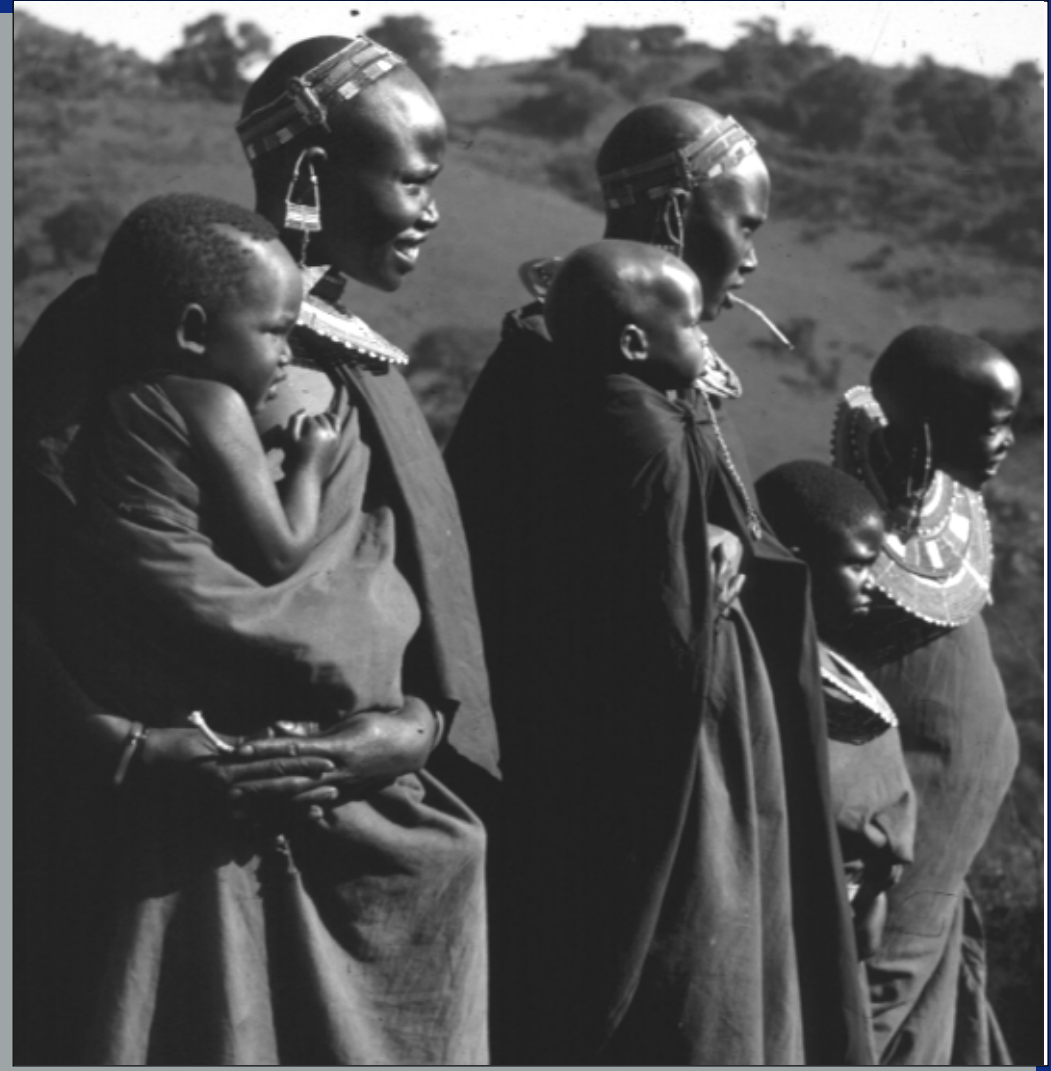


Protected Areas Programme

PARKS

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Populations and Parks



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Protected Areas Programme

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Cover photo: Maasai living around the Ngorongoro Conservation Area, Tanzania, have been forced to change their traditional grazing strategies as populations have increased. Such changes can have far-reaching consequences for protected areas. Photo: Jim Thorsell/IUCN.

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Editorial

ALEX DE SHERBININ

THE MODERN day metaphor for protected areas is ‘islands of biodiversity’ surrounded by seas of human altered landscapes. The new approach to protected areas conservation, sometimes called the bioregional approach, places protected areas within their wider context, seeking to maximize the possibilities for successful protection and propagation of species by managing larger swathes of surrounding land to provide appropriate habitat. In keeping with this trend, the Protected Areas in the 21st Century symposium sponsored by WCPA in Albany, Australia (November 1997), called for a movement from islands to networks of protected areas. Participants concluded that, among other things, “We need to establish partnerships and encourage cooperation with neighbours and other stakeholders, promote stewardship, enhance the use of relevant information, and develop and strengthen the policies, economic and other instruments which support protected areas objectives.”

If protected areas are islands, sometimes arranged in archipelagos called ‘networks’, and if the bioregional approach demands attention to the state of biological resources immediately surrounding them, then the rising tide of human population in buffer zones and even within protected areas themselves needs to be taken into account in parks planning and management. The aim of this issue of *PARKS* is to provide some practical tools and approaches for addressing population dynamics in a proactive manner. The issue begins with an article on population dynamics and protected areas in Tanzania that illustrates many of the issues currently confronting protected areas managers in the developing world. This is followed by an article illustrating the use of demographic data in population and habitat viability assessments for threatened species. The next two articles provide examples of ‘best practice’ for integrating health and family planning services into conservation activities, and innovative approaches for addressing migration to buffer zones and protected areas. The final article provides a comparative study of community involvement in protected areas management in Nepal and Britain. Community involvement and collaborative management approaches represent some of the best responses available to reconcile growing human needs with conservation objectives.

Although this issue focuses on issues in the developing world, it is clear that migration to protected landscapes is also an issue in the developed world, though often of a different nature. In the United States people are settling in the Rockies and Pacific Northwest for ‘quality of life’, fresh air, and scenic beauty. This creates the need for housing, infrastructure and economic opportunities that place pressures on protected areas. It is hoped that a future issue of *PARKS* can address this trend and other issues related to urban protected areas in the developed world.

Throughout this issue it is important to bear in mind that the causes of habitat fragmentation and biodiversity loss are partly related to the number of people, their density, and their expanding numbers, and partly to what they actually *do* near the protected area. A small number of people engaged in intensive resource extraction will, generally speaking, have a much greater impact than a large number of subsistence farmers. Both kinds of activities need to be assessed, and policy measures



adopted to minimise their negative impacts. The articles in this issue suggest that biodiversity conservation will only succeed if conservationists and protected areas managers enlarge their focus and seek to play a more significant role at two levels. At the local level they need to be aware of and address the local dynamics affecting their conservation objectives, and at the national level they need to advocate policy changes that will ensure species survival and sustainable natural resource management.

Alex de Sberbinin is a University of Michigan Population-Environment Fellow with IUCN's Social Policy Group.

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The WCPA mission is to promote the establishment and effective management of a worldwide network of terrestrial and marine protected areas.

Demographic impacts on protected areas in Tanzania and options for action

DAVIS MWAMFUPE

Population growth and internal migration, when coupled with changes in land tenure, is exerting increasing pressure on the environment and natural resources in Tanzania. This paper examines population dynamics affecting seven protected areas, and highlights factors such as poverty, alienation from land and resources, drought, and lack of local participation in conservation activities that are currently hindering conservation efforts in the country.

LOCATED IN eastern Africa on the Indian Ocean, Tanzania is noted for its biological diversity and extensive system of protected areas featuring savanna grassland ecosystems in the central areas, and tropical moist ecosystems in the northern mountains, along the coast and in the south. The country has an area of 884,000 km², which is almost equivalent to the combined territory of France and Germany. Of this land area, 11.5% is under protected status (IUCN categories I–V), which is twice the average percentage for sub-Saharan Africa, but roughly equal to the percentage under protection in Europe, North America, and Australia (IUCN 1994). With its population growth rate of 3% per year, Tanzania is confronting increasingly severe resource constraints. At this rate, Tanzania's population will double from 30 million to 60 million by the year 2020 (PRB 1997).

Since the 1970s Tanzania's protected areas have come under increasing threat from a combination of human activities. While natural forces such as prolonged drought have been identified as major causes of environmental degradation, there is also a growing realisation that the population dynamics of the surrounding settlements have had adverse impacts on protected areas. The major population issue is migration, which has more dramatic short-term impacts on the environment. This is related, of course, to longer-term phenomena such as natural increase and urbanisation.

Population dynamics and impacts on protected areas

The human population around most protected areas in Tanzania has, over the years, been changing in terms of its size, density and livelihood strategies. This is noted mostly among the pastoralists who occupy much of the fragile semi-arid parts of Tanzania. However, these changes have also involved cultivators who have been expanding their activities into more marginal lands in response to land shortages. The fragility of the environment and the weakness of the underlying resource base imply a limited capability to absorb increased numbers of people.

Population growth has increased the demand for resources such as land for cultivation and grazing, fuel-wood and other forest products, consequently leading to deforestation and encroachment into the protected areas. The rapid clearance of forest cover has affected the ecological balance and environmental services, such as

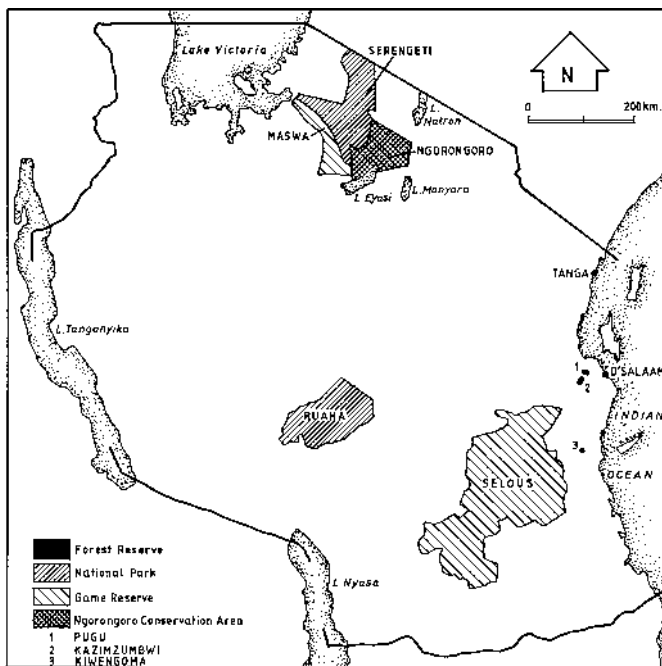
soil retention and regulation of water flows, and resulted in a loss of biological diversity.

The demographic impact on the protected areas in the country cannot be understood by simply looking at the numbers of people and their livestock. More important is the manner of utilising these resources, because a small population located in a sensitive ecosystem may cause far more environmental damage than a larger population on another type of ecosystem. Depending on soil quality and climatic conditions some ecosystems can sustain significant intensification of agriculture in response to population increase. Emphasising the interrelationship between environment, technological and demographic factors with resource management systems, Kjekshus (1977) argues that in the Tanzanian context these systems evolve after many years of adaptation to local environmental conditions. Resource management systems which have evolved in arid and semi-arid lands, where pastoralism is the main economic activity, are different from those systems in more humid areas where crop cultivation is practised. For example, Thwaites (1944) describes the Nyakyusa's careful adaptation of different crop systems and methods of land use to the environmental conditions in Rungwe District, which is characterised by sharp altitude changes and corresponding rainfall variations.

The pastoralists for their part, are authorities on grasses and capable of assessing the feed values of different grazing lands and their stock-carrying capacity (Allan 1965). This 'fund of ecological knowledge' evolves after many years of adaptation to the specific local conditions. As a result, in-migrants need to adopt new land management practices which comply with the local environmental conditions. The pastoral groups, for example, have migrated from the semi-arid areas of north and central Tanzania, where crop cultivation is only a marginal economic activity, to areas that are ecologically different. With their limited experience of managing soils for

crop cultivation they pose severe threats to the resource base in the new settlements.

Figure 1.
Distribution of protected areas in Tanzania.



Ngorongoro Conservation Area

Until fairly recently, most pastoralists such as the Maasai, Nyaturu and Barabaiga practised transhumance. This was made possible due to the abundance of land and low population levels of both humans and bovines (Raikes 1981). The traditional grazing strategy of the Ngorongoro Maasai always attempted to maximise the use of the lowland short grass of the Rift Valley floor at the time of its productive climax. During the dry season the animals were moved to the upland pastures of the Ngorongoro Highlands (Potkanski 1994). The management of livestock within these mobile systems of grazing was in tune with the ecological realities of dry

land areas, where the pattern of rainfall and grazing is subject to high risk and variability from season to season. Thus, this transhumant grazing made best use of seasonally variable dry land pastures and was essentially a traditional drought-coping strategy that had positive implications for the environment (Rugumamu 1989). In this way land use conflicts between livestock keeping and wildlife were kept to a minimum.

In recent years, the population of the pastoralists living in the settlements surrounding the Ngorongoro Conservation Area has been growing rapidly in response to both internal and external factors. For example, the Maasai population in these areas has been growing at the rate of between 2%–3% per annum in the last few decades largely due to natural increase and immigration (Homewood and Rogers 1991). The shortage of water, increase in the number of wildebeest and other ungulates, and the prohibition of burning as a range management tool have resulted in the shrinking of pastures in much of the Ngorongoro Conservation Area, consequently causing the Maasai to abandon their traditional areas (Potkanski 1994, Nanagi and Lendyl 1996). Pressures on the environment have exacerbated the conflicts between farmers and herders, especially where permanent cultivation has been introduced in areas previously used by herders for seasonal migration. A case in point is the colonisation of the Maasai's traditional land by sedentary tribes such as the Iraqw, the Chagga and others who are also desperately in search of farming land.

Changes in people's livelihood strategies in response to land alienation and the worsening environmental conditions is again related to population dynamics. For example, traditionally the Ngorongoro Maasai used to satisfy all of their grain needs through the sale of livestock and livestock products to their agricultural neighbours. However, the recent incidence of cattle diseases which have befallen the herds during the last few years have made cattle numbers fail to keep pace with the human population. Despite the wide availability of marketed foodstuffs in the Ngorongoro Conservation Area, the actual access to these agricultural products by many pastoralists is highly limited due to inflated prices and unfavourable terms of trade between pastoral and agricultural products. As a result of this, most Maasai households have recently also taken up cultivation as an alternative survival strategy. However, this new economic activity also requires land, which is increasingly hard to come by.

Serengeti National Park

Rapid population growth is also observed in the districts west of Serengeti National Park, the total population of which reached 1.8 million in 1988 (Campbell and Hofer 1995). From 1978 to 1988, the population within 5 km of the park boundary increased by 4%, while a lower increase was noted in the band extending from 10 to 25 km. During this same period, the overall population density within 50 km of the protected area boundary increased from 26.6 to 35.2 persons per km² (Table 1).

The fact that some of the settlements in the Arusha Region are right on the boundary of the Serengeti protected area means that encroachment through cultivation, fuel-wood collection, grazing and other activities has become a major concern to the management of this protected area. There is a possibility that rural migration and the reduction of the human population north-west of the Serengeti might be related to local depletion of wildlife and that high rates of increase in some areas close to the south-western park boundary may be related to the greater availability of wildlife in areas suitable for hunting (Campbell and Hofer 1995).

