WORKING PAPER

No. 38

August 2000

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Land Tenure Center

AN INSTITUTE FOR
RESEARCH AND EDUCATION
ON SOCIAL STRUCTURE,
RURAL INSTITUTIONS,
RESOURCE USE,
AND DEVELOPMENT

UNIVERSITY OF WISCONSIN —
MADISON

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All views, interpretations, recommendations, and conclusions expressed in this paper are those of the author and not necessarily those of the supporting or cooperating institutions.

NOTE: This version of the document reflects an author correction made on 23 January 2001. The information in Table 4 on page 11 has been changed. No other changes were made.

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INTRODUCTION

In 1994, the United Nations Human Development Report introduced the concept of human security, predicating it on the dual notion of safety from chronic threats of hunger, disease, and repression on the one hand and protection from sudden and hurtful disruptions in daily life on the other (UNDP 1999). Environmental insecurity became shorthand for that dimension of human insecurity induced by the combined effects of natural disasters and mismanaged environmental endowment. Such thinking helped foster the notion of "environmental refugee" to describe a new insight into an old phenomenon: large numbers of the world's least secure people seeking refuge from insecure biophysical environments.

As useful as this conceptual progression is, it can be misleading. It gives the impression that reducing environmental insecurity will avail more human security and, by extension, result in fewer environmental refugees. The error in this appealing formulation is not immediately obvious, for the wisdom of reducing soil and forest loss, of safeguarding ground and surface water supplies, and of not polluting the food chain or the earth's atmosphere seems unassailable. The error arises in another quarter. Environmental security, when defined as ever larger protected areas free of human subsistence pressures, may bolster human security for some while breaching it for those dwelling in the path of such conservation. Under certain circumstances, more environmental security can generate a category of environmental refugees little noticed by those who have popularized this term.

Africa is a region of much interest in sorting out the relationship between human and environmental security. For one thing, nearly two-thirds of Africa's population is still rural. At a time when the global community is deepening its commitment to biodiversity conservation through parks and protected areas, most of which are rural, a large proportion of Africa's population stands in the path of expanded protected areas. Moreover, Africa leads the world in traditional political refugees—defined by the UN High Commission on Refugees as "Any person who is outside the country of his (sic) nationality … because he has or had well-founded fear of persecution by reason of his race, religion, nationality, membership of a particular social group or political opinion and is unable or, because of such fear, is unwilling to avail himself of the protection of the government of the country of his nationality" (Goodwin-Gill 1983:5-6). The environmental side-effects of political refugees are often enormous (Renner 1996).

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[1] Paper prepared for symposium in honor of John Cohen entitled: "African Governance and Civil Society: Equity, Efficiency & Participation." March 10-11, 2000, Cornell University. The authors thank Mary Krtiz, Norman Uphoff, Duane Chapman, and Barbara Bedford for sharing helpful materials and comments related to this research.

Whereas research abounds on the threats caused to biodiversity and natural values by human activities in their many forms, this study concerns itself with the significant threat caused to human populations—often the most vulnerable humans—of exclusionary conservation. We begin by characterizing the human insecurity linked to increasing environmental security via protected area conservation, as a variant of environmental refugeeism. Using a combination of land use change and case study approaches, we estimate the number of Africans experiencing this phenomenon. We then place environmental refugeeism in the context of recent economic development theory and suggest why environmental refugees, as employed here, are in double jeopardy. That is, they often undergo a series of dislocations resulting from development initiatives, one form of which is protected area greenlining. We conclude with a discussion of one possible remedy for policy administrators seeking expanded conservation and a reduction in human displacement.

THE EVOLVING MEANING OF "REFUGEE"

The typology of world refugees is changing. The 1967 definition stated above is widely disputed, the line between refugee and displaced persons is blurring, and "refugee" is expanding to include economic and humanitarian asylum-seekers. Those favoring a more inclusive definition assert that refugee homelessness can be long or short-term; displacement can result from direct or indirect violence; and asylum may or may not cross an international boundary. Increasingly, a "refugee" is simply coming to mean "someone compelled to leave home" (Zolberg, Suhrke, and Aguayo 1989).

In 1985 the UN Environmental Program formally recognized that a broad range of environmental disasters can generate refugees (Westing 1992). Such refugees are the victims of long-term mismanagement of nature by humans (soil erosion, greenhouse gases, toxification of air, water, soil or food chain, deforestation and desertification), of massive public works intended to control nature (dams, highways, power plants, urban renewal), or of unforeseen "acts of God." The environmental refugee reality has intensified interest in the interactions between environmental and human security in diverse world settings (Kreimer and Munasinghe 1991, Gadgil and Guha 1995, Leiderman 1995).

