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The Role of Communities in Closed Area Management in Ethiopia

Much of the Earth is degraded, is being degraded, or is at risk of degradation. Dry Afromontane forests in Ethiopia are one of the ecosystems affected by this phenomenon. This study focuses on assessment of community perceptions of experiences with, and benefits from, enclosure practices meant to prevent or mitigate land degradation. Communities around Biyo-Kelala and Tiya enclosure areas, in central and northern Ethiopia respectively, were used for the study. The assessment was carried out on the basis of a semi-structured questionnaire survey and focus group discussions. Results showed that an overwhelming majority of the people have a positive attitude about enclosures and feel that they have gained benefits. However, people prefer not to ensure private ownership, but favor maintaining the existing communal (village level) management system instead. This demonstrates that groups emerge to manage common property when they live close to the resource. Yet the issue of benefits and their equitable distribution among community members was found to be the basis for developing a sense of security for ownership and hence the success of enclosures. The other finding was that rehabilitation of deforested lands provides economic benefits by supplying raw material to meet the local demand for wood, reducing the pressure on the remaining forests and supplying various non-timber products. Nevertheless, it is not possible to design a national model for the management of this practice: the design of management rules is specific to a particular locality.

Keywords: *Enclosure; rehabilitation; benefit sharing; ownership; participation; Ethiopian Highlands.*

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Introduction

The term "dryland" refers to ecosystems with productivity constrained by insufficient and erratic rainfall (Swaine 1992; Lyaruu 1998) and covers arid, semi-arid and dry sub-humid areas known to be susceptible to degradation. These account for 1/3 of the earth's surface, and African drylands comprise 1/3 of the world's total drylands (UNEP 1991). The present estimated dryland area of Ethiopia is over 75 million ha (EFAP 1994; EARO 2000). However, dryland vegetation regions in the country are facing serious problems of degradation.

It can be said that land degradation remains the main threat in these areas. The pressure of growing population in these areas has forced landless farmers to cultivate soils on slopes that cannot be cultivated safely without effective soil and water conservation measures, and cannot sustain crop production at all. Particularly in the North and Central Highlands of Ethiopia, forest and woodlands used to be the only "land banks" that were changed to farmland as population grew over time (Tewolde Berhan Gebre Egziabher 1989). Indeed, there is an urgent need to design management strategies and ecologically and socially sound procedures to safeguard remaining forests and restore degraded ones. Rehabilitation measures are a requirement to restore some ecological and economic services. Hence the practice of area closure (hereafter referred to as "enclosure") was tried and found successful, with results that became apparent in a relatively short period of time.

The principal objective of the practice is to maintain economically productive and biologically diverse vegetation (Zoebisch and Masri 2002) rather than less valuable open degraded land. The practice has helped to change marginal lands to potentially productive areas, providing important vegetation assets for energy sources based on biomass, on which 78–80% of the total household energy supply of the country depends (EFAP 1994).

Enclosures are sources of wood for construction, farm implements, and non-timber forest products. They also play an important role in conserving remaining soil resources and improving soil fertility. Enclosures improve soil fertility by augmenting soil nutrients from decomposed plant remains. Enclosures also limit nutrient loss from a site by controlling runoff (vegetation acting as a physical barrier to soil erosion). This eventually improves the capability of the land to support other vegetation types, including exotic plantations, or otherwise support livestock. Nevertheless, in many cases success is obstructed by lack of clear management guidelines. The purpose of the present study is to explore approaches, as well as community perceptions and the benefits of enclosures as an alternative strategy for degraded land rehabilitation. Experiences to date including strengths, weaknesses, opportunities and threats, are also assessed.