Table 1. Size and rate of increase of local communities west of the Serengeti in Tarime, Serengeti, Musoma Rural, Bunda, Bariadi, Maswa, and Meatu Districts, and Kalamela and Mkula Wards in Magu District, within 50 km of the boundary of the protected area.

distance category (km)	no. of people per km ² in 1978	no. of people per km ² in 1988	mean annual % rate of increase
0 to < 5	18.17	27.05	4.06
5 to < 10	29.69	39.97	3.02
10 to < 15	33.98	41.65	2.06
15 to < 20	31.24	38.84	2.20
20 to < 25	22.86	29.04	2.42
25 to < 30	20.05	26.99	3.02
30 to < 35	26.80	37.70	3.47
35 to < 40	28.59	37.26	2.68
40 to < 45	24.25	33.90	3.40
45 to < 50	31.29	40.07	2.50
0 to 50	26.64	35.2	2.83

Source: Campbell and Hofer 1995

Human population movements near the Serengeti are related to shrinking grazing lands and the breakdown of local resource management systems that had evolved to keep human demands and environmental supplies in balance. Large movements of people in and around the protected and conservation areas have also been triggered by drought and dry-land degradation. These may be referred to as ‘environmentally induced population displacements’, a characteristic of which is quasi-permanent settlement in relatively resource-rich areas (IOM 1996). In the case of the Serengeti, a number of the communities near the park’s borders are involved in illegal wildlife meat hunting (including gazelle, giraffe, impala and waterbuck). The illegal off-take from the park exceeds 200,000 resident and migratory herbivores per year.

The colonisation of grazing land and the conversion of property rights from communal to private tenure have been a serious impediment to the movements of transhumant pastoralists. Confronted with these problems, the pastoralists have lost their ability to maintain their mobile livestock economies in a sustainable manner, which has given rise to social and occupational changes. Citing a specific example of the Barabaig of northern Tanzania, Lane and Moorehead (1994) identify four main policy initiatives in Tanzania that have converged over time to undermine pastoralists’ security of tenure. These include the nationalisation of land, villagisation, village titling and land use planning. As a result of these measures the Barabaig lost access to their traditional lands, and therefore also their property rights and consequently find their movements increasingly restricted. This situation was compounded further by state intervention which has reduced the pastoralists’ land by converting their land into state farms. These land pressures caused by rising population, land deterioration and conflicting land uses are putting an increasing number of pastoralists of northern Tanzania on the margins of existence and therefore forcing them to invade other areas including protected and conservation areas.

Maswa Game reserve

Population increase and the concomitant expansion of human activities into the Maswa Game Reserve (on the south-western border of Serengeti National Park) has

resulted in land use conflicts between crop cultivation and wildlife conservation. By cultivating (usually at an extensive scale) right on the edge of the Maswa Game Reserve these farms are located in high risk areas, exposed to damage by wildlife. In response farmers feel justified to poach/hunt animals as a protection or defensive measure (Serengeti Regional Conservation Strategy 1994).

Ruaha National Park

Besides the short-distance migrations in and around protected areas in the country there are notable long-distance migrations of the pastoralists from northern Tanzania into the southern parts of the country. The Maasai, Nyaturu and Barabaig have, in the recent past, migrated into parts of Morogoro Region and Usungu Plains (near the Ruaha National Park) in Mbeya Region following the eastern Rift Valley (Mbonile and Mwamfupe 1998). Some of these migrants have gone as far as crossing the borders to neighbouring countries of Zambia and Malawi. These movements have been prompted by drought and land conversion as mentioned above. In these areas too, pastoralists have been forced to adopt crop cultivation besides livestock keeping.

Migration into the Usungu Plains is not limited to pastoralists, since it has also involved crop cultivators from Makete and Rungwe districts, which face a critical shortage of land as a result of population pressure and technological stagnation. The cultivators who originate from areas that are ecologically different (with plenty of rainfall almost throughout the year) are moving to an area where rainfall is seasonal and therefore supports different combinations of crops. These people, too, have had to adopt extensive forms of cultivation and the resulting land use conflicts with the immigrant pastoralists have pushed some of these crop cultivators into the margins of the Ruaha National Park with near disastrous results. These include the decline in the number of *kongoni*, *topi* and *kudu* which are poached for meat, and elephants, rhino and leopards which are killed by commercial poachers.

As a result of the north to south population movements described earlier, serious conflicts of this nature are to be found in the Usungu Plains of Mbeya region, where shifting cultivation is spreading and encroaching into the Ruaha National Park (Kikula *et al.* 1996). This situation is further compounded by the presence of livestock in the nearby areas, which has also caused increasing competition for resources, contributing to the alarming decline of wildlife populations in the area including the complete disappearance of some species.

Selous Game Reserve

The land use conflict just discussed is not an isolated case. It is also noted in the south-west boundary of the Selous Game Reserve in southern Tanzania. Shifting cultivation in the villages of Kikulyungu, Ndapata, and Barikiwa is in direct conflict with wildlife from the nearby reserve. In these villages, the local farmers complain of animals destroying their crops. On the grounds that these farmers do not benefit from being close to the reserve they feel

Cattle grazing outside a Maasai village in Tanzania. Photo: JimThorsell/IUCN.



justified to hunt animals in the reserve (Mwamfupe *et al.* 1989). In effect they are compensating directly for some of the costs that they have incurred due to crop damage. Land use conflicts are also noted in the northern boundary of this reserve. The government's decision to establish the Kisaki and Msolwa villages close to the Tanzania Zambia Railway Authority (TAZARA) for the security of the railway station did not take into consideration the likely impacts of the settlements on wildlife conservation. The creation of the Kisaki village took 6,000 hectares of land from the reserve. In 1971 the village had 200 people, this had increased to 2,015 people in 1978. The population of Msolwa has grown from 500 people in 1971 to 5,107 in 1988.

Tanga Coastline

Although not a protected area, impact of population increase on biologically rich areas is also noted for the coral reefs on the north coast of Tanzania, in the region called Tanga (Horrill 1997). Population pressure and demand for fish have contributed to over-fishing, including the use of dynamite on coral reefs for fish extraction. This over-exploitation of the fishing grounds is exacerbated by the lack of alternative income sources among the people in the areas, although collaborative management agreements are now successfully diminishing the pressures on the resource.

Pugu and Kazimzumbwi Forest Reserves

The coastal forests of Pugu and Kazimzumbwi Forest Reserves are remnants of a former area of extensive forest cover belonging to the Zanzibar-inhambane section of the Guinea-Congolian Phytogeographical Region (White 1983). These forest reserves are located in the peri-urban zone of the Tanzanian capital, Dar es Salaam. Despite their limited size, these forests are recognised globally as 'hot spots' of species diversity and endemism (Howell 1981). For example, of the 190 recognised forest tree species in the Coast Region, 92 are endemic to the area (White 1983). Apart from their biological/botanical significance these coastal forest reserves are also a source of a wide range of valuable forest products, which are vitally important to the livelihoods of many Tanzanians, particularly of Dar es Salaam and Coast Regions.

The population of the villages surrounding the Pugu and Kazimzumbwi forests has been increasing rapidly over the last few years. The population of Kazimzumbwi village for example, more than doubled from 1,525 in 1978 to 3,765 in 1995 (Table 2).

From 1978 to 1995 the child population in the Kazimzumbwi village increased by 46%. In the same period the population of the village had grown by almost 150%. Much of this growth occurred in the adult age group, indicating that the increase was mostly attributable to in-migration. This is also suggested by the mixed ethnic composition of the village population. Economic factors play an important role in

Table 2. Population growth rate by age groups in Kazimzumbwi Village.

age group	0-14	15-64	65+	total
1978	639	755	131	1,525
1995	930	2,230	605	3,765
change	+291	+1,475	+474	+2,240
% growth	46%	196%	362%	147%

Source: 1978 Census Report and Village Office Files, 1996. (1995 data: estimates)

most of these movements. People move into these peri-urban areas in search of arable land. This is a result of a cycle of migration prompted by economic pressures where people first move from rural villages into the urban area of Dar es Salaam in search of employment, then move out to peri-urban and rural areas to supplement their scarce urban incomes with rural farm plots. Due to the increase in population of these outer villages the density has increased from 37 people per square kilometre in 1967 to 90 persons in 1978 and 120 people per square kilometre in 1988 (Mwamfupe 1996).

In recent years Pugu and Kazimzumbwi Forest Reserves have come under threat from a combination of urban-induced human activities, mainly agriculture, fuel-wood collection and pole cutting. As human population grows, cultivation and residential areas have expanded into the forested areas. The remaining areas of the forest are now subjected to unsustainable felling and logging. This situation is so serious that Pugu forest has become one of the most disturbed coastal natural forests in Tanzania, and is subject to the greatest variety of land-use pressures.

The Pugu and Kazimzumbwi Forest Reserves are surrounded by villages which are basically rural in character. Nevertheless, because these villages are adjacent (20–30 km) to the rapid expanding city of Dar es Salaam, they are susceptible to urban influences. This influence is in terms of the growing demands for land for cultivation, residence, and the forest products of which charcoal and timber production are most significant. Some villages, especially those on the eastern side of the Pugu Forest Reserve, may, in the next five to ten years, be designated as part of urban areas of the city.

There is no doubt that the villagers recognise the importance of forests. However, most seem to value these forest more for the direct benefits (consumptive uses) than the indirect ones (non-consumptive uses). The ranking of the importance of forests by the villagers in Pugu and Kazimzumbwi clearly show that “extraction factors” seem to be more prominent than the conservation. Forests as “sources of fuel-wood, timber and charcoal” are ranked as the three most important values of the forests. In contrast, aspects such as “water catchment” and “environment value” are ranked low in the sixth and eighth position respectively.

The dominant economic activities carried out in and around the two forest reserves include brick making, charcoal production, logging, and agriculture. Charcoal production is perhaps the most serious source of pressure on the two Forest Reserves. Charcoal is produced for commercial purposes as prompted by the ever growing demand by urban residents in Dar es Salaam city. Due to the high costs of alternative energy source such as electricity and kerosene, charcoal has become the major affordable source of energy (Yanda *et al.* 1998). Although timber extraction is supposed to be done only on the exotic species and then only by licensed people, this activity is largely uncontrolled. This explains the loss of 24% of the natural forest in the period between 1953 and 1988. Logging done on a commercial scale has a potentially damaging effect on growth potential by removing the young trees.

Cultivation in and around the forest reserves has expanded considerably. Such expansion has been at the expense of other forest covers such as natural forests, bush land, and grassland. Much of this agriculture is still shifting cultivation, although signs of intensification are beginning to appear, reflecting a response following an increase in population in the area. The brick and tile factory (located in the Pugu Forest Reserve) depends on the forest as a source of firewood, which is normally used in

the burning process to make the bricks durable. There is also open cast mining of kaolin carried out within the Pugu Forest Reserve. Kaolin mining threatens the forest reserves because the mining involves a removal of top soil to a depth of 20–30 cm.

The effects of population dynamics are mediated through land use decisions and demand for resources. Neither in-migration into the villages surrounding the forest reserves nor encroachment of forest land has been controlled. Clearly, the loss of biodiversity in the Pugu and Kazimzumbwi forest reserves are largely due to population pressure which has forced more people to gain their livelihoods on limited areas of good land, with resultant resource over-exploitation (Mwalyosi 1994).

Maasai tribesman.
Photo: Jim
Thorsell/IUCN.



Recommendations

Following the preceding discussion a number of questions arise. Why do people invade forests and other protected areas? Are they doing this simply out of greed or malice? Is it for accumulation of wealth? Don't they know the value of wildlife? Or, are these actions of desperation and the need to survive? If it is a question of local livelihood, can these people be assisted not to encroach into the protected areas? These are among the basic questions, answers to which could result in improved protected areas management in Tanzania. This calls for a better understanding of the socio-economic environment in which these people live, but also the impact of micro-economic policies impinging on them.

At the root of the conflicts between population dynamics and the environment is the squeezing of people from land on which they used to graze or grow crops for hundreds of years. Moreover, in some areas population has been growing, but sometimes at paces far in excess of the capacity of the land to sustain this growth. Such dynamics have especially been to the disadvantage of the pastoral communities who lack formal property rights. Their movements, sometimes into protected areas, have been prompted by the lack of alternative livelihoods after being excluded from land on which they used to earn a living. To some people, encroachment into protected areas is an act of desperation.

Therefore, specific measures need to be taken which focus on and take into account the interest of pastoralists.

The socio-economic situation in the lands surrounding the Tanzanian protected areas is shared by almost all rural communities in the Sub-Saharan Africa. The prime feature of this context is the widespread poverty of the population caused by a combination of harsh climatic conditions, economic problems and population dynamics. Poverty is not a factor conducive to the conservation of natural resources, since the state of destitution of the population prompts it to exert growing pressure on its environment either by clearing fresh tracts of land, or else by occupying marginal land that is not particularly suitable for agriculture or stock raising. The emphasis on poverty should not obscure the fact that political decisions may also contribute to environmental destruction. Thus, it is important to address the problems of local livelihoods and poverty of communities adjacent to conservation areas as well as political and institutional factors affecting resource conservation. Enhancing participation in natural resource management through collaborative management agreements is one means by which to increase sustainable use (Borrini-Feyerabend 1996).

Local participation involves three main aspects: taking part in design/planning, implementation, and sharing the returns. In practice however, plans are made away from local people and brought to them for implementation. This gives rise to the problem of excluding the local people in matters concerning the conservation of wildlife in their localities. In rare cases where this has been done, participation has mostly been limited to implementation, and does not include involvement in project design and planning. For example, in most agro-forestry projects local people are involved in reforestation activities, but have no say in the choice of tree species. This ignores the fund of knowledge that locals have accumulated on their forests, and results in poor conservation practice. Similarly, locals know the migration patterns of the animals in the parks. This indigenous knowledge that the local people have, is central to the success of conserving wildlife, and should be tapped. In order to conserve forests and other wildlife and achieve its sustainable utilisation the local community must be involved in all aspects of conservation and there must be an equitable sharing of benefits.

It has become increasingly clear that local people lack commitment to participation in conservation matters. Where there is sabotage it is because they have been alienated, and do not benefit in any way from these protected areas. More often than not they disproportionately bear the costs of conservation, while foreign tourists and commercial enterprises enjoy the benefits. The aptly titled volume *Whose Eden?*, recently published by IIED (1994), showed that local populations have no incentive to conserve wildlife from which they gain nothing, and may even lose. This is narrated by one villager living adjacent the Kiwengoma Forest Reserve in Rufiji district:

This is our forest, our ancestral forest, our ancestors' burial place, we have sacred places in there ... Today, outsiders harvest timber from our forests, and money is paid to the district officials but nothing comes to us. Why are we not allowed to use part of our forests just as the fishermen are doing to rivers in their places? Are you telling us these forests do not belong to us?

(Mwajabu Nyakingwande – Rufiji district)

At present the interactions between conservation agencies and local communities are generally not good. Perhaps with the exception of timber cutting which is often monopolised by a few licensed business people, there are few opportunities for local people to benefit from protected forests. Yet the same people are expected to bear the conservation tasks such as tree planting and forest patrols, as is the case in the Kiwengoma Forest Reserves in Rufiji district. Therefore, along the lines of the CAMPFIRE programme in Zimbabwe, tourism and legal hunting revenues should be channeled to local development projects to improve the schools, health facilities or even the roads leading to these villages. In addition, communities should be allowed a sustainable off-take from natural herds for household consumption.

There is ample evidence to show that most people living around the protected areas in the country know the importance of wildlife. However, what is lacking is an awareness of the values of protected areas not only for hunting and fuel-wood collection and other uses, but their biodiversity value too. That is why it is important to educate people on the wider values of these protected areas. In relation to this there also seems to be little recognition of the population/environment linkages among the people living around most protected areas. What is needed is a long-term strategy which involves, for example, inclusion of population and environment issues in all school curricula.

Communities around protected areas should be assisted in making and adhering to appropriate land use plans and crop husbandry. Enforcement of government laws and protection by forest guards alone, without involving the people living around the protected areas, is not likely to be sufficient, and it can even be a catalyst for increased destruction. Viable economic alternatives must be identified to secure the local community's livelihood.

Conclusion

Population dynamics, particularly in rural areas, have had an impact on the country's protected areas. The natural rates of population growth combined with migration have led to land use conflicts between agriculture and wildlife. At the root of these conflicts is the colonisation of grazing land and the conversion of property rights from communal to private tenure. This is partly a reflection of government's failure to appreciate the impact of macro-economic policies at local levels. For example, the nationalisation of land, and more recently, the conversion of pastoralists' land into state farms, have all led to the breakdown of the resource management system, thus putting the pastoralists on a margin of existence. The result is an increasing incursion into protected areas.