As refugee categories multiply, refugee numbers have tended to climb. According to the strict 1967 UNHCR definition, a mere 13.5 million people were refugees in 1998 (World Almanac 1999). This is up from most refugee estimates at mid-century but down from UNHCR counts earlier in that decade. A more inclusive definition embracing environmental refugees tells quite another story. Hinawi (1985), Jacobson (1988), Suhrke (1992), Myers (1993) and Hugo (1995) all suggest that environmental disasters are dislocating people well in excess of UNHCR refugee counts. A report completed late in 1998 (a particularly disaster-prone year) by the Worldwatch Institute and the insurance industry found that 300 million people had been displaced from their homes that year, or more than the combined populations of Canada and the United States (Trenberth 1999). Sea-level changes and coastal evacuations following future climate change may dwarf these numbers (Clark 1991, Birdsall 1992).

Our intention is to describe a category of environmental refugee omitted in the above inventory of storms, floods, droughts, fires and El-Niño effects. These "other environmental refugees" (OERs) are the victims of what Albert (1994:46) has termed "ecological

expropriation." They are people displaced by the creation of national parks and protected areas without mitigation (Geisler 2000a). As with people displaced by natural or unnatural disasters, civil wars, and ethnic cleansings, these refugees are forcibly removed from their homelands, often without notice or consultation. Environmentally sophisticated land reform, we shall see, is an under-appreciated mitigation strategy.

ESTIMATING ACTUAL OER NUMBERS

Unlike traditional refugees who cross national boundaries and gather in rehabilitation centers and camps, OERs have few logical gathering points and are difficult to enumerate. They diffuse into subsistence landscapes, migrate to the informal sector of cities and villages, and dissolve into wage labor ranks of agribusiness, mines, and ecotourism ventures, if they find work at all. Often their plights are unpublicized by the same government and nongovernmental agencies which contribute to their creation. Nor do OERs typically plead for restitution. Their land titles are fragile at best; their legal resources are minimal; they are often ethnically disadvantaged. In the case of Africa, they may already be political refugees with precarious standing and substantial resource requirements (fuelwood, potable water, basic nutrition). Renner (1996) shows in both Asia and Africa how the line blurs between traditional and environmental refugees; many of the world's desperately poor have multiple refugee statuses.

Despite these obstacles, there are several ways in which OERs can be estimated. One is indirect, based on land conversion trends. It depends heavily on the public land base set aside for exclusive conservation, though it tends to overlook the growing number of private protected areas being established worldwide (e.g., Langholtz, et al. 2000). A second approach extrapolates to regions or continents from single-country estimation models of conservation opportunity costs. A final technique is through case studies of human displacement from protected areas; while more direct, it necessarily offers an incomplete picture of OER counts for entire regions. All three methods are, at best, gross approximations of the OER phenomenon.

The results of the indirect, area-based technique appear in table 1. Early in this century, national parks were still an oddity in most countries and few in number. By 1997, parks and protected areas accounted for 841 million hectares in IUCN categories I-V, and another 414 million hectares were internationally recognized and semi-protected as IUCN VI-VIII lands (see appendix for description of IUCN categories).[2] More and more governments are taking stock of their remaining wilderness and semi-wilderness zones and are assigning them protected status of one kind or another. The 1997 total is twice that of 1985, suggesting that a significant base is undergoing significant growth, at least on paper.

[2] Recent work by Brandon, Redford, and Sanderson (1998:4-5) states that over 13,000 sites protect about 8.9 percent of the earth's surface if all eight IUCN categories are included (the least restrictive being Biosphere Reserves, World Heritage Sites & International Wetlands) and marines sites are included. This "protection" is misleading, they note, since true protection (management primarily for biodiversity conservation) is problematic for all but a few sites.

Table 1: Global protection of natural areas, 1985 and 1997

Region	Number	1985 area (1000ha)	% of land	Number	1997 Area (1000ha)	% of Land
Africa	443	88,662	3.0	746	154,043	5.2
Asia	790	52,414	2.0	1,733	162,877	5.3
Central America & Caribbean	——	——	——	414	14,793	5.6
South America	——	——	——	810	129,014	7.4
United States & Canada	329	87,895	——	2,333	214,714	11.7
Europe	704	17,239	3.6	2,943	14,141	——
USSR/Russia	141	15,111	0.7	210	51,670	3.1
Oceania	739	38,232	4.5	1,212	60,382	7.1
World	3,613	423,774	3.2	10,401	841,041	6.4

Sources: WRI/UNEP/UNDP (1986,1998)

Africa's protected areas grew from 443 (88,662,000 hectares, or 3 percent of the continent's land mass) in 1985 to 746 in 1997 (154,043,000 hectares or 5.2 percent). Even if a more restrictive definition of "protected area" is employed (IUCN categories I-III), the geographical implications remain considerable (300 protected areas or 90,091,000 hectares).[3] Virtually all African countries have increased their protected land base since 1985,[4] and seven have designated over 10 percent of their land area to protected area status (table 2). Twenty-two exceed the average for protected area as a percentage of total African land area; 11 of these show intermediate population densities (over 40 people per 100 hectares). Among these, Burundi and Rwanda both report over 200 persons per 100 hectares and are Africa's most densely populated countries after Mauritius. In 14 countries, the land designated as protected exceeds the land designated as cropland.

