigenous fruit: rights to naturally regenerating trees are viewed as common property by local people even when they are located on privatized land; rights to indigenous fruit on planted trees, where labor has clearly been invested, in contrast, are seen as individual.

Under what conditions do people engage actively in building rights to common property and by so doing increase biodiversity? In this context, James Fairhead and Melissa Leach (1995, 1996a, 1996b) provide dramatic evidence from the forest-savanna transition zone of the Republic of Guinea of an increase in forest cover—“forest islands”—associated with increases in population, contradicting the narratives of “experts” from the days of colonial rule to the present.

What is the role of the state in the management of common property? If relations between a body such as a forestry commission and local people are adversarial, what forms do acts of resistance take, and do these lead to misuse of the forest and a negative impact on genetic diversity? Frank Matose’s (1994) research in Mafungautsi Forest Area, northwest Zimbabwe, identifies several means through which, in a political conflict, certain groups who had lost rights to land resisted the efforts of the forestry commission to exert control by gathering prohibited forest and nonforest products (also, see Goebel 1997; Matose, Gill, and Just 1997).

Finally, do people evoke symbols of spiritual connection to the land in struggles to define tenurial rights, and to what extent does such connection lead to practices that support biodiversity?

Individual Control, Collective Rights

What social processes sanction collective rights to gather wild plant foods from agricultural land under individual control? Are such institutions socially inclusive? How do these rights vary according to the type of resource being gathered, or whether the plant is to be used for household consumption or for the market? In what ways and under what conditions does the exercising of such rights, and production for the market as well as for consumption, support or undermine plant genetic diversity?

Such questions emerge from an insightful study of wild plant food in Northeast Thailand by Lisa Leimar Price (1997).

She examines the changing and socially intricate relationship between rights to plants and to land tenure in a matrilineal and matrilineal society where land, under women’s control, has become increasingly privatized. Her research suggests that, in this particular context, an individual’s right to harvest wild plant food is related both to local concepts of tenure (the negotiability of collective gathering rights to privately held land) and how a plant species is ranked with respect to taste, market value, and rarity (Price 1997:217). Social consensus at the community level is seen as critical: in protecting collective gathering rights on privately owned agricultural land; in restricting rights for the gathering of wild plants for the market; and, for household consumption, where a wild plant is recognized as rare.

This system is also one in which women own the agricultural land and, as gatherers, managers, and marketers of wild food plants, possess knowledge of the status of particular species and the authority to build consensus around restrictions to gathering as well as to support usufruct rights to land under private tenure. As Price (2001:19) notes, we do not know “how such species level systems of increasing protection and privatization function in contexts where women are lacking the authority over agricultural land, long term social networks, and female kinship networks.” Nor, she continues, do we know “the different valuations men versus women place on selected species and where conflict and cooperation may emerge.”

Methodological Implications

These questions give rise to the methodological challenges of untangling the intricate relationships between the political and the ecological. First, on the basis of the evidence cited, in-depth multiscale research, along the lines of Burawoy et al.’s (2000) “global ethnography,” is in many cases appropriate. Such an approach focuses on case studies but does not see the case study of the relationship between land tenure and biodiversity as isolated from the currents of global capital. Rather, it focuses on the iterative nature of the connection between the local and the global. The local is thus not conceived as existing inertly against a backdrop of global forces, but rather as constructed through this dynamic.

Many of the questions identified above draw from rich ethnographic case studies, using a combination of participant observation, personal narratives, and, at times, methods, such as focus groups, that are often associated with participatory rural appraisal. With this approach, processes through which the relationship between the political and the ecological is created may be explored and the connections between power and resistance and power and knowledge may be teased out. To make connections with the global, these methods are frequently supplemented by key interviews with government officials, as well as primary documents and archival materials. The latter are often seen as essential to trace the historical beginnings of the processes at work.