Lack of community participation also hinders conservation. When local people do not benefit from conservation, they lack commitment to conservation objectives and conflict often ensues. Foremost, the local people must know for whom they are conserving the wildlife. With growing population pressure, relations between people and the protected areas will only improve when people see direct benefits from these areas. If these important wildlife habitats are to survive they must be of value to local people. Therefore, it is important that there should be a flow of benefits down to the stakeholders. There is also a need to raise people's awareness on the linkages between population and environmental destruction, and, whenever possible, alternative sources of income should be sought to reduce the pressure on wildlife.

Population programmes can address family planning and reproductive health needs, and ultimately reduce population growth rates.

The complexity of conservation matters calls for a more comprehensive approach and cooperation between all government ministries. Conservationists might usefully collaborate with the ministries for Land and Settlement, Natural Resources and Tourism, and Agriculture and Livestock.

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People and habitat protection

FRANCES WESTLEY, ULYSSES SEAL, ONNIE BYERS AND GAYL D. NESS

Human population, production and consumption are growing rapidly and are placing heavy pressures on those species and habitats that the conservation community is striving to protect. A major weakness in our organised abilities to deal with this problem lies in disciplinary specialisation. The Global Biodiversity Research Network, an international scientific network, has been developed to bring together the necessary disciplines of human demography, management science, development studies, conservation biology and population biology, in an effort to a) understand the impact of local human populations on the survival of threatened ecosystems and their resident communities, and b) develop tools and processes for securing the involvement, collaboration and responsibility of a wider range of local in-country stakeholders in the processes of *in situ* species, habitat and ecosystem management. One such process is the Population and Habitat Viability Assessment, an inclusive consultation process designed to help develop priorities and methods for species and habitat conservation. This paper describes how demographic data can help in the PHVA process, and provides a case study of a PHVA undertaken in Uganda in 1997.

IN 1987, the Brundtland Commission published its influential report *Our Common Future*, which firmly established sustainable development on the international agenda for the 1990s. Among the priorities identified in the report was the conservation of species and ecosystems. "Species and their genetic materials", the authors argued, "promise to play an expanding role in development, and a powerful economic rationale is emerging to bolster the ethical, aesthetic, and scientific cases for preserving them". This imperative was echoed in the IUCN's basic policy statement *Caring for the Earth* (1991), and became the focus of the World Resource Institute, The World Conservation Union and the United Nations Environment Program's *Global Biodiversity Strategy* (1992). In these documents a clear ethic of sustainable development is presented: development has to be both people-centered and conservation-based. Unless we protect the structure, functions and diversity of the world's natural systems, on which our species and all others depend, development will undermine itself and fail. Unless we use Earth's resources sustainably and prudently, we will deny people their future. Development must not come at the expense of other groups or later generations, nor threaten other species' survival.

These statements reflect a growing concern with environmental conservation. Over the past two decades the concern has taken on an increasing urgency, due in part to the world's rapid population growth and economic development. Designated parks and protected areas have been increasing exponentially (IUCN 1997). We have also become more knowledgeable about the processes and dangers of species extinctions in specific habitats. Along with these moves for conservation, however, has come a relentless growth in people: numbers, production and consumption are growing rapidly and are placing heavy pressures on those species and habitats that we strive to protect.

A major weakness in our organised abilities to deal with this problem lies in disciplinary specialisation. Population specialists have developed powerful tools and

massive data collection processes to understand the dynamics of human growth and movement. All too often, however, these specialists know little about the environment and species directly affected by human numbers and actions. On the other side, environmentalists have developed powerful research and management tools to deal with almost all species and habitats. All too often, however, these specialists know little about the dynamics of human populations and their activities. Fortunately, this is changing and there are now a number of attempts to build bridges between population and environmental specialists to deal directly with the problem of protected areas, people and species survival.

One of these efforts is now being directed by a social scientist at McGill University, in collaboration with the Conservation Breeding Specialist Group (CBSG) of IUCN's Species Survival Commission (SSC). The effort, supported by Canada's Social Science and Humanities Council, aims to build an international scientific network to bring together the necessary disciplines to deal with the problem. The CBSG works in partnership with the Global Biodiversity Research Network, which seeks to build interdisciplinary connections and create an exchange of expertise among specialists concerned with the conservation of biodiversity. Network members, representing the fields of human demography, management science, development studies, conservation biology and population biology, share a concern to a) understand the impact of local human populations on the survival of threatened ecosystems and their resident communities; and b) develop tools and processes for securing the involvement, collaboration and responsibility of a wider range of local in-country stakeholders in the processes of *in situ* species, habitat and ecosystem management. In order to achieve these goals, the Network has focused on a set of workshops called population and habitat viability assessments (PHVAs; the 'population' here refers to animal populations), originally developed by the CBSG.

A working group taking part in a Population and Habitat Viability Assessment. Photo: CBSG.

Population and Habitat Viability Assessments

In the past ten years the SSC's Captive Breeding Specialist Group has pioneered new strategies to allow practical and effective conservation actions around endangered

species all over the world. A small, scientifically based organisation, CBSG has developed the PHVA process in order to identify species and habitats deserving conservation and, more importantly, to assist stakeholders in producing practical research and management recommendations. CBSG has conducted or participated in 125 such workshops in 50 countries over the last five years. CBSG has been described as "an endangered species fire brigade which goes from crisis to crisis with state-of-the-science advice on the emergency moves best calculated to avert calamity" (Alvarez 1993).

PHVAs are organised at the behest of the government of the range countries,



and they are designed to encourage equal participation among stakeholders and to minimise power differences. The workshops bring together the full range of conservation stakeholders – including biologists, wildlife managers, captive breeding specialists and government officials – who have an interest in conserving and managing species in their habitats or the consequences of such management. One goal in all workshops is to reach a common understanding of the state of scientific knowledge available and its possible application to the decision-making process and to needed management actions. CBSG has found the policy-driven workshop process, with risk characterisation tools, stochastic simulation modelling, scenario testing, and deliberation among stakeholders, to be a powerful tool for extracting, assembling, and exploring information. During the PHVA process, participants work in small, self-selected groups to discuss these identified issues and each working group produces a brief report on their topic, which is included in the PHVA document resulting from the meeting.

The workshop centres on a computer simulation called VORTEX to model extinction scenarios and align stakeholders' research and action agendas around a common direction and plan. This process encourages developing a shared understanding across wide boundaries of training and expertise. The tools also support building of working agreements and instill local ownership of the problems, the decisions required, and their management during the workshop process. As participants appreciate the complexity of the problems as a group, they take more ownership of the process as well as the ultimate recommendations made to achieve workable solutions. This is essential if the management recommendations generated by the workshops are to succeed.

Frequently, local management agencies, external consultants and local experts have identified management actions. However, an isolated narrow professional approach that focuses primarily on the perceived biological problems seems to have little effect on the required political and social changes (social learning) for collaboration, effective management and conservation of habitat fragments or protected areas and their species components. The PHVA process provides an objective environment, expert knowledge, and a neutral facilitation process that supports sharing of available information across institutions and stakeholder groups, reaching agreement on the issues and available information, and then making useful and practical management recommendations for the species and habitat system under consideration.

The PHVA process is based upon biological and social science. Effective conservation action is best built upon a synthesis of available biological information, but is dependent on actions of humans living within the range of the threatened species as well as established national and international interests. There are characteristic patterns of human behaviour that cross disciplinary and cultural boundaries, which affect the processes of communication, problem-solving, and collaboration: 1) in the acquisition, sharing, and analysis of information; 2) in the perception and characterisation of risk; 3) in the development of trust among individuals; and, 4) in 'territoriality' (personal, institutional, local, national). Each of these has strong emotional components that shape our interactions. Recognition of these patterns has been essential in the development of processes to assist people in working groups to reach agreement on required conservation actions, collaboration needed, and to establish new working relationships.

CBSG participants recognise that the present science is imperfect and that management policies and actions need to be designed as part of a biological and social learning process. The PHVA process essentially provides a means for designing management decisions and programmes on the basis of sound science, while allowing new information and unexpected events to be used for learning and to adjust management practices.

The basic set of tools for PHVA workshops include small group dynamic skills, explicit use in small groups of problem restatement, divergent thinking sessions, identification of the history and chronology of the problem, causal flow diagramming (elementary systems analysis), matrix methods for qualitative data and expert judgments, paired and weighted ranking for making comparisons between sites, criteria, and options, utility analysis, and stochastic simulation modelling for single populations and metapopulations.

The workshops produce assessments based upon in-depth analysis of information on the species' life history, population dynamics, ecology, and history of the populations. Information on population size and characteristics, genetics and environmental factors pertinent to assessing population status and risk of extinction under current management scenarios and perceived threats are assembled in preparation for and during the workshops. Modelling and simulations provide a neutral focus for assembly of information, identifying assumptions, projecting possible outcomes (risks), and examining for internal consistency. Timely reports from the workshop are necessary to have impact on stakeholders and decision makers. Draft reports are distributed within four weeks of the workshop and final reports within 90 days.

A primary output of stochastic modelling is risk assessment and scenario evaluation. A stochastic population simulation model is a kind of model that attempts to incorporate the uncertainty, randomness or unpredictability of life history and environmental events into the modelling process. Events whose occurrence is uncertain, unpredictable, and random are called stochastic. Most events in an animal's life have some level of uncertainty. Similarly, environmental factors, and their effect on the population process, are stochastic – they are not completely random, but their effects are predictable within certain limits. There are a host of reasons why simulation modelling is valuable for the workshop process and development of management tools. The primary advantage is to simulate scenarios and the impact of numerous variables on the population dynamics and potential for population extinction.

Inclusion of demographic data: past experiences

CBSG has long recognised the value of inclusion of human demographic information into the PHVA process. In fact, to varying degrees, this type of social science data was used to enrich the knowledge base on which management decisions were made in PHVAs for the Javan gibbon and langur, the Thai gibbon, and the Indian rhino (Sengupta and Patnaik 1994, Supriatna *et al.* 1994, Tunhikorn *et al.* 1994, Molur *et al.* 1995). In each case, data on human fertility, mortality, migration and attitudes were presented and used to aid in subjective evaluation of projected land use patterns and habitat degradation as they concern the long-term management of the species. These data were in some cases collected from local surveys and censuses, but more often from anecdotal information and personal communications. When data were not

available for the area in question, information gathered for a different, yet similar area was used.

Although “Demproj”, a computer program designed to make demographic projections, was used in the Javan gibbon and langur PHVA, no attempt was made to translate this information into data appropriate for use in the VORTEX modelling process. Data indicate that population growth in the areas surrounding the habitat of these species continues (despite fertility reductions in some areas), as does immigration, and places additional pressure on park resources. In addition it was found that community participation in park management is essential to the success of any conservation programme. Recommendations from the human demography working groups in these three PHVAs urged cooperation, communication and participatory planning among residents, park managers, government agencies and NGOs to discourage encroachment of the park lands and protected areas these threatened species inhabit.

As yet, however, the workshops have been limited in terms of the inclusion of social science data, such as demographic data, land use data, and cultural and economic data, either in the modelling process, or in the planning process. CBSG also recognises that preservation and protection of natural resources cannot be done by biologists, social scientists and agency people alone. While thus far the workshops have been successful in building collaboration between scientists and wildlife managers, non-scientific groups such as local landowners or tribes, grassroots organisations and the private sector also need to be at the table. Social scientists have also been under-represented. Workshop designs are urgently needed to provide such inclusion, without compromising the sound science which is the PHVA signature.

The Global Biodiversity Research Network was designed to be an important step in that direction, by creating an intensive exchange between social and natural scientists around such tools and processes. One of the first issues to be confronted is that of better incorporating human population dynamics into the PHVA process.

The human population: numbers and behaviour

The human impact on species and habitats is a function of both numbers and behaviour. Numbers have become particularly important with the recent rapid growth of population, especially in the less developed regions. In these areas, rapidly growing populations with low levels of income and weak government structures imply heavy pressures on all habitats. In the more developed regions, numbers may be less important than behaviour, in part because greater government capacities can provide more effective protection of designated habitats and species.

Numbers

Demographic theory and methods provide us with some powerful tools for projecting population numbers into the future. Projections for the next 10–20 years are often quite accurate, largely because birth and death rates tend not to change very rapidly and the people who will give birth are already here and their numbers and reproductive habits can be fairly well known. There is even good experience assessing the impact of various diseases, famines, and various forms of health care support (like family planning). Populations tend to bounce back relatively quickly after widespread epidemics, famines and even wars. More recently, there have been

very rapid declines in fertility when family planning services are made available (Ness and Golay 1997).

Note, however, that projections of human population size and composition are only as good as the assumptions upon which they are based. In the case of births and deaths, accurate predictions of future trends are relatively easy to make. Migration is quite a different matter. Data are weak, and migration trends are heavily affected by opportunities within both sending and receiving areas, making future trends difficult to predict. To cope with this uncertainty, alternate projections can be made based on different scenarios concerning the likely future trends in fertility, mortality and migration. Another caveat relates to the size of the population being projected. UN world projections have been accurate to within 1% for the past 40 years. But projections made in the 1950s for Latin America overestimated its present day population by 9%. For individual countries, provinces and districts, projections are much more difficult, though not impossible, to make.

Projections allow us not only to learn about the future size of a population, but also to predict its likely age and sex composition. Rapid population growth will give us a younger population, including lots of new babies and infants. That means increased demands for maternal and child health services, schools and various forms of infant care. It is also possible to project the growth of the 'young male' population (ages 15–24), a highly volatile and rapidly growing group in most poor countries. As will be seen in the Uganda field experiment (below), young males played a key role in the breakdown of social order in Rwanda and Eastern Congo, which contributed to habitat loss for the mountain gorilla. Young males are high in energy and testosterone, and low in judgment, and a sense of the future. They are often found at the centre of urban or ethnic violence, and in frontier areas of extreme environmental degradation. But what these young males actually do depends on the opportunities open to them.

At present there are useful computer programs, such as Demproj, which can be used easily in the field to make future projections. Local census publications will often contain counts of people in and around protected areas, from which projections can be made. These will be more accurate if local informants can provide information on migration streams. Such projections can provide environmental managers with a useful view of the future pressures they can expect from human numbers.

Behaviour

Although numbers are important, what people actually do is far more important, and, unfortunately, less easy to assess than are the numbers. There are, however, several major factors affecting behaviour that can be tracked relatively easily, and translated into probabilities of population encroachment on the habitat and species.

The first factor is education. Statistics on enrolment levels are generally available, and even at local levels, informants can provide accurate information. Education usually means a more controlled young population, with increasing levels of skill and productivity, and possibly greater environmental awareness. Poverty levels are also important. The poorer the local population, the more dependent they may be on protected habitats for food, fuel and fodder. Average land holding size may be one useful indicator of wealth where figures on income are absent.

Another factor is economic incentives. If there are incentives to clear land or transform habitat into pasturage, then people will respond to those incentives. Here,

national policy measures may be important for removing perverse incentives that affect conservation objectives. Traditional livelihoods and present-day incentives and disincentives will likely play a dual role in affecting land use. People who have traditionally hunted, fished, or cultivated in an area may continue to use practices that, while once highly adapted to the local environment, have subsequently become maladapted due to changing circumstances of population growth, reductions of land area available, or combinations thereof.

Ethnic diversity in any region implies a potential for violent disruptions that can have a devastating impact on the environment, as will be shown in the cases of Rwanda and eastern Congo. Even more important, however, are government leadership and policies. Government leaders may either foment and exacerbate ethnic violence, or promote greater unity and acceptance.

All these factors affecting behaviour can be identified and specified in the small area of any PHVA. They may constitute a useful checklist of questions to put to local informants who might be contracted or organised to develop a PHVA-specific database for a forthcoming workshop. Some can be included in the modelling activities as well.