If, as suggested by Boserup (1981), "sparse" settlement of a square kilometer (100ha) ranges from 1-16 persons, then the OER population for Africa ranges from 1.5 to 24.5 million people using IUCN categories I-V. The more restrictive categories (I-III) yield an estimate of 900,000 to 14.4 million OERs. These estimates are disquieting not only in their magnitude but also in the fact that most of the displacement in question seems to have occurred in the last three decades.

[3] IUCN Categories I-III are the most restrictive/protective and therefore the most likely to exclude humans for other than scientific or touristic purposes.

[4] This information is not presented in table 2 but is available from the authors.

Table 2. African protected areas, land and population in context

Countries	Land area (10^3ha)	Population (1998)	Pop. density (per 10^3ha)	All protected areas (IUCV Categories I-V)			Cropland 1992-94
				Number	Area (10^3ha)	% land area	
World	13,048,300	5,929,839	442	10,401	841,041	6.40	1,465,814
Africa	2,963,468	778,484	249	746	154,043	5.20	189,803
Algeria	238,174	30,175	121	18	5,891	2.50	8,088
Angola	124,670	11,967	90	12	8,181	6.60	3,500
Benin	11,062	5,881	503	2	778	7.00	1,880
Botswana	56,673	1,551	26	8	10,497	18.5	420
Burkina Faso	27,360	11,402	394	12	2,855	10.40	3465
Burundi	2,568	6,589	423	9	144	5.60	1,120
Cameroon	46,540	14,323	291	16	2,097	4.50	7,040
Central African Rep	62,298	3,489	54	13	5,110	8.20	2,020
Chad	125,920	6,892	52	9	11,494	9.10	3,256
Congo, Dem. Rep	34,150	49,208	78	11	10,191	4.50	0.170
Congo, Rep	226,705	2,822	206	9	1,545	4.50	7,900
Cote d'Ivoire	31,800	14,567	441	11	1,986	6.20	4,031
Egypt	99,545	65,675	636	12	793	0.80	3,137
Equatorial Guinea	2,805	430	146	N/A	N/A	N/A	230
Eritrea	10.000	3,548	328	3	501	5.00	366
Ethiopia	100,000	62,111	582	20	5,518	5.50	12,197
Gabon	25,767	1,170	43	5	723	2.80	460
Gambia, The	1,000	1,194	1,141	4	22	2.20	165
Ghana	22,754	18,857	784	9	1,104	4.80	4,407
Guinea	24,572	7,673	306	3	164	0.70	787
Guinea-Bissau	2,812	1.134	388	N/A	N/A	N/A	340
Kenya	56,914	29,020	488	36	3,504	6.2	4,520
Lesotho	3,035	2,184	685	1	7	0.20	320
Liberia	9,632	2,748	233	1	129	1.30	371
Libya	175,954	5,980	32	6	173	0.10	2,170
Madagascar	58,154	16,348	264	36	1,119	1.90	3,105
Malawi	9,408	10,377	1,046	9	1,059	11.30	1,700
Mali	122,019	11,832	91	13	4,532	3.70	2,569
Mauritania	102,522	2,453	23	4	1,746	1.70	208
Mauritius	203	1,154	5,562	3	12	6.00	106
Morocco	44,630	28,012	605	7	316	0.70	9,686
Mozambique	78,409	18,691	227	11	4,779	6.10	3,180
Namibia	82,329	1,653	19	16	10,616	12.90	704