Second, it is crucial to identify and to capture in the research design the complexity of social relations that inform rights to land, labor, and its product, which, in turn, have a bearing on issues of biodiversity. In this context, purposive sampling that recognizes how social differentiation is constructed is necessary. Much of the research cited above, including that from Murang'a, shows clearly that gender and other axes of social differentiation do not just exist; they are brought into being through social and political struggle; they are negotiated. The category "gender" may be crosscut by other axes of social differentiation—such as wealth, age, and marital status—and people's experiential ecological knowledge and land use practices vary according to these political positionings. Thus, women, no more than men, are not adequate analytical categories. It is also necessary to focus not just on individuals, but to identify social units of varying degrees of formality or informality, recognizing that these frequently have to do not only with the exercise of tenurial rights but also the exercise of ecological knowledge.

Conclusion

The central objective of this paper has been to make a case for research into the relationship between land-based property rights and biodiversity, recognizing that this research field has been much neglected. The argument is built on the author's research in Murang'a District, Kenya, and through the work of others, primarily in sub-Saharan Africa. The paper focuses on the relationship between the political and the ecological at the local level, but argues that this level does not exist in isolation from the operation of global forces. On the one hand, the latter may concern international discourses of biodiversity and sustainability; on the other, it may have to do with structural adjustment programs that demand an increase in genetically uniform crops for the export market.

Conceptually, the paper engages with poststructural political ecology to explore, first, the meaning of biodiversity in the construction of local knowledge. Second, this theoretical approach is employed to demonstrate the complexity of people's rights to the land. A key question is the extent to which individual rights, differentiated by gender, class, or age, are secure under particular land use systems, and how matters of security play themselves out in the promotion of plant genetic diversity. Third, recognizing the key role women farmers play in smallholding systems in sub-Saharan Africa, the paper extends this argument about security of tenure by considering how rights to labor and the products of labor influence land use practices, including those that foster biodiversity. Finally, poststructural political ecology theorizing is used to analyze recent research in sub-Saharan Africa to generate a framework for future research that differentiates among land to which individual rights are claimed, land to which rights are held in common, and land under individual control to which collective rights are negotiated. The discussion closes with a recommendation that research in this area

employs a methodology such as global ethnography to capture the complexity of the interrelationships among the social, the political, the economic, and the ecological.

Notes

¹With respect to questions of security of tenure and long-term agricultural sustainability, I have not addressed the issue of the effect of HIV/AIDS. Early work by Tony Barnett and Piers Blaikie (1992) showed, on the basis of research in Uganda, that the widespread incidence of this disease can have a devastating effect on security of land tenure and agricultural production as well as on social fabric. Further research is undoubtedly needed into this issue, into the question of security of tenure in areas where death rates are high, into the acute loss of local ecological knowledge that may be occurring, and into the effect that this will have for the maintenance of crop genetic diversity.

References Cited

- Barnett, Tony, and Piers Blaikie
1992 *AIDS in Africa: Its Present and Future Impact*. London: Belhaven Press.
- Blaikie, Piers
1989 *Environment and Access to Resources in Africa*. Africa 59: 18-40.
- Blaikie, Piers, and Harold Brookfield
1987 *Degradation and Society*. London: Methuen.
- Braun, Bruce, and Noel Castree, eds.
1998 *Making Reality: Nature at the Millenium*. London: Routledge.
- Bryant, R.L.
1998 *Power, Knowledge and Ecology in the Third World: A Review*. *Progress in Physical Geography* 22:79-94.
- Burawoy, Michael, Joseph Blum, Sheba George, Zsusa Gille, Teresa Gowan, Lynne Haney, Maren Klawiter, Steven Lopez, Seán Ó Riain, and Millie Thayer
2000 *Global Ethnography*. Los Angeles: University of California Press.
- Campbell, B., A. Mandondo, N. Nemarundwe, B. Sithole, W. de Jong, M. Luckert, and F. Matose
2001 *Challenges to Proponents of Common Property Resource Systems: Despairing Voices from the Social Forests of Zimbabwe*. *World Development* 29:589-600.
- Carney, Judith
1996 *Converting the Wetlands, Engendering the Environment: The Intersection of Gender with Agrarian Change in Gambia*. In *Liberation Ecologies*. Richard Peet and Michael Watts, eds. Pp. 165-187. London: Routledge.
- Carney, Judith, and Michael Watts
1990 *Manufacturing Dissent: Work, Gender, and the Politics of Meaning in a Peasant Society*. Africa 60: 207-240.
- Chanock, Martin
1985 *Law, Custom and Social Order: The Colonial Experience in Malawi and Zambia*. Cambridge: Cambridge University Press.