Materials and methods

Study area

This study was conducted in 2 locations where enclosures have been put into practice, Biyo-Kelala in central Ethiopia and Tiya in northern Ethiopia. The former is located in Awash River Catchment area and the latter in

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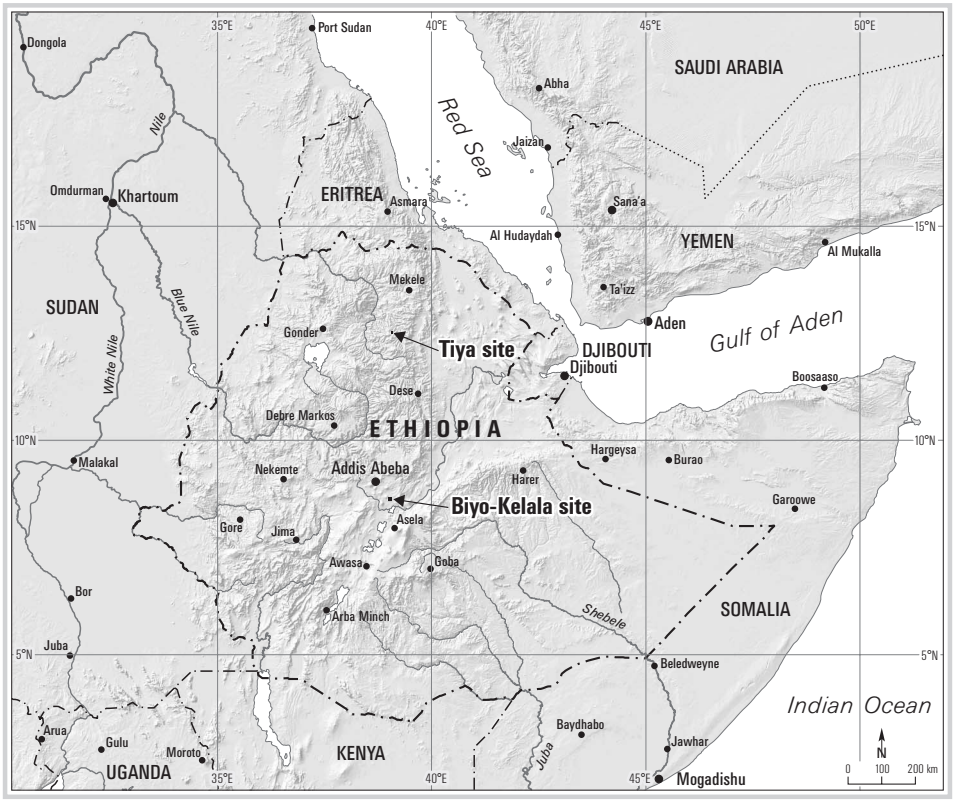


FIGURE 1 Location of the study sites. Tiya is in the Waghimra Zone and Biyo-Kelala is in the East Shewa Zone. (Map by Andreas Brodbeck)

Tekeze River Catchment area (Figure 1). Biyo-Kelala is located at about 8°35′ – 8°40′ N and 39°00′ – 39°05′ E, about 62 km east of Addis Abeba. The altitude ranges between 1880 and 1960 m. The area receives annual minimum rainfall of 604 mm and maximum rainfall of 1044 mm, with an annual average temperature of about 28°C. The vegetation in the area has been categorized as semi-arid woodland with broad-leaved species. Tiya is located at about 12°31′ – 12°32′ N and 39°03′ – 39°05′ E, and about 720 km from Addis Abeba on the way from Korem to Sekota. The altitude ranges between 2100 and 2200 m. Generally, the area has rugged topography dominated by rock outcrops with mountainous terrain and high plateaus dissected by river basins. Tiya is located in the dry *Woina-Dega* (literally, "intermediate altitude") agro-ecological zone dominated by semi-arid conditions. Annual rainfall ranges between 349 and 643 mm.