Countries	Land area (10^3ha)	Population (1998)	Pop. density (per 10^3ha)	All protected areas (IUCV Categories I-V)			Cropland 1992-94
				Number	Area (10^3ha)	% land area	
Niger	126,670	10,119	75	6	9,694	7.70	4,035
Nigeria	91,077	121,773	1,263	20	3,020	3.30	32,579
Rwanda	2,467	6,528	2,188	5	362	14.70	1,150
Senegal	19,253	9,001	443	9	2,180	11.30	2,355
Sierra Leone	7,162	4,577	600	2	82	1.10	540
Somalia	62,734	10,653	157	1	180	0.30	1,026
South Africa	122,104	44,295	347	232	6,578	5.40	15,200
Sudan	237,600	28,526	115	11	8,642	3.60	12,975
Swaziland	1,720	931	512	2	35	2.00	191
Tanzania	88,359	32,189	349	30	13,816	15.60	3,660
Togo	5,439	4,434	772	8	428	7.90	2,420
Tunisia	15,536	9,497	589	6	44	0.30	4,882
Uganda	19,965	21,318	1,015	32	1,910	9.60	6,780
Zambia	74,339	8,690	111	21	6,364	8.60	5,273
Zimbabwe	38.685	11,924	296	25	3,068	7.9	2,876

Source: WRI/UNDP/UNEP (1998: 244, 286, 298)

The second estimation procedure builds on intensive analysis performed in Kenya, a country with 3.5 million hectares in IUCN categories I-V (or 6.2 of its land base in 1997). Roughly a decade ago researchers calculated the opportunity costs of biodiversity conservation in that country (Norton-Griffiths and Southey 1995). They tried to determine the net benefits from converting lands set aside for parks and reserves to agriculture and livestock production. The research generated dollar estimates of $99 million in net returns (about 1.4 percent of Kenya's 1989 GDP), using a conservation land base of 41,420 km^2. Human population for this area was estimated to be 2.1 million rural inhabitants, based on adjusted 1979 census data using a conservative per annum growth rate of l.035 percent.

This Kenyan estimate yields a human density of 50.7 people per square kilometer. If the social and ecological carrying capacity of Kenya is typical of Africa as a whole, there would be 78 million OERs for the continent, using the same protected area land base employed in the first approach. Using the more restrictive categories (I-III), the OER extrapolation to all of Africa falls to 45.7 million. Because table 2 suggests, however, that in 1996 Kenya's population density was nearly twice that of Africa as a whole, it is prudent to reduce both these estimates by half: 39.5 million OERs for the more inclusive IUCN classification and 22.9 million for its more restrictive counterpart. These estimates exceed those of the first approach; they suggest what Africa's "protected" land might support if resettled by Africans and opened to multiple economic uses.

Case studies offer a third and somewhat different approach to OER estimation. Researchers for at least four decades have made counts of OERs evicted from specific Africa's parks. Their

findings are summarized in table 3 and make the broad-brush estimates reported above more concrete. These estimates do not use consistent definitions of OERs, yet in the aggregate they suggest that the social-cultural impact of large-scale, long-lasting conservation may have devastated hundreds of thousands of African lives. These estimates would rise if partial refugees were added to the tally, that is, those people living outside of protected areas but depending on them for basic resources. Offsetting this "partial eviction" is the fact that, in many protected areas, evicted park inhabitants reenter protected domains illegally and are thereby not "fully evicted" from protected habitats.

Table 3: OER case studies in selected African countries

Country	Park name	Area[1] (ha)	OER	Reference
Botswana	Central Kalahari GR	5,180,000	39,000	Kelso 1993 Colchester 1994
Cameroon	Korup NP	125,900	1,000	Colchester 1994
Kenya	Amboseli NP	39,206	6,000	Western 1982
Madagascar	Mananara Biosphere Project	23,000	35,000	Ghimire 1994
Malawi	Royal Chitwan NP	N/A	100,000[a]	Colchester,1994
South-Africa	Kruger Park Tsitsikama Forest	1,948,528 N/A	250,000 2,000	Carruthers 1993-95 Ellis 1994 Platzky & Walker 1985
Tanzania	Serengeti NP Selous GR Mibulu GR	1,476,300 5,000,000 N/A	16,200 40,000 10,000	Arhem 1986, Yeager and Miller 1986, Kjekshus 1977, Neumann, l998
Togo	Lion's Denn NP Keran NP	1,650 163,640	6,000	Lowry Alma,1994
Uganda	Kibale Forest Reserve and Game Corridor	33,915	30,000	Colchester 1994
Zimbabwe	Nyanga NP	33,000	200	Ranger 1989 Moore 1994

NP=National Park; GR=Game Reserve
[a]These families are allowed to use the park area for 15 days a year to collect honey
[1]Source: Protected Areas of the World-Afrotropical Volume 3. The World Conservation Union, Gland Switzerland.

The following capsules summarize selected OER cases from table 3:

Uganda. National park privations were detailed with disturbing intensity by Turnbull in 1972 and again by Calhoun in 1991. The former's research among the Ik of Kidepo National Park was among the earliest OER studies. More recently, mass expulsions of forest dwellers and peasant settlers in Uganda resulted from a wildlife corridor between Kibale Forest Reserve and Queen Elizabeth National Park. Some 30,000 people were expelled from the corridor without warning, "leading to serious human rights violations, mass impoverishment, burning, looting, the

killing of livestock, and deaths of indigenous people" (Feeney 1993, cited in Colchester 1994:14).