- Cleaver, Frances
2000 Moral Ecological Rationality, Institutions and the Management of Common Property Resources. *Development and Change* 31: 361-383.
- Crowley, Eve L., and Simon E. Carter
2000 Agrarian Change and the Changing Relationships Between Toil and Soil in Maragoli, Western Kenya (1900-1994). *Human Ecology* 28:383-414.
- Crucible II Group
2000 Seeding Solutions. Volume 1. Policy Options for Genetic Resources. Ottawa: International Development Research Centre.
2001 Seeding Solutions. Volume 2. Options for National Laws Governing Control Over Genetic Resources and Biological Innovations. Ottawa: International Development Research Centre.
- Davison, Jean, ed.
1988 Agriculture, Women, and Land: The African Experience, Boulder, Colo.: Westview Press.
- Deleuze, Gilles, and Felix Guattari
1996 A Thousand Plateaus: Capitalism and Schizophrenia. London: Athlone.
- Dolan, Catherine S.
2001 The "Good Wife": Struggles Over Resources in the Kenyan Horticultural Sector. *Journal of Development Studies* 37(3):39-70.
- Elabor-Idemudia, P.
1991 The Impact of Structural Adjustment Programs On Women and Their Households in Bendel and Ogun States, Nigeria: Structural Adjustment and African Women Farmers. C.H. Gladwin, ed. Pp.128-150. Gainesville: University of Florida Press.
- Elson, Diane
1994 Micro, Meso, Macro: Gender and Economic Analysis in the Context of Policy Reform. *In* The Strategic Silence. Gender and Economic Policy. I. Bakker, ed. Pp.33-45. London: Zed Books.
- Escobar, Arturo
1996 Constructing Nature. Elements for a Poststructural Political Ecology. *In* Liberation Ecologies. Richard Peet and Michael Watts, eds. Pg. 46-68. London: Routledge.
1998 Whose Knowledge, Whose Nature? Biodiversity Conservation and the Political Ecology of Social Movements. *Journal of Political Ecology* 5:53-82.
- Evans, Alison
1989 The Implications of Economic Reform for Women in Zambia: The Case of the Economic Reform Programme, 1983-1987. Paper commissioned for the Commonwealth Expert Group on Women and Structural Adjustment. London: Commonwealth Secretariat.
- Fairhead, James, and Melissa Leach
1995 False Forest History, Complicit Social Analysis: Rethinking Some West African Environmental Narratives. *World Development* 23:1023-1035.
1996a Misreading the African Landscape: Society and Ecology in a Forest-Savanna Mosaic. Cambridge: Cambridge University Press.
1996b Enriching the Landscape: Social History and the Management of Transition Ecology in the Forest-Savanna Mosaic of the Republic of Guinea. *Africa* 66:14-36.
- Glazier, Jack
1985 Land and the Uses of Tradition among the Mbeere of Kenya. Lanham, Md.: University Press of America.
- Goebel, Allison
1997 "Then It's Clear Who Owns the Trees": Evaluating Privatization in the Social Forest in a Zimbabwean Resettlement Area. Staff Paper 97-06, Department of Rural Economy, University of Alberta, Edmonton.
- Gray, Leslie C., and Michael Kevane
2001 Evolving Tenure Rights and Agricultural Intensification in Southwestern Burkina Faso. *World Development* 29:573-587.
- Guyer, Jane
1996 Diversity at Different Levels: Farm and Community in Western Nigeria. *Africa* 66:71-89.
- Hornborg, Alf, and Mikael Kurkiala
1998 Introduction. Voices of the Land. *In* Voices of the Land. Identity and Ecology in the Margins. Alf Hornborg and Mikael Kurkiala, eds. Pp. 7-13. Lund, Sweden: Lund University Press.
- Howard-Borjas, Patricia L., with W. Cuijpers
2002 Gender Relations in Local Plant Genetic Resource Management and Conservation. *In* Encyclopedia of Life Support Systems. Oxford: UNESCO Publishing-Eolss Publishers. URL: <<http://www.eolss.net>> (June 19, 2003).
- Ingold, Tim
2000 The Perception of the Environment: Essays in Livelihood, Dwelling and Skill. London: Routledge.
- Ingold, Tim, and Tehri Kurttila
1999 Perceiving the Environment in Finnish Lapland. Manuscript, Department of Anthropology, University of Manchester, U.K.
- Kandeh, H. B. S., and Paul Richards
1996 Rural People as Conservationists: Querying Neo-Malthusian Assumptions About Biodiversity in Sierra Leone. *Africa* 66:90-103.
- Laurie, N., C. Dwyer, S. Holloway, and F. Smith
1999 Geographies of New Femininities. Harlow, U.K.: Longman.
- Leach, Melissa
1994 Rainforest Relations: Gender and Resource Use Among the Mende of Gola, Sierra Leone. Edinburgh: Edinburgh University Press.
- Leach, Melissa, and James Fairhead
1995 Ruined Settlements and New Gardens: Gender and Soil-Ripening Among Kuranko Farmers in the Forest-Savanna Transition Zone. *The IDS Bulletin* 26:24-32.
- Mackenzie, A. Fiona D.
1987 Local Organization: Confronting Contradiction in a Small-holding District of Kenya. *Cahiers de Géographie du Québec* 31(83):273-286.
1990 Gender and Land Rights in Murang'a District, Kenya. *Journal of Peasant Studies* 17:609-643.