Sedentary mixed farming is the mainstay of farmers in both localities. A strong tradition of social integration is evident in both areas. Crop production is mainly rainfed. Agriculture has expanded towards steeper slopes, which are cultivated for their marginal outputs. This has accelerated soil erosion and vegetation degradation in the areas. Degraded lands remain with little vegetation cover. But areas recently abandoned for restoration by enclosure are now regenerating, demonstrating change with worthwhile benefits, such as environmental beauty and economic incentives for local communities (Figure 2).



FIGURE 2 Protection of upper catchment through enclosure (black line) in the Tiya site. (Photo by Tefera Mengistu)

Data collection

A reconnaissance survey was conducted to get an overview of the area and specify the study sites. The community role in management and utilization of enclosures, benefits gained, and experience to date were assessed

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using a questionnaire survey and focus group discussions. People's perceptions and options for improvement were the focuses of discussion. The survey of perceptions focused on decisions for demarcation, ownership rights, rights of use, and benefits gained so far in relation to the sustainability of enclosures. A semi-structured questionnaire was employed. Respondents were selected randomly from the list of community members directly involved in management of enclosures. Respondents were members of the farming community. An attempt was made to examine the issues from the viewpoint of local communities and of those who work with them. On this basis, 31 interviewees from Biyo and 32 from Tiya were selected for individual interviews.

All respondents were engaged in farming, and women accounted for 21% of the total. With respect to housing tenure, 90% were homeowners (the remaining 10% were members of a household with no separate home of their own, but no 2 respondents were from the same household). We explained our intention to conduct this survey to the respondents and then sought responses to the questions specifically developed for this study. The focus group discussions included individuals from the Ministry of Agriculture, the local administrations, local NGOs, community representatives, and older community members. In the focus group discussions, elders were given a chance to express their views, as they are in a position to compare changes resulting from the use of enclosure with previous open access.

Data analysis

Data were categorized in different strata to facilitate analysis. First, we tried to identify which variables are the best indicators for the sustainability of enclosures. Analysis of selected socioeconomic characteristics related to enclosure practices provided a basis for evaluation of the system in terms of local economy and land care. The attitudes and feelings of community members towards enclosures, site demarcation and future expansion, the role of site selection, attitudes about ownership, and the effectiveness of community by-laws (reflected in the interviews and/or focus group discussions), were used as important indicators of the sustainability of enclosures. The questions and questionnaires were coded to make them fit the statistical package. Analysis was done using Pearson's chi-square test. The percentage of individuals who responded with reference to indicators, and to prospects and constraints, was examined. Factors such as access to, and control over, resources, use of trees and non-forest products by individual farmers, decision-making power on the use of income from enclosures, and management and control of tree resources were used to assess the benefits and costs for the local community, and hence sustainability. Finally, a SWOT analysis was employed to identify the strengths, weaknesses, opportunities and threats of the practice.

Results

Biophysical comparison of enclosures and adjacent free-access lands showed that above-ground woody species composition increased by 50%, whereas soil seed banks increased by 43% after enclosure (Tefera Mengistu et al 2005). But since natural biophysical systems and economic systems are usually interrelated and affect each other, every improvement in the biophysical system provides a potential impulse for economic development (Hanušin et al 2001).

This study verified as much; most farmers interviewed (93%) felt positively about enclosures, stating that the value of the land increased after enclosures. 82% of the respondents confirmed that they had benefited from enclosures. They observed that enclosures increased land productivity, as they resulted in more grass (for thatching) and more construction material. However, thatching grass was more appreciated than other types. Most respondents (79%, n = 50) found the availability of grasses for thatching after enclosure attractive in financial terms, as local people previously had to purchase grass from other areas at considerable expense. On average, a household share of thatching grass sells for 104 Ethiopian Birr annually (1 US$ = 8 Eth Birr) in Biyo Kelala (sd = 40) and for 38 Eth Birr in Tiya (sd = 12; sd being the standard deviation from average annual income). This has helped increase annual household income.