Uganda: a recent field experiment

Gorillas are found in east central Africa and equatorial west Africa. One of the three gorilla subspecies, the mountain gorilla *Gorilla gorilla berengei*, is restricted in its distribution to two small populations: one of about 300 individuals in the Bwindi Impenetrable National Park in Uganda, and the other of about 310 animals in the Virunga Volcanoes region. The Virungas region includes Mgahinga Gorilla National Park (Uganda), Parc National des Volcans (Rwanda), and Parc National des Virunga (Congo).

The distribution of the mountain gorilla is entirely within National Parks, but there are serious threats to these ecologically vital afro-montane and medium altitude forest habitats. Historically, hunting and poaching resulted in a rapid decline of the Virungas population from which it has not yet recovered. The continuing civil unrest in Rwanda and the Democratic Republic of Congo (former Zaire) is producing thousands of refugees who are encroaching into the Parc des Volcans and the Parc des Virunga areas. Current rates of deforestation for firewood collection and building materials are likely to cause permanent habitat damage in the near future. Uganda's Mgahinga National Park has also suffered from these unsustainable land-use practices. This rapid rate of habitat destruction will result in a decline of the mountain gorilla population and a long-term reduction in the viability of the subspecies as a whole. There was a recognised need for a systematic

The mountain gorilla PHVA, Uganda.
Photo: CBSG.



evaluation of mountain gorilla population viability and development of a regional management plan that incorporates the needs of all relevant governmental, non-governmental, public and private stakeholders.

The CBSG, in collaboration with the Primate Specialist Group, was invited by the Director of Uganda Wildlife Authority (UWA), the Office Rwandais de Tourisme et Parcs Nationaux, and the Institut Congolais pour la Conservation de la Nature to conduct a PHVA for the mountain gorilla in December 1997 in Kampala, Uganda. Participants included biologists, researchers, and wildlife managers from Uganda, Congo and Rwanda, and international experts on mountain gorilla population biology and ecology. Approximately 52 people participated in the entire five-day Workshop. Participants included 26 nationals from the range states. Eighteen people were from protected area authorities and 16 from NGOs active in range management. The NGOs' long history of international collaboration, as well as the recognition by the local organisers of the need to bring all available tools to bear on the problem of gorilla conservation, resulted in their willingness to include a wider range of stakeholders and to incorporate a human demographic element into the PHVA process.

Therefore, after two meetings and wide ranging theoretical discussions, the Global Biodiversity Research Network seized upon this opportunity to try out at least one goal of the Network: the inclusion of better human demographic data in the PHVA process. Demographic data for Uganda were available at the national level. In order to be useful, however, they would need to be combined with local knowledge in order to get input on numbers and some behaviours of people in and around the protected area. A list was therefore generated of individuals to contact who could help identify sociologists, agricultural economists, demographers, anthropologists and CARE employees at the local level. Once the relevant local expertise was secured, data on human numbers and behaviour would then have to be linked to a variety of species specific effects (e.g. habitat quality, carrying capacity, etc.) in order to link with VORTEX. This required discussions and communication between the biologists and sociologists at the PHVA.

As Bob Lacy, the VORTEX modeller, pointed out, two translations would be required: from human to habitat and then habitat to biology. He suggested participants could start with best estimates and then could address uncertainties, with the value being in the discussion that would take place trying to come up with the numbers to be inputted. They would also establish which parameters they need to change in order to ensure survival. In the Ugandan context, it was felt that the DOS version of VORTEX rather than the newer Windows version would be the best: with a broader group of individuals, the slow entering of parameters would translate into clearer understanding and greater ownership.

In the weeks leading up to the PHVA, a number of individuals in Uganda and elsewhere were contacted by email in hopes that the Network members could secure a broad based representation of social scientists. National level Ugandan data were obtained from the UN publications, and a graduate student working at McGill University did a library and Internet search, producing a set of documents on the prevalence of AIDS, local demographic trends near the parks (Bwindi in Uganda and Virunga on the border of Rwanda, Congo and Uganda), and the history of institutional arrangements in these parks where the gorillas lived.

The human demographic impact

Inclusion of human demographic data presented some problems. Network members had national data and found material in a World Bank report about local population growth as well as in and out migration. However, it quickly became obvious that this was not easy to translate into impact, at least in the Bwindi case. Here population growth did not translate into gradual erosion of the protected area. It did seem to increase three pressures: a) pressure to change national policy (due to local demands for more access to park resources) in the event that there was some sort of democratic or local empowerment process in place; b) human-animal conflicts, and c) possible sabotage (fire, poaching) if benefit-sharing was seen by locals as inadequate (in Bwindi a resource sharing scheme was in place and serious incidence of sabotage had diminished).

Another interesting possibility that the Uganda experience suggested was to work with human epidemiologists to try to get a measure of the likelihood of increased human population density surrounding parks to translate into increase human to animal disease transmission. During the PHVA, Network members tried to get this figure from the veterinarians present, but they referred the Network to sanitary engineers or to human epidemiologists. This is something to work on further before the next PHVA.

A quite different picture of human population dynamics emerged when looking at the social and ecological history of the second park habitat area, Virunga, which lies on the border of Rwanda, Congo and Uganda. There, it was easier to make estimates about population pressures and ecosystem/habitat/species destruction, because they were so extreme. The area was at the centre of protracted warfare and had suffered accordingly. No government protected the parks and calculations were available of the exact impact of refugees camped on the border of Virunga, in terms of the amount of wood that was removed from the park and the amount of human organic waste dumped in the park as well as the increased number of animals killed and poached (I-Mage Consult 1997). Two of these could be turned into a measure of reduction of carrying capacity: rate of deforestation + rate of human consumption of gorilla food (bamboo) = reduction of habitat carrying capacity. Two others could be turned into a measure of mortality: rate of poaching + increased rate of disease transmission through human contamination. Workshop participants experimented with combining these two separate equations in a catastrophe scenario and this could be modelled as occurring at some frequency based on political upheavals in sub-Saharan Africa (say every 10–15 years). It could be modelled as having an initial severe impact which tapers off to a less severe but continuing impact.

It also became very obvious as working group discussion proceeded that in addition to figuring out how to model human demographics, the network needed to find a good way to introduce the impact of resource use on species survival. It was thought that a resource economist might be of help in this regard. The complexities of economic and conservation needs loomed large in a number of working groups, as well as the impact of different revenue generating schemes on the survival of the gorilla and its habitat. A lot of information seemed to be available but discussions would have benefited from more expertise.

In sum, this first experiment stimulated much thought about how to constructively model the impacts of human population pressures in several scenarios. It also

suggested, however, the importance of modelling resource use and generation as important variables influencing species survival.

Impact of institutional context

Network members went to the Uganda situation with the idea that a number of contextual factors would affect the success of any conservation initiative. These factors included the presence and strength of government policies on conservation, monitoring of conservation, political stability, and general well being of the population. There was a great deal of information on these variables from public sources. The Network members were not, however, trying to model these as impacts. Rather, they were interested in whether participants in the workshop seemed to feel they were important. Governance as an issue attracted a lot of attention and arose as an important issue in three working groups. All admitted, however, to suffering from an expertise deficit, as there were not enough social scientists present (only one local expert) and only one lawyer. Discussions in these groups revealed that there was the possibility of creating two distinctive scenarios.

■ The catastrophe scenario in which active government does not exist and in which the only positive actions were stimulated by the direct intervention of International Non-Governmental Organisations (INGOs) or the collaboration of local park officials with the INGOs. The only management regime which seemed to offer any hope in these circumstances was one of protection, and this only worked if armies and park officials had a global perspective: i.e., felt that the gorillas were an important resource to be conserved because of their global significance and importance to international tourism and conservation groups. Otherwise deforestation, contamination and random killings had the potential to threaten the viability of species survival.

■ The stable government scenario with some empowerment of local populations in which such schemes as trusts, revenue sharing (from ecotourism) and multiple use of the parks seemed to have fairly positive benefits. Here population pressure would not immediately translate into habitat destruction but over time might result in sudden policy shifts which would remove protection. More discussion of how to estimate probabilities is required.

These two scenarios probably have fairly wide applicability to the developing world.

On the whole, it appears that information concerning institutional context is fairly easy to obtain through journals and Internet sources. The literature search conducted at McGill turned up some very interesting material of good quality. This particular process, however, suggested that in addition to the amount and kind of government regulation and monitoring, the general well-being of the population and the political stability of the regime, the presence and active involvement of INGOs is a critical contextual factor, especially in unstable scenarios. In the stable scenarios, the presence of some kind of resource/revenue sharing regime is also critical if conservation is to work. It also suggested that the idea of developing some ideal-typical scenarios about institutional context is promising.

Impact of inclusion of expanded stakeholder group

The Network failed to secure an expanded stakeholder group at the Uganda PHVA. This was due in part to the lack of lead time and in part to lack of awareness of who those people would be. It became evident that defining the right mix of social and

biological scientists and practitioners, and obtaining the cooperation of local people by explaining their 'stake' in the process, demanded extensive and skilful communication to organisers. Specialists, working in their own discipline, need expanded definitions of the expertise of other specialists and a clear rationale for their inclusion. From the Network perspective, the Uganda workshop and our project could have benefited from the following experts: a) resource economists, b) natural resource management (e.g. forestry) experts, c) social anthropologists (with an interest in conservation), d) demographers, and e) human epidemiologists. They should be contacted early in the planning process and might be identified through the IUCN Social Policy Group or a local IUCN office.

Community representation remains a challenge. Network members were told that including representation below the district level would be difficult as people would not have the sophistication to deal with this kind of workshop.

In sum, the Network's mountain gorilla PHVA experience stimulated a much more detailed protocol for an expanded process. It is obvious that this workshop would have been strengthened by the addition of this expertise in the room, as many of the groups regretted its absence. In the case of this species, the biology was fairly well established, and people were eager to deal with some of the social science, economic and management topics.

Adequate expertise is especially important in order to include issues in the workshop agenda. A topic cannot be forced, either by a facilitator or a group member. It was decided by the end of the workshop that it would probably be a good idea to have a 'human process modeller' working side by side with the VORTEX modeller in the modelling group. This person could then try running demographic models or economic models and appeal to the working groups for input. The Network members could be used for this task. At a bare minimum, the Network members should include a demographer who can run Demproj in every workshop.

At the time of writing, the next Network meeting was scheduled for June 1998 in Canada. Future plans include experimenting with Canadian/North American PHVAs. This will give the Network a chance to compare situations where human population growth is not a driving dynamic to the cases where it is, such as Uganda. The Network members also hope to experiment with the use of Participatory Action Research (PAR) at another developing world PHVA, in order to bring in more local data as well as stakeholders. The Global Biodiversity Research Network PHVAs are very much a work in process.

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Demproj: This simple demographic projection software is available at no cost from The Futures Group International, 1050 17th Street, Washington, DC 20036. Fax: +1 202 775 9694.

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Towards best practices for population-environment partnerships

CARLOS ARAMBURÚ, PETER R. WILSHUSEN AND FRANK D. ZINN

Integrated conservation and development projects (ICDPs) are a widely used approach that seeks to improve social and economic conditions for natural resource dependent communities while protecting ecologically valuable habitats. While such projects frequently address income generation, education and health needs of local populations, they often overlook population issues such as family planning and reproductive health services. Since 1993, the University of Michigan Population-Environment Fellows Program has fostered partnerships between conservation and population organisations in a number of ecologically important areas around the world in order to address locally defined population concerns. This article presents examples of two such partnerships from Uganda and Brazil. Population-environment partnerships appear to increase trust with local communities, encourage inter-organisational learning and, in certain cases, economise on scarce resources. Over the long run, these linked interventions may contribute to population stabilisation around protected areas.

IN RECENT years, conservation practitioners have adopted protected area management strategies that attempt to both protect biologically diverse landscapes and attend to the needs of local people. While the biosphere reserve concept presented an early model for linking core protected areas with buffer zones and surrounding communities (Batisse 1984), it was not until the early 1990s that the so-called integrated conservation and development projects (ICDPs) gained wide currency (Wells and Brandon 1992, Pimbert and Pretty 1995, Larson *et al.* 1998). In many circles conventional national park management strategies were strongly criticised as overly authoritarian. Antagonism between park managers and local communities at times led to violent conflicts. In the widely cited case surrounding the creation of Kidepo National Park in Uganda, officials forcefully relocated the Ik people and caused irreversible cultural and social impacts (West and Brechin 1991).

Integrated conservation and development strategies (ICDPs) emerged in response to the problems associated with the 'fences and fines' approach to protected area management. ICDPs seek to improve social and economic conditions for natural resource dependent communities while protecting ecologically valuable habitats. Proponents of the ICDP approach reason that local communities will degrade forests and other areas less if they are organised to take action, have control and access to the natural resource base, possess adequate information and knowledge, and believe that their economic and social situations will improve (WWF-US 1995). Fundamental to the ICDP strategy is the notion that by seeking to provide local communities with adequate livelihoods, and by involving them to varying degrees in protected areas management, they will have a greater stake in protecting or sustainably using the resources within the protected area.

Local social and economic development involves a range of activities including improved agricultural and animal husbandry practices, income generation opportunities



*Community members near Una Biological Reserve, Brazil, presenting their environmental and health initiatives as part of a Population-Environment Fellows Program project to establish closer links between health and environmental organisations.
Photo: Alex de Sherbinin/IUCN.*

(such as low interest, revolving loan programmes), nature-based tourism, health and sanitation improvement, and agro-forestry. Several on-going projects from places such as Costa Rica, India, and Nepal suggest that community-based, participatory management strategies can work well under certain circumstances (Western *et al.* 1994). Strong investment in ICDPs by World Wildlife Fund-US is an indicator of the approach's prevalence and importance. In a recent review of the organisation's experiences with ICDPs, Larson *et al.* (1998) state that these types of projects receive over half of WWF's funding.

Compared to economic development and education initiatives, population activities such as the provision of reproductive health services have received less attention in the literature on ICDPs specifically and community-based conservation in general. In the context of this special issue of *PARKS*, the University of Michigan Population-Environment Fellows Program (PEFP) represents an example of a concerted attempt to join these two fields in and around protected areas where population pressures appear to be especially acute with respect to the conservation of biological diversity. As a recent report by Population Action International suggests, community-based population and environment (CBPE) programmes are increasingly prevalent, largely in response to the self-identified needs of community members, especially women whose role and potential for conservation work has often been overlooked. The report profiles 42 projects in Latin America, Africa, and Asia where organisations are pursuing both natural resource conservation and reproductive health activities, including improved access to family planning services (Engelman 1998).

This article presents some initial experiences of the University of Michigan Population-Environment Fellows Program and explores some key issues that have emerged for individual Fellows working in the field. The article describes the PEFP and introduces two case studies that explain how Fellows have created bridges between population and environmental organisations in order to establish joint projects in and around protected areas. It also provides a short discussion of some of the concepts and strategies that the PEFP uses to guide its programme. The article concludes with a discussion of some of the key lessons that emerge from the case studies as well as from conversations held at recent PEFP workshops.

The University of Michigan Population-Environment Fellows Program

The Population-Environment Fellows Program was established at the University of Michigan School of Public Health in 1993 with funding from the United States Agency for International Development (USAID). The programme offers two-year overseas fellowships to graduates with advanced degrees in areas related to population and environment. Applicants to the programme usually have a graduate degree in a

relevant area of study such as Public Health, Sociology, Natural Resource Management, Sustainable Development, or Demography. Applicants must also have course work or work experience that demonstrates both population and environment experience. The program has three primary objectives:

- To provide technical assistance to development organisations in formulating and implementing joint population-environment interventions.
- To provide valuable early career professional experience to recent graduates of relevant Masters and PhD programmes.
- To draw upon the experience of Fellows and host organisations to add to the understanding of sustainable development and the linkages between population, health, and environmental issues.

Fellows are placed as entry level professionals in conservation and development organisations for two-year assignments. Fellows utilise technical tools such as participatory rural appraisal, geographic information systems (GIS), demographic analysis, programme design, and needs assessment surveying, among others, in the design and implementation of field projects.