- 1995 "A Farm is Like a Child Who Cannot Be Left Unguarded": Gender, Land and Labour in Central Province, Kenya. *The IDS Bulletin* 26:17-23.
- 1998 Land, Ecology and Resistance in Kenya, 1880-1952. Edinburgh: Edinburgh University Press.
- Matose, Frank M.
1994 Local People's Uses and Perceptions of Forest Resources: An Analysis of a State Property Regime in Zimbabwe. Master's thesis, University of Alberta, Edmonton.
- Matose, F., D. S. Gill, and L. Just
1997 Local People and Forest Resources in Zimbabwe. Staff Paper 97-01, Department of Rural Economy, University of Alberta, Edmonton.
- McGregor, Joann
1995 Gathering Produce in Zimbabwe's Communal Areas: Changing Resource Availability and Use. *Ecology of Food and Nutrition* 33:163-193.
- McKean, Margaret A.
2000 Common Property: What Is It, What Is It Good For, and What Makes It Work. *In* People and Forests. Communities, Institutions and Governance. C. C. Gibson, M. A. McKean, and E. Ostrom, eds. Pp. 27-55. Cambridge, Mass.: MIT Press.
- Meena, Ruth
1991 The Impact of Structural Adjustment Programs on Rural Women in Tanzania. *In* Structural Adjustment and African Women Farmers. C. Gladwin, ed. Pp. 169-190. Gainesville: University of Florida Press.
- Mooney, Pat R.
1996 The Parts of Life: Agricultural Biodiversity, Indigenous Knowledge, and the Role of the Third System. *Development Dialogue*. 1-2:7-183.
- Moore, Sally F.
1986 Social Facts and Fabrications: "Customary" Law on Kilimanjaro, 1880-1980. Cambridge: Cambridge University Press.
- Neumann, Roderick
1998 Imposing Wilderness: Struggles over Livelihood and Nature Preservation in Africa. Berkeley: University of California Press.
- Netting, Robert McC., and M. Priscilla Stone
1996 Agro-diversity on a Farming Frontier: Kofyar Smallholders on the Benue Plains of Central Nigeria. *Africa* 66:52-70.
- Okoth-Ogendo, H. W. O.
1978 The Political Economy of Land Law: An Essay in the Legal Organization of Underdevelopment in Kenya, 1895-1974. Ph.D. dissertation, Law School, Yale University.
1989 Some Issues of Theory in the Study of Tenure Relations in African Agriculture. *Africa* 59:6-17.
- Onimode, B.
1991 The Impact of Structural Adjustment Programs on Women in Nigeria. *In* Women and Structural Adjustment, Commonwealth Economic Papers, No. 22. Pp. 149-180. London: Economic Affairs Division, Commonwealth Secretariat.
- Opole, Monica
1993 Revalidating Women's Knowledge on Indigenous Vegetables: Implications for Policy. *In* Cultivating Knowledge: Genetic Diversity, Farmer Experimentation and Crop Research. W. De Boef, K. Wellard, and A. Bebbington, eds. Pp. 157-164. London: Intermediate Technology Publications.
- Peet, Richard, and Michael Watts, eds.