At the same time, 46% of the respondents indicated that land cover improved appreciably and gullies disappeared. It seems that the benefits of grasses have been a significant factor in influencing farmers' opinions. If farmers are neither allowed to graze nor to cut the grasses in the future (ie, restrictions on use of the land based on banning extraction of forest products), bitter feelings and resistance to expansion of the practice could result.

Analysis of the relationship between gender and attitudes regarding the practice of enclosure shows that women accept enclosure of the land more easily than men, as it appears that women aspire to relief from the burden of collecting wood for daily household consumption. Conversely, analysis of the relationship between age and attitudes about future expansion of enclosures revealed that the young in the community, all of whom were men, were least interested in expansion. Most farmers (90%) explained that the recovery of the sites constituted a vegetation "museum," as they called it, reflecting the past in their locality.

A majority of respondents (73%) explained the benefits of enclosure in terms of a decrease in land

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degradation and an increase in income from forest products (Table 1). However, grazing areas for animals and wood for household fuel have decreased appreciably; these are the costs of the practice.

TABLE 1 Perception of benefits and disadvantages of enclosures: number of positive responses per question, with percentage.

Perception	Number of pos. responses (%)
Sufficient grass for animals	5 (7.9)
Sale of grass for thatching	50 (79.4)
Use of wood as household fuel	11 (17.5)
Income from sale of forest products	50 (79.4)
Decreased land degradation	46 (73)
Shortage of grazing land	9 (14.2)
Shortage of fuelwood	5 (7.2)

Community and government roles in management

The vast majority of community members in this study (98%) participated in on-site selection of enclosures, and 91% agreed on the selection criteria. The most important (indicated by 60% of the respondents) criterion for site selection was the extent of land degradation as evaluated by villagers and development agents, implying that the more an area is degraded, the more likely it is to be enclosed for regeneration. Some of the indicators for assessing the extent of degradation were soil depth, past history of productivity, presence or absence of rock outcrops, and sensitivity to natural hazards (erosion, landslides). Another criterion was avoiding competition with other agricultural practices. Site selection should not create competition among priorities in the local community such as crop production, grazing and settlement. Observing these criteria is necessary to keep the activity from being jeopardized at some point in the future. Given these criteria, former forestland currently degraded and being used for marginal productivity is likely to qualify for enclosure.

The next step is demarcation of a selected site. 50% of the respondents favored the combined involvement of the local community, the local administration, and the office of agriculture in demarcation. The remaining respondents were not happy with the existing combined involvement, even though they were content with the outcome. When many agents of the state are involved in decision-making concerning local resource use, local people can develop a sense of unease, fearing that the resource will be owned by the state in the future. However, most confirmed that demarcation was important, and helped to establish and enforce local by-laws. Other studies have cited local by-laws, including locally defined systems of rights, responsibilities, and benefit sharing (Satheesh and Pimbert 1999). 73% of the respondents participated in formulating by-laws, and 86% responded that by-laws were agreed to by most members.

The cut-and-carry mode of using grass is still practiced by the local community, who are entitled to rights of use. This activity may have aided natural regeneration by avoiding competition between regenerating woody plants and grasses. On-site guards to protect against illegal cutting at the Biyo-Kelala site were hired by the community and are accountable to the Peasant Association leadership. Guarding is supported by government incentives such as monthly food aid at the Tiya site. Currently, the forest at the Biyo-Kelala site is being utilized more by the local community, while the only objective of enclosure at the Tiya site seems to be land reclamation.

Most people planned to continue protecting and maintaining their enclosures in their current form (87%), but the female respondents (13%) planned to expand the practice, which has become important as a supply of fuelwood, hence relieving them of a burden. On the other hand, the idea of shifting enclosure ownership from the community to individuals is not supported by most farmers, as indicated by 81% and 97% of the respondents for Tiya and Biyo-Kelala, respectively (Table 2). Their position assumes an increase in management costs under individual ownership. For example, the cost of guarding against illegal cutting is minimal when done on behalf of the whole village, as opposed to being carried out by individuals. Moreover, differences in individual priorities regarding land use, including the need for fencing and protection of individual parcels, would also increase costs.