Population-Environment Fellows work with a wide range of host organisations on projects that include integrated community-based development programmes, linked population-environment service delivery, policy analysis of population-environment dynamics, formation of partnerships between non-governmental organisations (NGOs) working in different sectors, and buffer zone management. Since the programme's inception, Fellows have been placed with CARE, IUCN, The Nature Conservancy, Pathfinder International, UNICEF, World Neighbours, World Wildlife Fund, and many national-level NGOs. Over 23 Fellows have served in Africa, Asia, and Latin America.

Approaches to population-environment dynamics around protected areas

Understanding and addressing the complexities of population-environment interactions is central to development planning. Within the scope of Agenda 21 (the programme for sustainable development agreed by all nations present at the 1992 "Earth Summit" in Rio), population-environment concerns are tightly intertwined with recommendations for achieving sustainable development. In this context, linked population-environment programmes seek to simultaneously provide crucial reproductive health services and protect biological diversity. Strategies for linking population and environment activities demand specific technical knowledge in both areas. Programmes that have evolved within these sectoral areas present great differences. Population programmes emphasise family planning and reproductive health information and services. Environmental conservation programmes focus on ecologically important biomes, seeking to reduce or manage the level of destructive human impacts. One way of doing this is through the creation of protected areas.

The two types of programmes can have the greatest synergistic effects where key ecological areas are under pressure from rapidly growing populations. According to the 1992 IUCN report *Protected Areas and Demographic Change: Planning for the Future*, the strongest demographic impact in protected areas stems from migration into areas of high biodiversity, mostly by young, male adults (see de Sherbinin and Freudenberger, this issue, pages 38–53). High fertility may also have impacts,

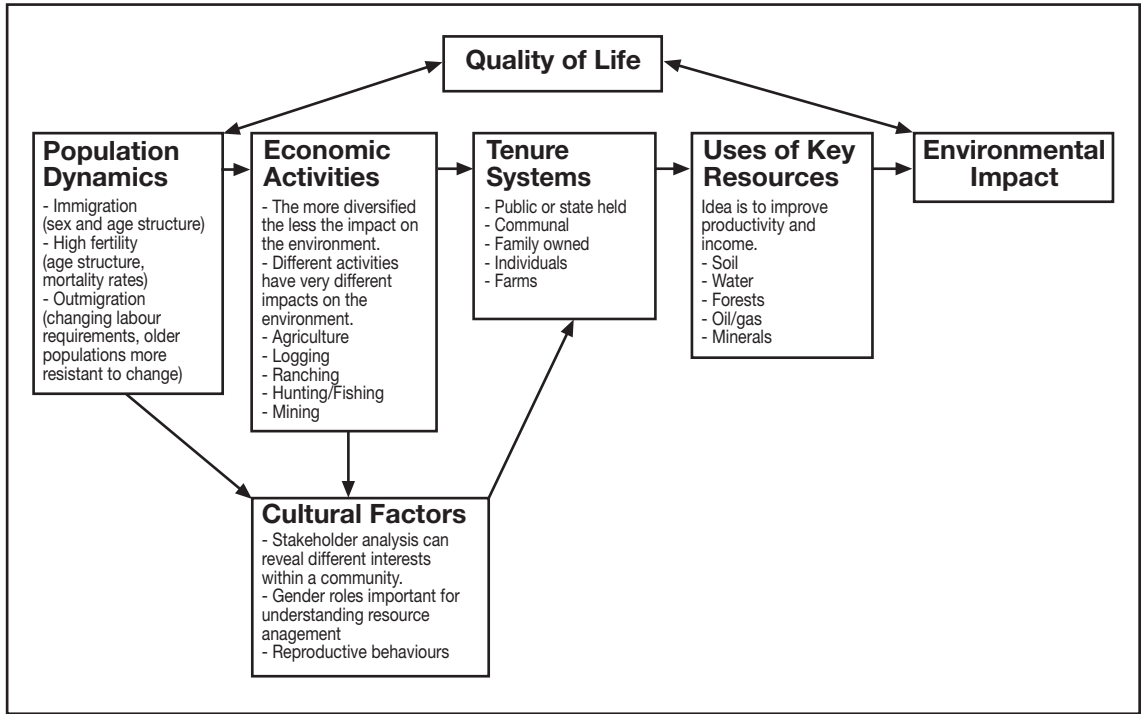


Figure 1. Links between quality of life, environmental impact and various mediating factors (after Aramburú 1993).

because growing populations require food (which leads to hunting and gathering within parks and/or land clearing for agriculture) and other natural resources (which leads to collection of non-timber forest products for subsistence use or income).

Population-environment dynamics emerge empirically in specific temporal and spatial contexts as a set of indirect relationships. More specifically, population dynamics associated with migration and fertility can have significant impacts upon human welfare and the environment, but these effects are typically mediated by socio-cultural factors. These factors include economic activities, legal and regulatory institutions, and cultural practices, among others. The mediating factors can either decrease or exacerbate the human and environmental impacts of population growth. In Figure 1, Aramburú (1993) notes some of the mediating factors. For example, various economic activities such as agriculture, hunting, and logging each create distinct types of impacts. Further, tenure systems structure collective human activities. Those communities without secure land or resource tenure, for example, most likely do not have strong incentives to conserve resources that they do not control. Cultural practices such as gender roles and reproductive behaviour also fundamentally influence human organisation and collective action. In sum, there are no simple relationships between population growth, human welfare and environmental impact. Understanding population-environment dynamics requires a detailed contextual analysis that accounts for the complex web of intervening factors that illuminate the constantly shifting relationships between social actors and their environment.

To help break what has been called “a cycle of increasing poverty, population, and environmental damage” (Dasgupta 1995), Aramburú (1993) recommends linked programmes that address the “self-defined priorities” of local people.

Linked population-environment programmes maintain the specialisations of each type of organisation but attempt to join the population, health, environment and other sectors at the local level. Table 1, adapted from Aramburú (1993), identifies an initial framework for integrating prototypical family planning and conservation programmes.

In order to link population and environmental concerns, the PEFP places Fellows where they can actively pursue partnerships between organisations or programmatic

Table 1. *Towards linked population-environment programmes (after Aramburú 1993).*

strategic criteria	population perspective	integrated perspective	conservationist perspective
1. Programme focus	<ul style="list-style-type: none"> • Demographic impact • Increased contraceptive prevalence 	Improve quality of life: <ul style="list-style-type: none"> • Income generation through better use of natural resources • Improve health standards and status of women 	<ul style="list-style-type: none"> • Resource conservation • Wildlife preservation
2. Target population	<ul style="list-style-type: none"> • Urban, densely populated rural areas • Low contraceptive prevalence 	<ul style="list-style-type: none"> • Border area populations • Urban populations with low health and sanitation levels 	<ul style="list-style-type: none"> • Located in protected or ecologically significant areas
3. Community participation	<ul style="list-style-type: none"> • Vertical family planning programme • Reliance on female voluntary workers 	<ul style="list-style-type: none"> • Community defines economic and health needs • Gender issues approach • Channel programme through local organisations 	<ul style="list-style-type: none"> • External prioritisation of resources that require conservation or protection • No analysis of economic value of resources to local community • Actions through male promoters/guards
4. Technological innovation	<ul style="list-style-type: none"> • Emphasis on introduction of contraceptive methods • Weak integration with other health interventions 	<ul style="list-style-type: none"> • Value and utilise local knowledge related to health and resource management • “Package” approach 	<ul style="list-style-type: none"> • Emphasis on conservation and protection rather than rational use • Use of external knowledge and technologies
5. Programme sustainability	<ul style="list-style-type: none"> • Transfer of costs to clients • Integration of family planning into other services 	<ul style="list-style-type: none"> • Enhance income generation and economic development • Create local culture for resource conservation, sustainable use, reproductive health • Community autonomy and empowerment 	<ul style="list-style-type: none"> • Sanctuary approach • External patrolling and control over protected areas

integration within organisations. Partnerships in this context represent collaborative relationships between two organisations or departments to provide multiple services or information to a specified target population. Presumably, partnerships will allow specialised organisations (or programmes within organisations) to respond to population and environmental challenges more comprehensively while minimising outlays of technical and financial resources.

Case studies from the Population-Environment Fellows Program

When integrated conservation and development projects start up in local communities surrounding protected areas, often one of the needs that becomes apparent almost immediately is health care. This concern is especially voiced by local women who generally have a longer-term view of their communities' needs and problems given their concern for the future of their children. PEPF Fellows have facilitated partnerships and programme integration to expand the reach of reproductive health services into these remote areas. For example, Population-Environment Fellow Tom Safford facilitated a working partnership between two Brazilian environmental organisations and Pathfinder International to bring needed reproductive health information and services to populations living in and around Grande Sertão Veredas National Park and Una Biological Reserve. Polly Dolan, a fellow based in Uganda, established a partnership between CARE/Uganda's conservation project in Queen Elizabeth National Park and a USAID-funded reproductive health project in order to expand both organisations' reach. These two case studies are discussed below.

Reproductive health services around Grande Sertão Veredas National Park and Una Biological Reserve, Brazil

Tom Safford was placed with Pathfinder Brazil from September 1995 to September 1997. His work helped establish formal working relationships between Pathfinder International, a family planning organisation, and two local environmental NGOs. The first partnership was established with an organisation known as Funatura (Fundação Pró-Natureza). Based in Brasília, Funatura is the oldest and one of the largest Brazilian environmental NGOs. Its partnership with Pathfinder has focused on the provision of health and family planning services to communities living in and around Grande Sertão Veredas National Park.

The park was established in 1989 and covers 84,000 ha of biologically diverse high plains areas characteristic of the *cerrado* or mixed savannah biome. Cerrado landscape features *veredas* or forest patches of spring-fed Mauritian palm trees. In addition, it contains areas of dense, thorny vegetation known as *caatinga*. Grande Sertão Veredas National Park houses many unique and threatened species of plants and animals including the jaguar, ocelot, maned wolf, pampas deer, and the red and green macaw (The Nature Conservancy 1996). Expansion of large-scale soy agriculture presents the single largest threat to this fragile biome.

The partnership between Funatura and Pathfinder-Brazil was established in order to improve the living conditions of communities in and around the park, specifically health and hygiene standards related to poor service provision and environmental conditions. Other objectives include: (1) to raise awareness about the linkages between environmental conservation and health issues, (2) to provide family planning services and information to communities in the region of the park, (3) to

develop and promote the utilisation of local medicinal plants and home remedies as a sustainable use of resources in the region, and (4) to promote community empowerment and mobilisation to preserve the environment.

The second population-environment partnership that came about with PEPF involvement linked Pathfinder-Brazil and a conservation and development NGO called Jupará. Jupará had previously established projects focused on agro-ecology in communities surrounding the Una Biological Reserve. The reserve was created in 1980 and comprises 7,000 ha of *restinga* and tropical wet forest types just south of the city of Ilhéus in the Brazilian state of Bahia. *Restinga* forest is characterised by low, shrubby vegetation and distinguished by the presence of an endemic palm (Thomas *et al.* 1996). The reserve is home to the endangered golden-headed lion tamarin *Leontopithecus chrysomelas* and contains some of the last remnants of the highly threatened Atlantic coastal rain forest. Once a region of economic prosperity, southern Bahia has fallen on hard times with the decline of its cocoa plantations. As a result, unemployment has surged and migration has increased. Invasion of land around the reserve by unemployed peasants is a serious concern.

Jupará's main activities in the region centre on sustainable agriculture, community mobilisation and environmental education. Jupará's community work led to the realisation that a more integrated programme that included health care and, specifically, improved reproductive health care would be highly valued by community participants. Its partnership with Pathfinder aims to meet the needs of community members in a more integrated way and to expand reproductive health care services to an under-served community.

Through his work on developing partnerships with environmental organisations, the Fellow helped Pathfinder to develop an integrated population-environment strategy for all of its operations in Brazil. This strategy will attempt to provide reproductive health information and services to under-served communities in Brazil by forming more connections with on-going environmental interventions. Rural areas of Brazil are disproportionately under-served in terms of family planning information and services. At the same time, Brazilian environmental NGOs tend to focus on rural interventions. Programmatic linkages with these types of environmental organisations can aid Pathfinder in meeting the reproductive health needs in under-served rural communities in Brazil.

Improved family planning services around Queen Elizabeth National Park, Uganda

Building on the work of a previous fellow, the PEPF placed Polly Dolan with CARE Uganda from February 1996 to March 1998, where she worked with communities living in and around Queen Elizabeth National Park (QENP). QENP was gazetted in



Characteristic restinga landscape near the Una Biological Reserve, Brazil. Photo: Alex de Sherbinin/IUCN.

1952 and covers 1,978 km² in Uganda's Rift Valley. Approximately 25,000 people live within the park in ten villages and earn their livelihood fishing on lakes George and Edward. CARE Uganda has worked with a total of 13 villages in and around the park since January of 1996 in a project called the Queen Elizabeth National Park Fishing Villages Conservation Project (QENP-FVC).

The fishing village populations subsist almost entirely on resources found within the Park and lakes. Very little agriculture is performed in the villages, and fish is the main staple food. Fishing is also the economic basis for the villages, providing income to fishermen and in turn to other businesses and service-related enterprises present in the communities. Both licensed and unlicensed fishermen use unsustainable fishing methods such as undersized nets and destructive 'beating the water' techniques, and are putting increasing pressure on the fish resource. While collecting resources such as fuel-wood, poles, *ambatch* (floats) and grass (for thatching) is illegal in all but three of the villages, the communities depend on the Park for these resources. An unofficial but well-organised system of bribe payments to Park rangers exists, despite efforts by the Park management to eradicate it.

Conflicts between the Park's management and the fishing village residents have existed ever since the Park's establishment. Conflicts have been mainly related to villagers' exploitation of natural resources within the Park, such as poaching, farming, bush burning, cattle grazing, and especially collection of fuel-wood and building materials. The fishing village communities resent the Park authorities for preventing them from undertaking activities within the Park boundaries necessary for their livelihoods, such as collecting wood for both cooking and fish smoking. Likewise, Park authorities consider the presence of people in the Park to be a threat to conservation.

The goal of CARE's QENP-FVC project is to improve the livelihood security of communities through ways that support the environmental conservation objectives of the park management. The project has encouraged conservation through improving sustainable access to fuel-wood outside the park, introducing sustainable fish harvesting methods, and bolstering community involvement in resource use policy development.

CARE's interactions with the fishing village communities revealed from the beginning that an exclusive focus on natural resource management was an inadequate response to the challenges faced by people living in the fishing villages. The community identified improved health and family planning services as pressing needs that should be addressed to strengthen their household livelihood and security.

In response to this un-met need, the Fellow identified an opportunity to develop a partnership between CARE's conservation project and the South Rwenzori Diocese family planning service delivery project (SRD), a project that is part of a larger USAID-funded programme. The SRD project works in 15 villages, five of which are also QENP-FVC project villages. The collaboration between the projects to date has consisted of shared training activities, increased sharing of data and information, and joint household visits by the project's extension agents when feasible. The collaboration between projects has attempted to educate all extension agents and field staff on both reproductive health and natural resource issues, but has emphasised the importance of generating referrals to agents trained in a specific area in order to keep workloads manageable.

CARE has recognised the benefits of linking with SRD because it meets some of the expressed needs of the community. In fact, links between CARE field agents and SRD's community-based family planning distributors have helped to increase the level of trust among local communities. SRD has also gained by improving access to reproductive health information among men, a population that had not previously been reached as effectively. Extension agents from CARE's QENP-FVC project can act as sources of information about reproductive health for men and refer them to SRD's distributors for further information or services. While the partnership between these two organisations is still in its nascent stages, the benefits of partnering have been apparent for both.