Botswana. The Central Kalahari Game Reserve is one of six cases in Botswana that have generated significant OER numbers. Most are Bushmen from the Central Kalahari, the victims of tribal warfare in which an opposing tribe gained political power and marginalized their Bushmen enemies. More recently, when game-ranching reserves began to prosper, those in power protected more land and evicted nearly 40,000 Bushmen yet again—a people uniquely adapted to the forbidding environment in question. Such behavior may have occurred in the absence of protected areas, but their establishment offered a "legitimate" excuse for draconian intertribal punishment.

Cameroon. Even case studies are at times vague about the real human costs and counts related to eviction. Cameroon's Korup National Park, residence in which has been illegal since 1981, is a resource base to many villages beyond the technical park boundaries. Some conservationists argue that even the park's buffer zone is also off-limits to habitation (Colchester 1994), and there are an unknown number of area residents who have voluntarily relocated out of the immediate region, making OER counts uncertain though by no means a fiction.

Madagascar. International donors (World Bank, USAID, WWF) joined forces to establish the Biosphere Project in 1990. The displacement of 35,000 local residents is conveyed in Ghimire's (1994) evaluation report of that zone. Other national parks, such as Ranomafama, have dislocated smaller numbers and partially mitigated the impacts with a variety of projects in the multiple-use buffer zones circling the park.

South Africa. Eviction from South African protected areas is at least a century old and complicated by racial policies which aggressively used conservation to gain international acceptance. According to Carruthers (1995), since the 1890s whites curtailed the basic rights of Africans in areas of high biodiversity or outright expelled them. The Homelands (bantustans) to which the latter were confined under apartheid were themselves reduced in size for conservation ends. Letsoalo (1994) gives examples of these set-asides: 70,000ha in KwaZulu and a minimum of 55,000ha in Bobhuthatswana. Of the 178 national parks and game reserves in South Africa, Kruger is the largest (almost 2 million hectares, or larger than Israel). It was initially depopulated during the Boer War. Rather that allow the return of African refugees following hostilities, the Boers created a vast park and removed remaining villagers from Kruger and other newly designated protected areas (partly motivated by labor shortages in mines and urban centers elsewhere in the country (Carruthers 1989, 1994, 1995)). As happened in other African countries, Kruger's managers used the Yellowstone model to justify complete exclusion of local inhabitants, converting the entire park to a fenced "exclosure."

Tanzania. Over a quarter of Tanzania's land is protected in some fashion, with almost 14 percent in national parks as of the early 1990s. Tanzania is generally ranked among the 10 poorest countries in the world, where approximately 80 percent of the agricultural production is conducted by peasant households. It represents both direct and indirect eviction processes. Today, Maasailand is filled with national parks—the Serengeti, Manyara, Tarangire, Arusha, and Kilimanjaro—and the vast Ngorongoro Conservation Area which has gone from multiple use status to ever-stricter prohibitions on cultivation and grazing. "To sum up," writes Arhem (1986:250), "for the Ngorongoro Maasai, twenty years of conservation rule has brought falling living standards and increasing poverty. For the majority of pastoralists [1,200 Maasai], food and

health standards have declined." Compensation promised for leaving national parks zones has not materialized and survival in conservation areas is less and less viable due to incremental use restrictions. Neumann (1998) sites studies documenting over 55,000 persons removed from protected areas, notes that another 5,000 pastoralists were forced out of the Umba-Mkomazi Game Reserve after refusing to obey a government eviction order in l988, and offers an in-depth case study of lost rights of use and access by Mount Meru villagers over the past century.

Togo. Mimicking Kenya and Tanzania, Togo converted its two parks listed in table 3 in the 1980s to unpeopled places to capture growing ecotourism revenues. Both conversions came as surprises to local communities and were imposed from above by the national government. Residents were given one week to vacate villages in the parks and were forcibly removed thereafter. In the 1990s, when democratic rule came to Togo, OERs violently confronted park managers for restitution and resettlement.

Zimbabwe. Much admired for its progressive conservation experiments, Zimbabwe has a parallel history of national park evictions. Ranger (1989) offers a rich history of vacillating policies toward native inhabitants of Matobo (or Matopos) National Park, the 2,000 inhabitants of which, before being evicted in the middle of the 20th century, were driven off other lands various times under a variety of justifications.