The sharing mechanism for benefits was negatively assessed by 22% of the male respondents. A major reason for this was the perception of communities that

TABLE 2 Local community attitudes about future ownership of enclosures.

	Tiya (n=31)		Biyo-Kelala (n=32)	
Resource tenure	Yes (%)	No (%)	Yes (%)	No (%)
Continue with community ownership	72	28	90	10
Issue shares for individuals	19	81	3	97
Keep with Ministry of Agriculture	9	91	6	94

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enclosures constituted farmlands on which land tax must be paid. Even though land is owned individually, young male community members to whom no land is distributed do not pay land tax and hence do not share in the benefits, whereas even the sick and the elderly who pay land tax can secure their entitlement to benefits from enclosures. (The data collected did not explicitly address the issue of wealth classes, so that no relation between wealth classes and perceptions was established.)

The Strengths, Weaknesses, Opportunities and Threats (SWOT) analytical framework was used to assess indicators for the sustainability of enclosures. Local communities view enclosures as an integral part of the afforestation of degraded lands that demonstrates a sacrifice of short-term benefits in favor of long-term visions and benefits (see Table 1). Existing community initiatives to promote participation and urge other parts of the country (the northern and southeastern parts) to practice enclosure represent good opportunities. Local communities have also developed a sense of ownership as they gain experience in authority over direct use, participation in decision-making, and establishing their own by-laws. Lack of a clear government role in such community-based natural resource management could be a possible threat if future revisions of management systems and identification of the role of each stakeholder are delayed.

The perceived weaknesses were the weak government role in facilitating joint management and lack of clear guidelines, which summarizes overall experience. The fact that resources from enclosures contribute to the household economy indicates that economic and social wellbeing is far better served by focusing on rehabilitation of degraded lands (Lovejoy 1985). On the other hand, the lack of a realistic view of what can be extracted as outputs from enclosures (wood products, non-timber products, conservation services for soil and biodiversity, and possible CO_2 sinks), and traditional perceptions of the ban on cutting trees under any condition, are issues that must be dealt with. Privatization of enclosures for individuals, as parcels of land representing a win–loss scenario of benefit-sharing among villagers (when one individual benefits while others are ignored), could jeopardize the practice in future.

Discussion and conclusion

Informal boundary demarcation to transfer access rights from the wider community to individual villages is an important precondition for successful rehabilitation of degraded lands (Kitalyi et al 2002). Demarcation is informal because it involves agreement and establishment of by-laws rather than fencing. Since communal village property is designated for defined user groups (*gote*, meaning small village or villages), it excludes potential beneficiaries from other villages. Private land is easily understood as belonging to a person or a family, but it must be kept in mind that corporate property (a category of classification, like "private") is considered private in the same sense that a home is considered private (Kneen 2004). Therefore, private property and the existing common property arrangement of enclosed lands have a good deal in common.

Property rights are understood to mean a social contract whereby rights are outlined and enforced by the state and the community (Melaku 2003). Ownership and use of resources are governed institutionally. The most important rights in a private property regime are the incentives derived from maximizing the return from one's property in full freedom, knowledge and confidence. Humans are also motivated by the prospect of acquisition of a resource. However, with regulated common property rights, as in the case of enclosures, the benefit to members is proportional to the input from each. Even though the individual is subject to the collective interest of the group, the group still has the right to design and choose the best management system. One experience in community property management is that of the Tiya community, where local institutions such as the *idir* (a strong religiously affiliated group) have arranged a grazing system on woodlands in the summer season. This arrangement prohibits free grazing, allowing only grazing of oxen used in plowing (as it is the critical farming season), with set rules and sanctions for members who refuse to obey.