Conversely, both CARE and SRD have learned important lessons about the organisational challenges inherent in partnering. In this case, CARE has greater organisational capacity than SRD. Concerns have emerged that one partner might end up carrying greater financial and organisational responsibilities. Additionally, while CARE has paid its extension agents a small allowance, SRD community-based distributors have worked on a voluntary basis. Both organisations have become concerned that this difference might produce contention at the community level. Finally, both CARE and SRD became aware that the extra responsibilities associated with the partnership might overburden their respective field staffs. As a result, each organisation has opted to maintain the beneficial communication links that the partnership offers while maintaining their individual specialisations (Dolan 1997).

Initial conclusions regarding linked population-environment programmes

A well-formed partnership can ensure that the goals of both a population and an environmental organisation are met, not only by using the capacities of both organisations to deliver both population and environmental services, but also by strengthening each organisation's capacity to meet its goals. An organisation can increase its capacity by learning from the strengths of the sectoral strategies and approaches of its partner. Another positive aspect is that partnerships are seen as powerful approaches in the eyes of communities since they ensure that a broad spectrum of needs are being met.

When entering into a partnership, however, several things must be kept in mind. For instance, partnerships require strong organisational, administrative and strategic planning commitments. In addition, modes of partnering will differ depending on the objectives, size, style etc. of the two organisations involved. Organisations considering partnering should expect that the sustainability of projects supported by partnerships will become an important issue.

Population-environment integration in development organisations

Partnering is not the only approach to linking population and the environment. Many development organisations can implement integrated strategies on their own (i.e. offering services in both population and environment). However, many of the issues raised regarding partnering still hold, since these organisations may also implement sectoral interventions individually.

Strategies for integrating population and the environment within a single development organisation can be classified as weak or strong. A weak

integration strategy might involve only training and service referral activities while a strong integration strategy would additionally involve directly offering population and environment services. While providing training and service referral represents a step in the right direction, this type of strategy does not necessarily ensure that a community's needs are being met. This type of strategy would also require that a sectoral organisation be available to provide services and accept referrals.

Conservation organisations are becoming increasingly involved in community development. Integrated conservation and development projects (ICDPs) tend to focus primarily on conservation, resource management, and income generating projects and often de-emphasise the family planning and reproductive health needs of a community. Where applicable, there is a need to more strongly emphasise in the ICDP framework components addressing family planning, as well as family and reproductive health. Conservation programmes have the opportunity to take a lead role in integrating these services.

Sustainability of linked interventions

Since the Population-Environment Fellows Program is moving out of the pilot project phase, it has begun to take a systematic look at how to ensure the sustainability of linked population-environment interventions. A project that has the long-term commitment of two organisations may be more sustainable, as the resources of both organisations can be utilised to meet the community's needs and the project's goals.

Regardless of the model used for linking population and the environment, projects need to secure funding to survive. In addition, sustained funding helps to ensure the continuation of projects, as well as the continued motivation of organisations to achieve their goals through linking population and environment. Sources for long-term funding include, but are not limited to: fees for service, income generation, and linking public and private organisations, to identify both national and local sources of funds. Building connections to national organisations, in both the public and private sectors, provides projects with potential resources for long-term funding and also provides projects with the social and political support needed to sustain linked interventions.

By involving the local community in the policy process, organisations can build support for their programmes and improve programme effectiveness. In addition, when a community is able to take over a project from more short-term participants or is able to implement programmes on its own, projects will become more sustainable.

Indicators of project impact

Linked interventions, such as those being undertaken by Population-Environment Fellows, are new and thus have begun to develop indicators for evaluating both their long and short-term impact. One important impact that integrated or linked population-environment projects can have is the increased awareness of the goals and approaches of the various sectors involved in the project. For example, population organisations will have a better understanding of the approaches and goals of environmental organisations, and *vice versa*. As a result, these sectoral organisations can learn from and draw on the strengths of each other.

Much of the work that Population-Environment Fellows are undertaking is experimental. While not all of the strategies will be successful, each one provides lessons to draw on for future attempts at implementing linked interventions as well as future attempts at attaining long-term population and environmental goals.

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Migration to protected areas and buffer zones: can we stem the tide?

ALEX DE SHERBININ AND MARK FREUDENBERGER

Through a series of case examples, this article examines population movements in and around protected areas, and suggests a series of policy responses at national and local levels. These include, among others, policies related to infrastructure and investment, land tenure, and access to and management of natural resources. The authors conclude that protected areas can benefit from strategic partnerships between conservation NGOs, protected area managers and public policy experts to address demographic trends that affect conservation.

PERHAPS THE single biggest demographic issue confronting protected areas in the developing world is in-migration¹. Unlike natural increase (births minus deaths), which tends to produce slow but steady growth in human populations, migration flows respond very quickly to changed circumstances in both migrant sending and receiving areas. Precisely because many of the factors that influence migration are outside the control of protected areas managers (or, for that matter, government agencies of any kind), it can often seem an impossible task to manage these flows in ways that diminish the negative impacts on biodiversity. The purpose of this article is to explore the issue of migration in and around protected areas through an examination of specific case examples in different ecological and demographic contexts, and to propose some policy options for dealing more effectively and proactively with population movements.

Before addressing the specifics of migration in the protected areas context, it is important to understand *why* people migrate. Here, economic motives reign supreme. In essence, people are willing to pay the cost of and overcome the barriers to migration because they expect an improvement in well-being. In rare instances, due to poor communication flows between destination and source areas, the expectation of improved circumstances may not be realised. But, more often than not, migrants do indeed experience tangible benefits from moving, even if the sheer number of people on the move is resulting in increased competition for jobs, land, and/or resources in destination areas. Non-economic factors influencing migration flows, such as family reunification or retirement, are typically much less important, particularly in the case of rural-to-rural migrations that characterise most population movements in and around protected areas.

Migration researchers speak of 'push' factors, which influence people's decisions to leave a particular area, and 'pull' factors, which influence people's decisions to settle in a given area. In the case of migration to protected areas and buffer zones,

¹ Although it is somewhat artificial to separate migration from the larger issue of population growth, we do so here for the purpose of clarity. Evidence suggests that countries with high rates of population growth also experience high rates of urban-rural and rural-rural migration. Population growth in source areas is one of the factors that can 'push' people to migrate to urban and/or frontier areas, as described in the paper on Tanzania by Mwamfupe, this issue, pages 3–14.

a review of more than 30 case studies has revealed a number of major push and pull factors, many of which operate simultaneously (see Table 1). In addition to these factors, there may be a number of underlying conditions (or intervening obstacles) that facilitate or impede migration into an area. These include, among others, accessibility by land or sea (i.e. the quality and density of the road network, proximity to major water bodies, etc.), the distance from more populated areas, the topography (i.e. mountainous or flat terrain) and communication links (telephone, radio etc.). Often, the development of roads and infrastructure for one purpose, be it logging or tourism, will facilitate migration into that area for other purposes such as cattle ranching, cultivation, or resource extraction. In this sense, migrants often follow economic investments.

Of the 'push' factors listed in Table 1, many are outside the control of protected areas managers. Economic stagnation, land scarcity and resource depletion in migrant source areas can generally only be dealt with in the areas of origin, and require attention from the relevant national authorities, international development agencies, and development NGOs. For instance, economic recessions in urban areas, a factor in many African countries, are resulting in an increasing number of urban dwellers who return to their native areas, either permanently or seasonally, to plant crops for supplemental income. This is increasing pressure on some forest reserves and protected areas, and yet little can be done about it at the local level.

The factors in the 'pull' column, by contrast, offer greater scope for local and regional action. The strategies for addressing these pull factors – such as land titling, land use planning, co-management and conditional territorial exclusion – will be

Table 1. Migration to protected areas and buffer zones: 'push and pull' factors.

push	→	pull
Scarcity of land and resources in rural areas (due to population pressure, climatic change, degradation, unsustainable use etc.)		Availability of land and resources (frontier areas, government owned 'open access' lands etc.)
Scarcity of employment and economic opportunities in urban and rural areas		Existence of economic opportunities (e.g. development projects, tourism operations), and, in some cases, proximity to urban areas
Migration as 'rite of passage' for young males or females		Any of the above
Civil conflict, tenure conflict, wars, expulsions		Relative peace, absence of conflict, safe refuge
Ethnic differences, minority status		Ethnic affinities, or lack of traditional ethnic claims to land/resources
Lack of social services (health facilities, schools etc.)		Availability of social services and other infrastructure
Government resettlement schemes		No 'pull' factor necessarily present, though land availability may be a rationale
Any of the above		Lack of enforcement and consequent facility of carrying out illicit activities (e.g. logging, drug cultivation, gold/diamond extraction etc.)

presented in greater detail in the section on policy options. In some cases, solutions will still reside at higher levels. For example, changing land tenure policies that facilitate the conversion of forested areas to private property through land clearing may require advocacy efforts in the national capital.

The next two sections examine migration issues in different ecological and geographic contexts. The first addresses frontier migration to tropical forest areas and island protected areas, the second addresses migration from densely settled and degraded ecosystems to relatively resource abundant ecosystems. Examples are used to illustrate the major issues and the actual or potential policy responses.

Frontier migration

Many of the protected areas of highest biodiversity value are located in frontier areas of the developing world; areas that were at one time isolated from population trends in the heartland by virtue of their remote locations. However, as land and other resources become scarcer in the more densely settled urban and rural 'core areas', there is an increasing tendency for landless poor to migrate to 'the peripheries' – i.e. frontier areas. Studies in Costa Rica and the Philippines also demonstrate a strong correlation between the economic downturn brought on by the debt crisis of the early 1980s and frontier migration (Cruz *et al.* 1992).

In many countries, governments provide direct and indirect incentives for relocation to frontier areas. In Indonesia and Zimbabwe these take the form of overt relocation schemes. In much of Latin America, migration to resource-rich areas can be characterised as politically expedient, insofar as it postpones the need for land redistribution, siphons off the unemployed, and creates opportunities where few others exist. In the case of Costa Rica, Cruz *et al.* point out that land and resource policies dating from early in this century, when unexploited forest areas were seen as a hindrance to 'development', have facilitated present day deforestation and land conversion. Thus, the combination of governments' *laissez-faire* attitudes and the economic needs of thousands of would-be migrants conspire to induce even further migration to frontier areas.

Three case examples illustrate the processes at work in frontier migration. The first is Calakmul Biosphere Reserve (CBR) located in the southern Yucatán Peninsula of Mexico along the border with Guatemala, and the second is the Dzanga-Ndoki National Park in south-western Central African Republic, sandwiched between Congo and Cameroon. These sites have a number of things in common, including presence of nearby international borders, trafficking in illicit goods (timber and diamonds, respectively), large areas of until now unspoiled timber resources, and the relative lack of law enforcement. The third case example, that of the Galapagos Islands, illustrates issues in frontier migration to island protected areas.

The Calakmul Biosphere Reserve of the Yucatán of Mexico

The Calakmul Biosphere Reserve is an important site for biodiversity conservation because it constitutes part of a larger system of protected areas known as the La Selva Maya, which joins Mexico, Guatemala and Belize to form an ecological corridor of over two million hectares stretching between the central Yucatán and the Belizian forests (Ericson *et al.* 1998). Established by presidential decree in 1989 and accepted into the UNESCO network of biosphere reserves in 1993, the reserve covers approximately 800,000 ha including core and buffer zones. Although to date no

management plan has yet been approved, the general understanding is that ecologically sustainable production activities are allowed within the buffer zone while no human activity is permitted within the core zone. Conflicts with local communities arise from the fact that the borders of the core zone cut across the territory of pre-existing communal lands (*ejidos*) and privately held properties. Indeed, the future of the reserve is compromised by both a steady influx of migrants into the core and buffer zones and rapid natural population growth rates in the *ejido* communities surrounding the reserve.

Throughout the region of the Calakmul Biosphere Reserve there are ruins from Pre-Classic and Classic Maya civilisation that attest to the long history of human settlement. Archaeological discoveries indicate that the Classic Mayans used intensive agricultural practices and elaborate hydrological works to support substantial population densities. Since the decline of the Classic Maya civilisation (circa AD 950), the southern lowland regions became largely uninhabited. For centuries after the Spanish conquest, the area provided a safe refuge for Mayan resistance. In the early 1900s, labourers in the chicle and timber industries first migrated into the region. Due to the seasonal nature of their work, these relatively few migrants were largely transient and dependent on fluctuating markets and on available jobs. By the 1970s, *ejidal* colonists began arriving in the region and continue to arrive today. The population living around the reserve is now estimated to be about 25,000 people. While population density is only 2.5 persons per square kilometre (including the reserve), the aggregate growth rates of some communities are very high ranging from 9% to 23% per year. Some communities are expected to double their population in a mere 3–7 years. Total fertility rates based on government census data show a range of 3.9–5.2 births per woman.

The people now living in and around the reserve have been *pushed* from their places of origin by lack of land, lack of employment, displacement by commercial agriculture, ecological catastrophe, and social unrest, as in the case of Chiapas, in recent years. They are subject to the *pull* of available land and the chance to establish new lives in a relatively unpopulated and still peaceful area. A fourth wave of in-migration, mostly government and service-industry workers, can be anticipated with the recent establishment of the ecological municipality of Calakmul, the strengthening of infrastructure, and the development of tourism in the region.

While the population density appears rather low in and around the Calakmul Biosphere Reserve, the ecological impact of the rapidly growing region is profound. Newly arrived settlers clear land in and along the poorly protected reserve for cash crop production of chillies, destined for the urban Mexican and north American markets. Forests are being converted to food crop production and then livestock raising. Illegal cutting of high value tropical forest species in and around the reserve further depletes the resource base. At a time when rapid forest

Mayan ruins at the Calakmul Biosphere Reserve in the Yucatán of Mexico. Mayan ruins are a major attraction for tourists, and in-migration has been stimulated by the growth of the tourist industry. Photo: Mark Freudenberg/WWF.



conversion is occurring, the national and international tourist industry, attracted by the magnificently restored Mayan ruins, is moving quickly to expand tourist facilities through construction of access roads to the reserve, a pipeline bringing fresh water from the highlands near the Guatemala border, four-star hotels and an airport near the reserve. Migrants are further drawn into the area by the expanded employment opportunities.

The Dzanga-Ndoki National Park of the Central African Republic

The rich biodiversity of the central African forests found within the Dzanga-Ndoki National Park of south-western Central African Republic is threatened by an influx of migrant labour drawn by the *pull* of extensive logging taking place in concessions in the buffer zones around the reserve and widespread artisanal diamond mining taking place in the northern buffer zone (Mogba *et al.* 1996, Mogba and Freudenberg 1998). These twin economic engines draw labourers into the region from as far away as Senegal and Mauritania. The story of the artisanal diamond mining industry is indicative of the role mining plays in frontier areas of the world. Similar stories occur elsewhere with gold mining in the Amazonian forests, sapphire extraction in Madagascar, and gold mining elsewhere in central and southern Africa.

The Central African Republic has long been an exporter of diamonds. Diamonds provide roughly 60% of the national exports. The precious mineral is located in alluvial deposits along the many streams and rivers of the dense tropical forest areas of the country. The south-western corner of the Central African Republic, where the Dzanga-Ndoki National Park is located, is known as a highly productive area for diamond mining. Throughout the forested regions of the country, diamond mining camps are found along the stream courses where diamonds have been discovered, often by the BaAka and other 'pygmy' populations of the region. No comprehensive census has been conducted, but camps range in size from 50 to 4,000 residents. Camps grow and decline rapidly in size in relation to the richness of the diamond fields. Young men and women in these settlements dig into the stream beds and along the banks to remove vegetation and top soil until they reach the layer of gravel that contains raw diamonds. Craters cut into the soil sometimes reach 5–8 metres in depth.

The area excavated for diamonds often resembles a moonscape of craters surrounded by piles of sterile mud and clay.

The ecological impact of diamond mining is severe on vegetation and wildlife. The extraction of diamonds from large pits destroys habitat along the many streams and rivers and pollutes the waters. Fish habitats are thus decimated by mining activities. But most importantly for the future of the Dzanga-Ndoki National Park, diamond mining contributes significantly to wildlife poaching in both the Special Dense Forest Reserve and the national park.