The exact number of African OERs will perhaps never be known, but the estimation procedures presented here suggest that their magnitude is not trivial. The OERs represented in table 3 exceed half a million people for a handful of protected areas in 10 out of 48 African counties. The area-based approach used first yields a range of 900,000 to l4,000,000 OERs (IUCN I-III) or of 1.5 to 24.5 million OERs (IUCN I-V), depending on density assumptions. The second approach extrapolates from the Kenyan opportunity cost analysis and leads to still larger estimates: 23 to 44.5 million OERs. The OER estimates from the case studies, though far from inclusive, place the phenomenon in more precise social and historical context and reduce the hypothetical quality accompanying the former approaches. None of the estimates account for assorted forms of indirect OER growth, the most important being those Africans who reside outside the protected areas in question but blocked from access related to a broad range of natural resources basic to their livelihood.

OERS IN DEVELOPMENT THEORY CONTEXT

Some might view the OER estimates presented here with skepticism because refugees could be construed not just as people experiencing involuntary relocation but as people without resources to self-relocate out of harm's way. Table 4 focuses on the inverse relationship between human security and environmental security, a subject posed at the outset of the paper. It ranks all African countries by the developing country poverty index used by the United Nations Development Program[5] and then re-ranks them by the percent of protected area in IUCN categories I-V from table 2. It underscores that the poorest countries consistently have the highest land percentages in protected status (Pearson rank-order correlation of .85).

[5] This index concentrates on deprivation in three dimensions of human life: longevity, knowledge, and a decent standard of living. For details, see UNDP (1999:163).

The social impacts of biological greenlining are both positive and negative, depending on which side of the line one stands. Perhaps the fundamental tragedy illuminated in the present analysis is that many OERs have already moved, prior to the onset of large-scale conservation initiatives, due to development project failures as well as successes. According to the development paradigm popular in the 20th century, poorer nations follow in the footsteps of wealthier ones by industrializing and, thereafter, exporting goods and services which spawn leading sectors and allow the country's economy to "modernize" (Neumann 1998; McMichael 2000). According to this widely accepted model, industrialization requires initial subsidies which can take several forms—foreign assistance and loans from abroad and intersectoral transfers from within. The latter routinely include the movement of agricultural surpluses at a low prices to areas of urban-industrial concentration, thus holding down the cost of urban labor by lowering food costs. Rising labor costs, from this perspective, siphon off earnings that are ideally reinvested in capital equipment expansion.

Several things about this paradigm are relevant to OER growth. First, contrary to the model's early reckoning, development of the kind just described has changed societies in a variety of ways but alleviated neither poverty nor inequality. According the World Bank (1999), the number of world inhabitants living on $1/day or less (the "desperately poor") is steadily increasing; according to UN Development Program (1999), the income gap between the richest and poorest fifth has more than doubled over the past 3 decades. The Bank's monitoring of global poverty yields other sobering results: more than 80 countries have per capita incomes lower than what they were a decade or more ago and 55 are experiencing falling per capita incomes. The World Health Organization (1996) reports that 3 billion people (half the earth's current population) are malnourished. Dreams of sustainable development are giving way to realities of sustained underdevelopment.

Just as significant, poor countries (both capitalist and socialist) have universally sought to intensify and commercialize agriculture to achieve the theorized intersectoral shift. "Success" typically is accompanied by larger production units and concentration of farming assets. The side effects of such actions on smaller producers are summarized by Meliczek (1997:4):

> Because of the need for immediate economic gains, many countries favoured the establishment of large scale farming enterprises which produce monocrop export crops and neglected the sector of small farmers whose situation deteriorated, leading to increased poverty, indebtedness and growing landlessness.

Africa's smallfarmers have, more often than not, been losers rather than winners as the development paradigm played out. As Simon Kuznets (1965) predicted early on and later World Bank findings confirm (Lele and Stone 1989), per capita supply of agricultural land in the underdeveloped world has plummeted, forcing an outmigration of small holders. Some find urban employment in the formal and informal sectors, others go abroad to save and remit what they can. Still others find their way to export zones and maquiladora-type enclaves, or remain on the land as wage laborers for the agribusinesses that replaced them.

Table 4: Relationship between poverty and percent of land in IUCN Protected Area Status (I-V)