On the other hand, individual parceling may lead to overuse and degradation, particularly on sites where productivity is low, a characteristic of enclosure areas (Bruce 1998). Although substantial arguments can be made in favor of privatization (limited depletion of resources by unregulated utilization, halting the process of degradation; avoidance of the "tragedy of the commons") (Arnold 1998), the respondents in this study did not favor private ownership of enclosures. This may be attributed to the community's long experience in managing communal lands through local arrangements (experience is specific to a locality, whereas peasant associations manage everything).

As forests are managed not only for their products but also for their services, they need to be managed in large units by communities rather than as parcels by individuals. In addition, productivity is minimal and not uniform in fragile areas, so resource users may prefer to share output from the entire area rather than a

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single parcel. Giving the right to use forest products to the nearby *gotes* makes management easier. This concords with the suggestion that groups emerge to manage common property when the user population lives close to the resource and is relatively small (Ostrom 1995).

When the management and use of enclosures is vested in a nearby village (*gote*), people from other villages who may have used the resource in the past will resist reservation of the resource for one or two villages (reflected in the focus group discussions). A frequently indicated solution for this problem is to create local enclosure patches around villages rather than allowing a win–lose scenario to develop between villages with respect to a single resource, as this could evolve into future conflict.

On the other hand, woody species were substantially richer in enclosures than in open areas, indicating the importance of enclosures for the conservation of biological diversity (Tefera Mengistu et al 2005; Zoebisch and Masri 2002). This indicates the potential of dry Afromontane forests to recover if anthropogenic disturbances are systematically reduced. Therefore, most disturbed ecosystems in Ethiopia or similar ecoregions (Zoebisch and Masri 2002) could be converted to forests or other woody vegetation with very little management effort in a system such as the enclosure system. Competition with other types of land use may constitute a threat, but this could be reduced by intensification of land use and a proper land management system. No matter how fierce the competition is, a minimum area should be set aside for enclosure, even in the future when the population is still growing.

A reforestation program based on natural processes of vegetation recovery is a potentially rapid, efficient and cost-effective method for reforesting degraded watersheds (Dalmaco 1987). If such areas are left undisturbed by indiscriminate human use, natural succession will change them to productive land, thereby reducing pressure on remaining natural forests. This represents great potential to provide products or services to support a growing human population. To avoid conversion of forestlands to other types of land use for the sake of livelihood (which is usually the case), forests and forest products must be valued properly in the market, like other agricultural products. The guiding principle for enclosures is that farmers should obtain direct benefits (Maikhuri et al 1997) and participate in decision-making, design, management, and evaluation (Maikhuri and Rao 2002), in order to avoid traditional consideration of forests and trees as less valuable, usually government resources.

It is vital to develop community management systems to manage and use enclosure areas. Enclosures can be viable systems if they have clearly defined users, clearly defined resource boundaries, and realistic rules established locally. Indeed, laws and legislation should support community management systems to avoid the "tragedy of the commons." Enclosures with locality-specific (Maikhuri and Rao 2002) and community-based co-management systems are crucial and can be regarded as alternative approaches to managing degraded lands. Management of enclosures constitutes neither denial of access nor management by exclusion of the surrounding community, but control of access and management by restriction. This can be achieved by developing locality-specific regulations on use and management responsibilities at village level. Indeed, given variations in biophysical and socioeconomic conditions, models to manage enclosures must be developed at the community rather than the national level.

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REFERENCES

Arnold J. 1998. *Managing Forests as a Common Property.* Rome, Italy: Food and Agriculture Organization.

Bruce J. 1998. *Legal Bases for the Management of Forest Resources as a Common Property.* Community Forestry Note No. 14. Rome, Italy: Food and Agriculture Organization.

Dalmaco M. 1987. *Assisted Natural Regeneration. A Strategy for Cheap, Fast and Effective Regeneration of Denuded Forestlands.* Tacloban City, Philippines: Philippines Department of Environment and Natural Resources.