A diamond-miner cleaning diamond-laden gravel, dug up from deep pits cut into the stream bed. Sangha-Dzanga Special Dense Forest Reserve, Central African Republic. Photo: Mark Freudenberger/WWF.



Poaching is prevalent because miners pay handsomely for wild meat hunted in this luxuriant and bountiful tropical forest. Meat from domesticated livestock is generally not available in local markets because tsetse fly infestation limits the expansion of goat and cattle production. Hunters have largely decimated the wildlife from immediate areas surrounding the diamond camps. While wildlife populations are most likely declining around these settlements, forest clearing for agriculture is expanding. Miners consume prodigious amounts of alcohol fermented from manioc and corn. Women are the main producers of alcoholic beverages and are also the principle growers of crops consumed for food and grain-based alcoholic drinks. Using slash and burn techniques, fields are cut out of the dense tropical forest around the major diamond mining settlements. This in turn further degrades the habitats so vital to wildlife.

Galapagos Islands in Ecuador

The Galapagos islands are among the largest, most complex, and most biologically diverse archipelagos remaining in the world that are still largely in a pristine condition (MacFarland and Cifuentes 1996). Galapagos National Park, founded in 1959, is one of the best known national parks in the world. The Galapagos' natural beauty and importance for biological research make them a popular destination for tourists from around the world. The park's 60,000 visitors a year generate over \$3 million in park fees and roughly \$40 million in tourism dollars, which makes it an important asset for the national economy. World attention has been recently focused on the waves of migrants from mainland Ecuador to the Galapagos Islands. In-migration undermines the IUCN World Heritage Site due to a number of threats linked to the arrival of workers on the islands and the unsustainable practices and species they bring. Species are being depleted at an alarming rate due to overfishing, increased agricultural production, the arrival of goats, pigs, rats and cats as well as the introduction of fast growing species such as guava and raspberry.

Archaeological evidence clearly indicates that the Galapagos never received aboriginal residents. After accidental discovery of the islands by the Spanish in 1535, the islands became the base for a succession of seafarers. The islands were used as anchorages and refuges as well as places to obtain water, firewood, salt, and fresh meat. With the annexation of the islands in 1832 by Ecuador, attempts were made to colonise the islands. Many attempts were unsuccessful, but by 1900 the population of the island numbered approximately 600. From 1900 to 1940, the net increase in size of the human population was nearly nil. However, by 1949 population growth began to occur, characterised by waves of migrants moving on to the islands after earthquakes, droughts, and other disasters on the mainland. While population growth in the early 1960s was low, by the 1980s nature tourism began to draw in workers. Later, booms in the fishing industry drew in further migrants.

The income generated by tourism and fishing booms on the Galapagos has created an income differential in relation to the mainland, and government subsidies to the energy and transport sectors further fuel migration. At 6% per year, the annual growth rate on the islands is three times the national average (Fundación Natura and WWF 1998). It is estimated that with the high rate of in-migration, population may double every 7–12 years. By 2003, the population of the islands is expected to grow to 14,000–20,000. Most migrants come in search of higher wage opportunities supplied by the tourist, fishing, service and public sectors. The labour force is highly

mobile with much movement between the mainland and the islands occurring. While the precise causes and dynamics of both in-migration and out-migration are not yet fully understood, it is clear that many factors *push* people to leave the mainland and other factors *pull* them to new employment and livelihood opportunities on the islands.

As the three case studies described above exemplify, migration is caused by a wide range of factors ranging from transformations in the international economy to profound changes in local economies and societies. Tracing back the causes of in-migration to areas of high biodiversity, often located in national parks and other state reserves, requires a multifaceted and historical approach to understanding how and why settlement patterns change over time. Lightly populated areas are often found along national frontiers or in peripheral locations in the national economy, yet national governments often exercise little effective resource management control over the national parks and other state reserves situated in these remote areas. With growing alarm, conservationists note that indigenous management regimes are often breaking down because of a lack of recognition and protection from the state and the onslaught of newcomers who fail to respect the resource norms and practices of the local peoples. Indeed, frontier areas of high biodiversity are the places where illegal and ecologically deleterious resource extraction activities often proliferate because effective resource management regimes are lacking.

Migration in degraded environments

In many areas of the developing world, subsistence farmers, fishermen and pastoralists are heavily dependent for their survival on a fragile natural resource base. In such 'constrained ecosystems' (Agbo *et al.* 1993), environmental fragility is linked to periodic drought, poor soils, steep slopes or any combination of the above. In many such areas, land and resource degradation have reached such a critical point that people are forced to leave their rural areas of origin to seek a better life. The set of destinations is generally limited to three options: other countries (as has occurred from Haiti and Mexico to the United States or between countries in Sub-Saharan Africa), urban areas, and other rural areas. In countries with few, if any, resource rich areas, migration to zones that have received some protection status, or in which ecosystems are being rehabilitated, is a promising option. These are the 'islands of biodiversity' surrounded by seas of human-altered landscapes referred to in the editorial.

This section will provide examples of protected areas in the African Sahel and the Indian sub-continent that are attracting migrants from resource poor areas, and briefly outlines actual or potential coping strategies. The Sahel, situated between the humid tropics and the Saharan desert, is a thinly populated region known for its fragile soils and periodic drought conditions. Population densities range from 2 persons per km² in Mauritania to 45 in Senegal. In contrast, the Indian sub-continent is graced with more abundant water resources and higher quality soils, and yet the population densities are the world's highest for largely agrarian societies. India, the demographic giant, has a density of 326 persons per km², and Bangladesh has nearly three times this level. The Sahelian protected areas covered in this section include W, Pendjari and Waza national parks in Niger, Benin and Cameroon, respectively.

The examples from south Asia include Jaladpara Wildlife Refuge in West Bengal, India, and Royal Bardia National Park in Nepal.

W and Pendjari National Parks in Niger and Benin

With over one million hectares straddling Niger, Burkina Faso, and Benin, W National Park is one of the largest transfrontier parks in West Africa (Le Berre and Messan 1995). The 220,000 ha located in Niger is in the most humid zone, where rainfall averages 600–800 mm per year. The park contains a remarkable variety of relatively unspoiled ecosystems, from flood plains and wetlands associated with the Niger River, to gallery forests, clear forests, thorn covered savanna and banded vegetation. Due to the annual flooding by the Niger, the park is species-rich, including crocodiles, African and Royal pythons, hippopotamus, African elephant, bushbuck, Cape and Red duiker, and the last surviving individuals of a giraffe sub-species particular to West Africa. Some of the reptiles and mammals are subject to illegal poaching. The park also plays host to 400 bird species that frequent the region during the northern winter.

Due to the droughts of the 1970s and 1980s, many nomadic pastoralists were *pushed* from northern Niger to the southern parts of the country and northern Benin in search of pasture. As a consequence of in-migration and natural increase, the population of Say District, of which the park is a part, more than doubled from 74,800 to 164,300 people between 1977 and 1987. Demographic trends and changes in park regulations have led to an adaptation of survival strategies in the area. Villages in the past that relied primarily on hunting or fishing are turning to agriculture because of restrictions on hunting and declining fish stocks. Nomadic pastoralists are tending to settle down in the area adjacent to the park, practising a mix of agriculture and livestock raising.

By and large, the local population values the park as a source of natural resources, and do not resent its protected status. High densities of wild herbivores in the park result in the movement of surplus animals into surrounding areas, where the local population exploits them through hunting cooperatives, big game hunting, and photo safaris. The park has resulted in a net gain for local standards of living. The park authorities have granted privileged access to local villages for the collection of poles, dried *palmyra* palm fronds, and grass, and for regulated fishing. According to Le Berre and Messan, “these channelled activities represent a source of reciprocal earnings and alert the local people to the need to reserve these markets for themselves”. This reduces the uncontrolled exploitation of park resources. Currently, the park is under consideration as a Biosphere Reserve, which would increase the capacity to adopt a bioregional approach to conservation.

Located just 25 km to the south-west, Pendjari National Park in Benin is a study in contrasts. A strictly protectionist stance has contributed to malnutrition among the local population, where natural increase and government sponsored transmigration schemes have resulted in a dramatic increase in population density over the past 20 years. The current density just outside the park is 38 persons per km², which is three times the corresponding level in Niger. The local population is largely alienated from the park, gaining nothing from their location on park boundaries, and often losing livestock to marauding baboons. Agbo *et al.* suggest that locals might be given access to the park for controlled hunting in order to diversify their diets and generate good will.

Waza National Park in Cameroon

Also contrasting with W National Park is Waza National Park in northern Cameroon, 1,200 km due east (and 800 km north of Dzangha-Ndoki), where the intensity of local resource use is threatening to undermine conservation efforts (Scholte 1997). Situated in the Sudano-Sahelian zone, the park has 170,000 ha of flood plain on the Logone River. It contains populations of large mammals, including elephant, giraffe, hippopotamus, several antelope species, three primate species, warthog and predators such as lion and spotted and striped hyena. In the early 1980s the park was cut off from its water supply due to the Maga dam and associated large-scale irrigated rice perimeters. As the flood plain lost its value for fishing and grazing, many locals migrated out of the area in search of other opportunities.

Gazetted in 1968, the park was established in an area that had traditionally received nomadic pastoralists and fishermen on an annual basis following floods of the Logone river. Since 1994, IUCN's Waza Logone project has undertaken efforts to restore the ecosystem through controlled inundation of 800,000 hectares of flood plain. These have succeeded to such an extent that conservation objectives are potentially being undermined by the number of people moving into the area to take advantage of abundant fisheries and rejuvenated pasturage. In this case, the primary 'pull' factor is ecosystem rehabilitation. The population of the villages surrounding the park edges is increasing at an annual growth rate of 5%, composed of roughly 3% in-migration and 2% natural increase. The flooding resulted in a 34% increase in sedentary fishermen after 2 years, and the number of pastoral group camps doubled from 71 to 150.

One factor that may ultimately limit the influx is a physical feature: villages can only be built on mounds raised above the flood plain, and these are limited in number and geographic extent. The Waza Logone project plans to experiment with a policy of 'social fencing' that will grant privileged access to park resources to different categories of local stakeholders, based on (a) proximity of their territory to the park, (b) traditional use rights (fishermen and pastoralists), and (c) kinship (e.g. descendants of local people). It is hoped that through this mechanism, village councils and chiefs, whose traditional authority has been eroded in recent years, will be empowered to restrict new settlement in the area.

Jaldapara Wildlife Reserve in West Bengal, India

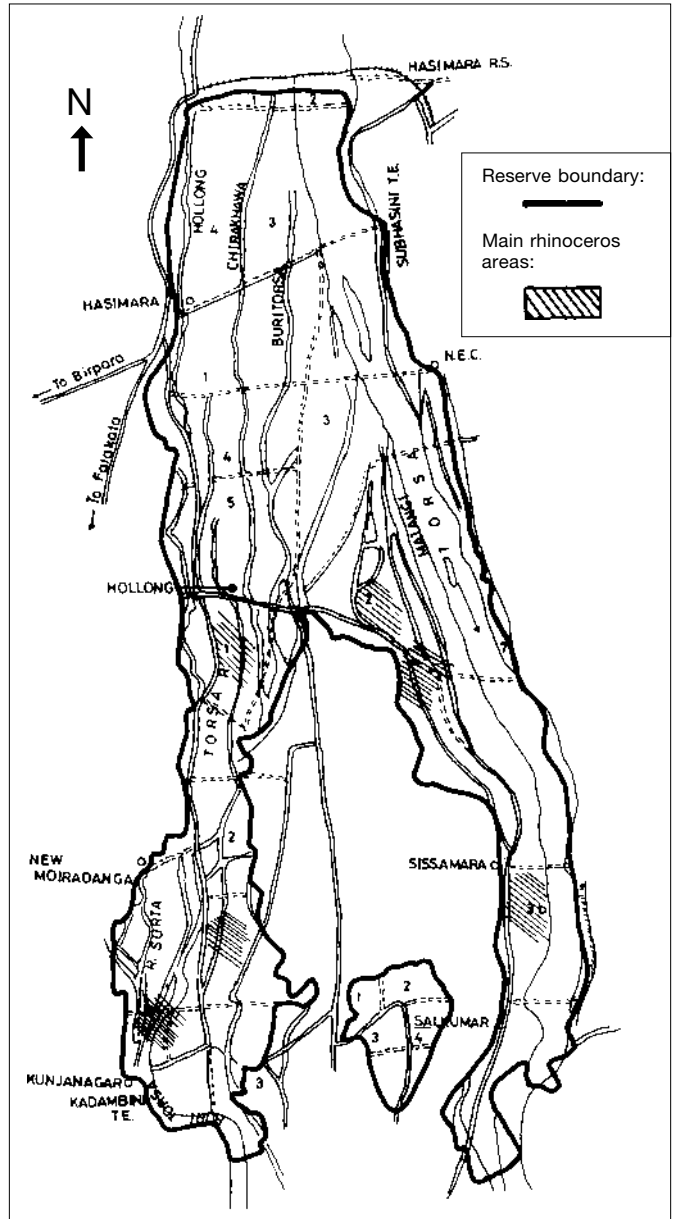
Jaldapara Wildlife Reserve is located near the border with Bhutan in the area of West Bengal north of Bangladesh. The Reserve, just 17,200 ha in size, is home to 34 endangered Asian Rhinos as well as elephant, leopard, hog deer, sambar, cheetal, and wildboar. Situated around the reserve are 37 villages and eight tea estates with a total population of 200,000 people (Sengupta and Patnaik 1994). The villagers are heavily dependent on the reserve for a variety of natural resources, including firewood (for local consumption and for sale), timber (for construction), cotton floss (to stuff quilts and pillows), grasses (for thatching and mat production), and grazing areas for their livestock. The latter poses serious competition for rhinos and other herbivores in the reserve and is also a potential vector for disease to the wildlife. Owing to the sanctuary's peculiar 'wish-bone' shape, there is virtually no part that is untouched by human pressures. On the other hand, wildlife depredation of crops is a problem in many villages.

Despite already high population densities, villages in this zone attract migrants from Nepal, Bihar, Assam, and, most recently, Bangladesh. Access to resources in the reserve may be one 'pull' factor, whereas the primary 'push' factor is landlessness in the more densely populated areas to the south. Although immigration is officially illegal, the number of people and households in the area have doubled from 1971 to 1991. In-migrants either remain in the area as landless labourers, or they buy land from the marginal and small farmers, who in turn become landless or subsist on extremely small plots of less than 1 ha. Approximately 20%–25% of households in each village are landless, and they derive 80%–90% of their income from resources in the sanctuary.

Given the high degree of dependency on the natural reserve, and the benefits of some human practices to ecosystem health (such as preventing succession from grassland to forest), exclusion of the human populations bordering the reserve is simply not an option. However, other options that have been proposed include income generation schemes, fuel wood and fodder plantations on waste lands, introduction of fuel efficient stoves, and even bio-gas generation. In addition, issuing permits to local people for collection of specified amounts of fire wood and thatching grass may be an option for restricting access to the reserve, as would formation of common property resource management committees which could provide the kind of 'social fencing' described above. The challenges, nevertheless, are great. The population, and by extension the number of landless, is projected to grow well into the next century.

Royal Bardia National Park in Nepal

The Royal Bardia National Park is located in the low lying Terai region of southern Nepal. The park, which is composed of 96,800 ha of riverine forest and grassland, contains ten protected mammal species (including the great horned rhino), three reptile species, and hundreds of tree and grass species. When it was gazetted in 1988,



The 17,000 ha Jaldapara Wildlife Reserve in West Bengal, India, is home to 34 endangered Asian rhinos; 200,000 people live just outside its borders. (After Sengupta and Patnaik 1994.)

the park displaced 1,500 families, which together with bans on hunting and fishing have been the source of intense people-park conflicts (WWF-UK 1998). In recent years the park has faced a number of challenges emanating from the arrival of people from neighbouring hill districts and expansion of development activities along its periphery. About 345,000 people live around the park, and the population is growing at 3.5% per year. Since 1971, the population density surrounding the park has more than tripled, from 50 to 170 persons per km². Illegal encroachment for collection of fire wood, timber and fodder has been rampant.