1996 Liberation Ecologies. Environment, Development, Social Movements. London: Routledge.
- Platteau, Jean-Philippe
1996 The Evolutionary Theory of Land Rights as Applied to Sub-Saharan Africa: A Critical Assessment. *Development and Change* 27:29-86.
- Posey, Darrell, and Graham Duffield
1996 Beyond Intellectual Property: Towards Traditional Resource Rights for Indigenous Peoples and Local Communities. Ottawa: International Development Research Centre.
- Price, Lisa Leimar
1997 Wild Plant Food in Agricultural Environments: A Study of Occurrence, Management, and Gathering Rights in Northeast Thailand. *Human Organization* 56:209-221.
2001 Women at the Center: "Wild" Plant Food Use, Gathering Rights and Management in Disturbed Farming Environments. Paper prepared for the Workshop on Comparing and Contrasting Different Approaches on Uncultivated Plant Foods, Harare, Zimbabwe, September 4-6.
- Redclift, Michael
1987 Sustainable Development: Exploring the Contradictions. London: Methuen.
- Rocheleau, Dianne E.
1991 Gender, Ecology, and the Science of Survival: Stories and Lessons from Kenya. *Agriculture and Human Values* 8:156-165.
1995 Gender and Biodiversity: A Feminist Political Ecology Perspective. *The IDS Bulletin* 26:9-16.
- Schroeder, Richard A.
1999 Shady Practices: Agroforestry and Gender Politics in The Gambia. Berkeley: University of California Press.
- Scott, James
1998 Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed. New Haven, Conn.: Yale University Press.
- Shipton, Parker, and Mitzi Goheen
1992 Understanding African Land-holding: Power, Wealth, and Meaning. *Africa* 62:307-325.
- Thomas-Slayter, Barbara, and Dianne Rocheleau
1995 Gender, Environment, and Development in Kenya: A Grassroots Perspective. Boulder, Colo.: Lynne Rienner.
- Verma, Ritu
2001 Gender, Land, and Livelihoods in East Africa: Through Farmers' Eyes. Ottawa: International Development Research Centre.

Wagao, Jumanne H.

1990 Adjustment Policies in Tanzania, 1981-1989: The Impact on Growth, Structure and Human Welfare. Innocenti Occasional Papers, Economic Policy Series, 9. Florence: UNICEF.

Watts, Michael

1998 Nature as Artifice and Artifact. *In* Remaking Reality. B. Braun and N. Castree, eds. Pp. 243-268. London: Routledge.

Watts, Michael, and Richard Peet

1996 Conclusion. Towards a Theory of Liberation Ecology. *In* Liberation Ecologies. Environment, Development, Social Movements. Richard Peet and Michael Watts, eds. Pp. 260-269. London: Routledge.

Worede, Melaku, and Hailu Mekbib

1993 Linking Genetic Resource Conservation to Farmers in Ethiopia. *In* Cultivating Knowledge: Genetic Diversity, Farmer Experimentation and Crop Research. W. De Boef, K. Wellard, and A. Bebbington, eds. Pp. 78-84. London: Intermediate Technology Publications.