EARO [Ethiopian Agricultural Research Organization]. 2000. *Dryland Forest Research Strategy.* Addis Abeba, Ethiopia: Dryland Agricultural Research Directorate and Ethiopian Agricultural Research Organization.

EFAP [Ethiopian Forestry Action Program]. 1994. *Final Report.* Addis Abeba, Ethiopia: Ministry of Natural Resources Development and Environmental Protection.

Hanušin J, Šúriová N, Šúri M. 2001. Socio-economic aspects of the integrated water management: Methods and application. *Ekológia* 20(Supplement 3):325–335.

Kitalyi A, Musili A, Suazo J, Ogutu F. 2002. *Enclosures to Protect and Conserve. For Better Livelihood of the West Pokot Community.* Technical Pamphlet No. 2. Nairobi, Kenya: Regional Land Management Unit [RELMA].

Kneen B. 2004. Redefining 'property': Private property, the commons and the public domain. *GRAIN [Genetic Resource Action International]. Seedling.* http://www.grain.org/seedling/?id=258; accessed on 12 July 2004.

Lovejoy TE. 1985. *Rehabilitation of Degraded Tropical Forest Lands.* Commission on Ecology Occasional Paper No. 5. Gland, Switzerland: International Union for Conservation of Nature and Natural Resources.

Lyaruu H. 1998. *Seed Dynamics and the Ecological Restoration of Hillslopes in Kondoa Irangi, Central Tanzania* [PhD dissertation]. Uppsala, Sweden: Uppsala University.

Maikhuri R, Rao K. 2002. Rehabilitation of degraded land. Land-use and land-cover change impacts and strategies in the Indian Himalaya Mountains. *IHDP Update. Newsletter of the International Human Dimensions Program on Global Environmental Change. No. 1/2002.* http://www.ihdp.uni-bonn.de/html/publications/update/IHDPUpdate02_01.html; accessed on 12 July 2004.

Maikhuri R, Semwal R, Rao K, Saxena K. 1997. Rehabilitation of degraded community lands for sustainable development in Himalaya: A case study in Garhwal Himalaya. *International Journal of Sustainable Development and World Ecology* 4:192–203.

Melaku B. 2003. *Forest Property Rights, the Role of the State, and Institutional Exigency: The Ethiopian Experience* [PhD dissertation]. Uppsala, Sweden: Swedish University of Agricultural Sciences.

Ostrom E. 1995. Common property regimes in the forest: Just a relic from the past. *Unasylva* 46(180):3–15.

Satheesh PV, Pimbert M. 1999. Reclaiming diversity, restoring livelihoods. *GRAIN [Genetic Resource Action International]. Seedling.* http://www.grain.org/seedling/?id=87; accessed on 12 July 2004.

Swaine M. 1992. Characteristics of dry forests in West Africa and the influence of fire. *Journal of Vegetation Science* 3:365–374.

Tefera Mengistu, Demel Teketay, Hultén H, Yemshaw Y. 2005. The role of enclosures in the recovery of woody vegetation in degraded hillsides of central and northern Ethiopia. *Journal of Arid Environments* 60:259–281.

Tewolde Berhan Gebre Egziabher. 1989. The Environmental variables which led to the ecological crisis in Ethiopia. *Coenoses* 4:61–67.

UNEP [United Nations Environmental Program]. 1991. *Studies Requested by General Assembly Resolution 44/172 on the Implementation of the Plan of Action to Combat Desertification.* Report of the Secretary General. http://www.na.unep.net/des/desfintoc.php3; accessed on 12 July 2004.

Zoebisch M, Masri Z. 2002. Natural restoration of degraded grazing lands. *Proceedings of the 17th World Congress of Soil Science, 14–20 August 2002, Bangkok, Thailand.* http://www.sfst.org/Proceedings/17WCSS_CD/Abstracts/0501.pdf; accessed on 12 July 2004.

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