Rank	Countries	Percent Protected Land	Rank	Countries	1999 UNDP Poverty Index
1	Botswana	18.50	1	Niger	65.50
2	Tanzania	15.60	2	Burkina Faso	59.30
3	Namibia	12.90	3	Sierra Leone	57.70
4	Malawi	11.30	4	Ethiopia	55.80
4	Senegal	11.30	5	Central Africa Rep.	53.60
6	Burkina Faso	10.40	6	Mali	52.80
7	Uganda	9.60	7	Chad	52.10
8	Chad	9.10	8	Benin	50.90
9	Zambia	8.60	9	Guinea	50.50
10	Central Africa Rep	8.20	10	Gambia, The	49.90
11	Togo	7.90	11	Senegal	49.60
11	Zimbabwe	7.90	12	Mozambique	49.50
13	Niger	7.70	13	Mauritania	47.50
14	Benin	7.00	14	Cote d'Ivoire	46.80
15	Cote d'Ivoire	6.20	15	Burundi	46.10
15	Kenya	6.20	16	Malawi	42.20
17	Mozambique	6.10	17	Uganda	40.60
18	Mauritius	6.00	18	Morocco	39.20
19	Burundi	5.60	19	Togo	38.40
20	Ethiopia	5.50	19	Zambia	38.40
21	South Africa	5.40	21	Nigeria	38.20
22	Ghana	4.80	22	Cameroon	38.10
23	Cameroon	4.50	23	Sudan	36.80
23	Congo, Rep.	4.50	24	Ghana	36.20
25	Mali	3.70	25	Egypt	33.00
26	Sudan	3.60	26	Congo, Rep.	32.30
27	Nigeria	3.30	27	Tanzania	29.80
28	Algeria	2.50	28	Zimbabwe	29.20
29	Gambia, The	2.20	29	Algeria	28.80
30	Swaziland	2.00	30	Kenya	28.20
31	Mauritania	1.70	31	Swaziland	27.60
32	Sierra Leone	1.10	32	Botswana	27.50
33	Egypt	0.80	33	Namibia	25.00
34	Guinea	0.70	34	Tunisia	23.10
34	Morocco	0.70	35	Lesotho	23.00
36	Tunisia	0.30	36	South Africa	19.10
37	Lesotho	0.20	37	Libya	16.40
38	Libya	0.10	38	Mauritius	12.10
39	Angola	6.60	39	Angola	n.a
40	Congo, Dem. Rep	4.50	40	Congo, Dem. Rep	n.a
41	Equatorial Guinea	n.a	41	Equatorial Guinea	n.a
42	Eritrea	5.00	42	Eritrea	n.a
43	Gabon	2.80	43	Gabon	n.a
44	Guinea-Bissau	n.a	44	Guinea-Bissau	51.8
45	Liberia	1.30	45	Liberia	n.a
46	Madagascar	1.90	46	Madagascar	n.a
46	Rwanda	14.70	47	Rwanda	n.a
48	Somalia	0.30	48	Somalia	n.a

Sources: UNDP (1999:147-50), WRI/UNDP/UNEP (1988:244, 286, 289). n.a.=not available, excluded from ranking and Pearson correlation calculations.

This rather standard overview of migration and survival strategies by smallfarmers overlooks another destination option for disenfranchised farmers in Africa and elsewhere: biodiversity frontiers in their own or neighboring countries. Large numbers of landless peasants have escaped their restructured agriculture by moving into zones simultaneously valued for genetic richness, ecosystem properties, and tourism potential. As these refuges for resource-poor people become conservation refuges for more affluent populations, national and international, they became OER incubators. As conservation gathers momentum to protect these zones, human security and environmental security collide.[6]

CONCLUSION: LAND REFORM REFORMULATED

The above theorizing suggests that if the agricultural and environmental administration are not coordinated, more OERs are virtually inevitable. Given the unlikely event that protected area growth will cease or that visions of exclusionary protection will end, one must ask what tools are at hand to reduce OER occurrences in Africa. One option is environmentally sophisticated land reform, that is, land reform that puts environmental values on an equal footing with equity and efficiency (Geisler 2000b). If this is done, the likelihood of buy-ins by conservation interests increases considerably, and environmental and human security can be realigned.

There are numerous ways in which land reform can be adapted to conservation agendas, despite the environmental mismanagement of numerous resettlement programs in the past. It helps to recall that land reform is not a single template. It has been made-over many times to suit diverse and evolving historical circumstances. Even more relevant, comprehensive land reform—otherwise referred to as agrarian reform—is predisposed to holistic approaches to social and environmental landscapes. Conceptually at least, agrarian reform has little aversion to balancing the needs of human and biological communities, even as it struggles to overcome institutional inertia, ideological opposition to state intervention in an era of privatization, and indifference to land reform in the absence of Cold War politics.

Land reform in the name of conservation is not new. Some land reforms have embraced soil conservation and reforestation as necessary to long-term productivity gains (e.g., the former Soviet Union). In the 1980s, Brazil's land reform agency assumed leadership of that country's expanding extractive reserve system, a model of extensive land reform intended to conserve biodiversity within a tropical environment. In the 1990s, South Africa's new land reform law devoted a lengthy chapter to natural resource management and conservation. Zimbabwe distinguishes between old and new residents of parks, granting the former "permits of residence" and moving the latter onto ranch land with title security. If one follows the environmental guidelines for resettlement generated by the UN's Food and Agriculture Organization (FAO, 1988) or enlists nontraditional definitions of land reform—for example Australia's Land Care model, or the ever-greener farm bills emerging in North America—then the opportunities for ecologically-coordinated agrarian reform appear to be many.

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[6] For a more elaborate versions and variations of this view of the social consequences of development theory, see Lele and Stone (1989), Peluso (1993), and Black (1998).

There are further reasons for believing that agrarian reform can complement environmental management and mitigate OER effects. First, communities are more apt to conform to conservation regimes that confer and secure property rights for community residents (Findley 1988, Lynch and Alcorn 1994). For example, tenure security is usually pivotal to affortestation; conversely, title insecurity is often a prescription for deforestation via "land improvement" (Dotzauer 1993).[7] Second, agrarian reform typically implies a shift from larger to smaller farm units, and thus to greater reliance on annuals and perennials in place of grazing and other extensive farming systems. Smaller units are more labor-absorbing (functional in capital-poor, labor-abundant conditions) as well as labor efficient (World Bank 1975, Binswager and Deininger 1993). Such farms also compare favorably with larger farmers in terms of genetic diversity (Wilken 1987, Thurston et al. 1994). Finally, social equality is a goal of land reform/agrarian reform, and some research suggests that equity correlates with lower human fertility (National Academy of Sciences 1986).

There would seem, then, to be ample room for a social-environmental alliance in favor of reformulated agrarian reform that counteracts the OER predicament. Such reform not only offers institutionalized mitigation for those displaced by conservation but also offers hope for *in situ* conservation and sustainability in resettlement areas. Were this routinized, OER recidivism to protected areas would slacken, and land reform would receive the attention it deserves from human rights and environmental justice advocates. Such reform has been used, with varying degrees of success, to relieve the human hardships of protected area development in both Africa (Cook 1994) and Latin America (Geisler 2000b). Moreover, at a macro level, agrarian reform is an arena in which agricultural and ecological policy administrators can and should engage; an example is the current collaboration between FAO and African governments to produce updated soil and land cover maps for both conservation and production purposes.

The family of interests surrounding protected area policy—especially their social dimensions—is today in turmoil. Many who were partial to integrated conservation and sustainable development programming in the 1980s and 1990s are now in revolt. What was politically correct then is giving way to environmental correctness, and conservation is taking a conservative turn in Africa. Yet making protected areas more restrictive begs the question that forged the family of interests two decades ago: what is to be done with communities that reside therein and are destined to be OER spawning grounds if a new alliance is not found? The present paper responds to this question by tallying African lands subject to protected area growth and offering case studies that illuminate the social consequences of this growth. It argues that closing these lands entirely to human habitation is untenable, unless new and viable alternatives are offered. One mitigation strategy, ecologically-coordinated agrarian reform, is ventured as a way of reinvigorating the social and environmental balance and reducing a looming yet little known refugee problem.

[7] In Latin America, Africa, and Asia, industry and the wealthier sectors of society are the most frequent beneficiaries of practices that lead to forest degradation, while local inhabitants bear most of the costs of that resource degradation (Dorner and Thiesenhusen 1992).

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APPENDIX: IUCN PROTECTED AREAS CATEGORIES*

Category I **Strict Natural Reserve/Wilderness Area: protected areas managed mainly for science or wilderness protection**

Category Ia **Strict Natural Reserve: protected area managed mainly for science**

Definition *Area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.*

Category Ib **Wilderness Area: protected area managed mainly for wilderness protection**

Definition *Large area of unmodified or slightly modified land and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as reserve its natural condition.*

Category II **National Park: protected area managed mainly for ecosystem protection and recreation**

Definition *Natural area of land and /or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations; (b) exclude exploitation or occupation inimical to the purposes of designation of the areas; and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.*

Category III **Natural Monument: protected area managed mainly for conservation of specific natural features**

Definition *Area containing one, or more, specific natural or natural/cultural features which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.*

Category IV **Habitat/Species Management Area: protected area managed mainly for conservation through management intervention**

Definition *Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.*

Category V **Protected Landscape/Seascape: protected areas managed mainly for landscape/seascape conservation and recreation**

Definition *Area of land, which coast and sea as appropriate, where the interaction of people and nature over time had produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area*

Category VI **Managed Resource Protected Area: protected area managed mainly for sustainable use of natural ecosystems**

Definition *Area containing predominantly unmodified natural systems, managed to ensure long-term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs*

** A protected area is defined in the new **Guidelines for Protected Area Management Categories** as: An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural associated cultural resources, and managed through legal or other means.*

Source: IUCN, 1985