A WWF project is seeking to ease conflicts by introducing community development projects such as income generation and health care. Furthermore, the project is monitoring population trends, including information on age and sex distribution, with the aim of developing more gender-sensitive approaches to conservation. Such monitoring systems can also provide vital information on migration trends that would help as government agencies consider policy responses to the influx in this region of high biodiversity.

These five cases clearly demonstrate the pressures to which protected areas are subjected in heavily degraded landscapes where human needs are great. In south Asia, the pressures on habitat are so great that they may eventually lead to the local extinction of endangered species. In all cases, it seems imperative to increase community involvement in and commitment to protected area and natural resources management (a topic covered below). Various kinds of 'social fencing' are also important elements in strategies to keep these islands of biodiversity from gradually sinking into the surrounding sea.

Policy options

As these cases demonstrate, influencing the direction and magnitude of population movements to buffer zones and protected areas is not an easy matter. As one demographer noted, "of all population problems, those of migration appear the most intractable" (Ness and Golay 1997). While public policy and programmatic responses must occur at multiple levels and among a wide array of actors, the success stories are few and far between. The root causes of migration must often be addressed, though these are often politically difficult measures to enact. For instance, in-migration around the Calakmul Biosphere Reserve in Mexico might be slowed if national policies and programmes were put in place to resolve civil conflict in the state of Chiapas, a factor that forces residents to flee to other parts of the country. Concurrently, national subsidies for chilli, maize, and livestock production would need to be reduced – a politically difficult choice to make. In Ecuador, national legislation has been passed to control the flow of migrants to the Galapagos islands. But so long as public subsidies to the energy and transport sector continue, migrants will most likely find it financially beneficial to settle on the islands. In both the Galapagos islands and in the diamond mining areas of the Central Africa Republic, migrants will always be lured by promises of employment in the booming internationally linked extractive industries, while in Niger preventing north-to-south migration of pastoralists is practically impossible in light of the repeated droughts that have struck the entire Sahel.

The responses to the ecological and social impacts of in-migration that may be the most promising are those that promote community-based conservation. Covenants

and resource management agreements are increasingly being negotiated within communities to regulate the land use practices of individual members and, through this mechanism, temper the ecological and social impacts of in-migration (Borrini-Feyerabend 1996). Initiatives to forge new collaborative management and common property resource management are promising, but also very complex. It is now well-recognised by conservationists that it takes considerable investments of time, patience, and financial resources to facilitate the emergence of new community-based resource management practices (Larson *et al.* 1998). As the experience of conservationists associated with the Dzanga-Ndoki National Park and the Calakmul Biosphere Reserve shows, it is very difficult to build the capacity of migrant communities to plan for the sustainable use of natural resources. Communities in these localities have little history of working together in a collaborative way. The internal political structure of divided and conflict ridden communities renders problematic the process of creating internal rules for managing the influx of recently arrived migrants. In some senses, it may be easier to establish collaborative management regimes in densely settled, degraded environments, if only because the long-established communities living in these areas are more cohesive.

This section briefly sketches a number of policy options for addressing migration and restricting access to lands bordering protected areas, some of which were mentioned in the foregoing presentation of case studies. The policy options are grouped according to the level at which they need to be implemented, beginning with the national level.

National level

■ *Land and resource tenure reform.* This is a politically sensitive issue in many parts of the world, and yet it is a crucial ingredient in the migration phenomenon. Where land and resources are *de facto* 'open access resources', there is an automatic incentive for individuals or groups to claim those lands. Cruz *et al.* (1992) write that "land tenure policies *are* population and resource policies when they invite large-scale migration into marginal frontier areas". Clarifying community rights and obligations to land and other natural resources can go a long way to building tenure security. Possible responses include cadastral surveys to establish legal land rights, and legal recognition of communal property rights that allow more effective community control over resources in their jurisdiction.

■ *Investment policies.* Where capital investment flows, so do people. International and national NGOs that are involved in conservation activities may wish to engage in advocacy efforts at the national level to change investment policies. They may seek to set legal limits on the amounts or geographic location of investment in enterprises deemed damaging to biodiversity conservation objectives. They may also wish to



Excavation for diamond-mining in the Sangha-Dzanga Special Dense Forest Reserve – it is very difficult to build the capacity of migrant communities to plan for the sustainable use of natural resources. Photo: Mark Freudenberger/WWF.

reform outdated agricultural and forestry policies that provide incentives for land clearing and frontier migration.

■ *Migration policy.* Aside from authoritarian regimes, very few countries have succeeded in controlling population flows to any significant degree. Nevertheless, if the political will around biodiversity conservation exists (see the last point below), policy makers will increasingly be forced to confront the ethical and legal controversies surrounding tools to reduce access of populations from one area of a country to resources in another. Long-term residents of some localities, like indigenous groups in South America, are indeed taking matters in their own hands by restricting access by outsiders to traditional lands. Legal recognition of native lands is increasingly part of the public policy arsenal in many Latin American countries. Pressures will grow to construct mechanisms to control settlement in ecologically sensitive zones.

■ *Administrative practice.* Internal administrative policies often shape the flow of population movements. Administrative restrictions attached to oil or lumber concessions can do much to alleviate the impact of in-migration. By encouraging oil companies, for instance, to limit the size and ecological 'footprint' of labour camps in ecologically sensitive areas, great strides can be made to limit incentives for in-migration.

■ *Stronger political support for protected areas.* In the absence of strong support for conservation objectives, it is very difficult to establish 'macro' policies that address trends in migration and investment. Thus, building political support may be considered the linchpin for the efforts outlined above. One potential strategy would be to conduct tours of protected areas for political leaders to educate them on the importance of the ecosystems (beyond their 'scenic' value) and the ecological and social impacts of in-migration. Mapping demographic trends and modelling population growth scenarios – tools which have been used in the population field for many years – are compelling ways of opening decision-makers' eyes to the value of biodiversity and ecosystem services.

Protected area level

■ *Collaborative management of protected areas.* Collaborative management arrangements increase local peoples' stake in conserving natural resources, and therefore should be seen as a key strategy in almost any context (Borrini-Feyerabend 1996). Establishing agreements requires extensive negotiations, but can yield tremendous benefits, not least of which is greater assistance with enforcement of poaching, grazing and other restrictions. Numerous studies have confirmed that, in the face of rising demographic pressures, real protection can only be achieved through the involvement of local populations in management decision-making and activities.

■ *Land zonation and enforcement.* Governments play an important role in creating the regulatory framework for effective land use planning. Creating officially recognised buffer zones with restrictions on land use practices in those zones is another option. While buffer zones exist around many protected areas, restrictions on land uses might limit the numbers of settlers allowed to arrive in an area in any given year or severely sanction agricultural practices deemed ecologically unsound. Such measures would require political support and collaboration between relevant government authorities (local and national) and local populations. Such an option necessitates an effective presence of the state in and around protected areas.

■ *Community-based conservation and development.* ICDPs have sometimes been criticised for attracting migration (Salafsky 1994, Scholte 1997), but the evidence is incomplete. Extension of health and education services and development of alternative income generation strategies that are less resource intensive can meet both humanitarian and conservation objectives. Yet, conservationists need to monitor carefully further whether there is a linkage between the provision of public services and in-migration.

■ *Infrastructure.* The construction of roads into areas of high biodiversity appears to be one of the central incentives for in-migration. In tropical areas of Asia, Africa, and Latin America, the evidence is now quite clear that roads constructed into dense forested areas facilitate greatly the movement of rural peoples. The relationship between road construction, land use changes in areas of high biodiversity, and in-migration needs to be continually monitored. Unless sound land use planning practices accompany road construction into areas of high biodiversity, conservation objectives may be seriously undermined.

■ *Population monitoring.* The collection of baseline data on population size, composition and distribution around protected areas, and periodically monitoring increases, can be of considerable use for conservation planning and management purposes. If conservation staff lack the necessary experience, or if it is politically sensitive, then university demography departments or government census bureaux may be able to collect the necessary data. Local populations should nevertheless be encouraged through the use of participatory applied research techniques to monitor and consider the dynamics and causes of population growth rates within their own communities (Barton *et al.* 1997). Such participatory techniques can also help conservation staff to better appreciate the historical dynamics of population movements, which is a first step in understanding the motivations and rationales of migrants and, ultimately, in resolving conflicts that may exist.

■ *Increase regulatory presence.* This consists primarily of enforcing park regulations so as to discourage illegal activities, thereby reducing incentives for people to move into protected areas.

Village level

■ *Conditional territorial exclusion.* Co-management of natural resources entails the establishment of agreements between government and local resource users to limit resource extraction to ecologically sustainable levels. At the local level, this implies the adoption of a 'conditional exclusion' strategy whereby long-term residents are granted the authority to establish rules, or tenure agreements, to limit entry into a community unless appropriate behaviours toward natural resources and the community are observed. As described in the W and Waza Logone case examples, some conservation projects are granting privileged access to resources to 'locals' and those with traditional use rights. As with collaborative management arrangements, it is assumed that long-term local residents will have a stake in maintaining the protected area resources, and will be more likely to be opposed to further migration into the areas.

■ *Land use planning.* Local level land use planning entails the creation and enforcement of rules, obligations and sanctions by community organisations to determine the present and future uses of natural resources. Considerable experience now exists of the possibilities and challenges of community-based land use planning

(Borrini-Feyerabend and Buchan 1997). Community land use planning is the foundation for effective actions to combat the social and ecological consequences of in-migration to areas of high biodiversity. Unless rural communities construct the covenants and agreements to sanction inappropriate uses of natural resources found within the territorial boundaries of the community, little hope exists to respond to in-migration. Many types of participatory research and planning methods, such as working with communities to imagine 'alternate futures', are useful for this kind of local-level planning (Barton *et al.* 1997).

Conclusions

As can be seen from the collection of case studies and the policy section above, there are very few 'recipes' for managing population flows in and around protected areas. Designing public policies and programmes is particularly difficult in frontier areas in light of the institutional vacuums generally existing in these areas. Success, as evaluated from a conservation perspective, is rare. Nevertheless, there is a real need to develop more tools and to learn from successful experiences. While efforts to stem the tide of in-migration to areas of high biodiversity are required at the national and international scale, these measures can be very politically difficult to implement. Few policy makers in the national and international economic and political spheres have an interest in reducing or mitigating labour flows both within countries and between nations. Conservationists may have few choices but to consider ways to mitigate the impacts of migration flows at the local level.

Until very recently, conservation organisations and government agencies charged with protected areas management have seen issues such as land tenure reform, land use planning and investment policies as outside their purview. The concern was with what went on *inside* the park, not on its borders, much less regions hundreds of kilometres away. With increasing population and economic development pressures around protected areas, such an isolationist stance is no longer tenable. Conservation organisations and protected area managers must begin to work with public policy experts to identify key policy levers at national and local levels that will promote conservation objectives like those of responding to the emerging threats of human in-migration to protected areas. Once these policy measures are identified, international and national conservation NGOs can either advocate for their implementation at the national and international level, or seek funding from government and donors for the necessary work at the local level.

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Involving communities in managing protected areas: contrasting initiatives in Nepal and Britain

JEFF S. HAYNES

Dartmoor National Park (England) and the Royal Chitwan National Park (Nepal) have entered into a partnership agreement under the auspices of the Europarc Partnership and Exchange Programme. This paper concentrates upon the critical area of communication between park authorities and local communities, in securing the conservation and management of protected areas. It contrasts the current efforts to promote local involvement in park management in Nepal, through the direct redistribution of park income to the local communities, with the changes in representation upon British national park authorities, designed to increase local democracy and local involvement in decision making.

IN 1994 the Federation of Nature and National Parks of Europe (now the Europarc Federation) established its Partnership and Exchange Programme between protected areas in Europe, Asia and Latin America. Funding for the Programme was secured from the European Commission, through its tropical forest budget, the Commission believing that 'the establishment of a mechanism for the exchange of skills and experience will lead to a long-lasting improvement in protected area management in developing tropical countries' and that 'the partnerships can bring some valuable lessons back to Europe, for instance in local community participation in protected area management' (Roby 1996). By the end of 1997 15 Partnership Agreements had been signed, linking individual parks, groups of parks and protected area systems whose authorities are prepared to invest time and resources to support long-term collaboration and joint working. In December 1996 a Partnership Agreement was signed between the Dartmoor National Park Authority, the Department of National Parks and Wildlife Conservation of His Majesty's Government of Nepal and the Royal Chitwan National Park.

Dartmoor is the largest open space in southern England. It is an area of open heather and grass moorland, granite tors, incised river valleys clad in broadleaved woodlands, with surrounding small fields enclosed by stone walls and hedgebanks. Its landscape is among the richest in Europe in terms of its archaeological remains. Its blanket bog, raised bog, upland heathland, upland oakwood, caves and mines are among habitats of international importance. It is home to buzzards, otters, wild ponies and a great variety of lichens, birds, plants and insects. Key Red Data Book species include dunlin *Calidris alpina* and breeding golden plover *Pluvialis apricaria*, at the extreme south-west of their European range, southern damselfly *Coenagrion mercuriale*, high brown fritillary butterfly *Argynnis adippe*, blue ground beetle *Carabus inticatus*, and Irish lady's-tresses *Spiranthes romanzoffiana*. Dartmoor also has a resident population of 33,000 people.

The Royal Chitwan lies in the central Terai of southern Nepal, part of the northern Gangetic Plain. It is an area of sub-tropical forest, dominated by sal woodland, and open grassland, covering the flood plain of the Repti, Reu and Narayani rivers and the adjoining Churia hills. It is the primary habitat for the great one-horned rhinoceros *Rhinoceros unicornis*, the Royal Bengal tiger *Panthera tigris*, gaur bison *Bos frontalis* and over 45 other mammals. Over 450 bird species have been recorded in Chitwan, there are several endangered reptiles, amphibians and insects, and its inhabitants include some wild elephant, gharial and mugger crocodiles, dolphin and python. The whole Park was declared a World Heritage Natural Site in 1984. Since 1973, the only residents within the Royal Chitwan have been National Park staff, army personnel and the operators of a handful of licensed jungle holiday lodges.

The basis for partnership

At first glance the only obvious similarities between Dartmoor and the Royal Chitwan are their areas, which are almost identical (each around 950 km²), and their 'national park' titles. Closer inspection reveals that whilst the Royal Chitwan is a 'national park' in the true sense, being an IUCN Category II area, Dartmoor is a Category V 'protected landscape', only afforded the 'national park' description because in Britain there is no higher category of protected area to command this label. Even in terms of area the two are dissimilar, for to compare like with like one must consider the Royal Chitwan National Park together with its newly defined buffer zone, which significantly extends the area. The Park and buffer zone will together comprise the subject of a new management plan.

The Partnership Agreement links Dartmoor both with the Royal Chitwan and with the central government Department for National Parks and Wildlife Conservation (DNPWC) which has an overarching responsibility for the management of all protected areas in Nepal. While field staff are based in each national park and protected area, specialist support is provided by this central department in Kathmandu. As a result, staff can be, and are, regularly moved from one area to another. These areas, such as the Sagarmatha (Mount Everest) National Park, may be as different from the jungle of the Royal Chitwan as from the high moorland of Dartmoor! Despite the differences in landscape character between the Royal Chitwan and Dartmoor, they are bound by shared purposes and common management issues.

The statutory purposes of all British national parks have been redefined under the Environment Act of 1995, which has also led to the establishment of each of the English and Welsh national parks as free-standing local authorities, separate from other central and local government organisations. The first purpose of British national parks is conservation of the natural beauty, wildlife and cultural heritage of the area; the second is promotion of the understanding and enjoyment of the area's special qualities,

Villagers from the buffer zone outside the Royal Chitwan National Park.
Photo: Willem Montagne.



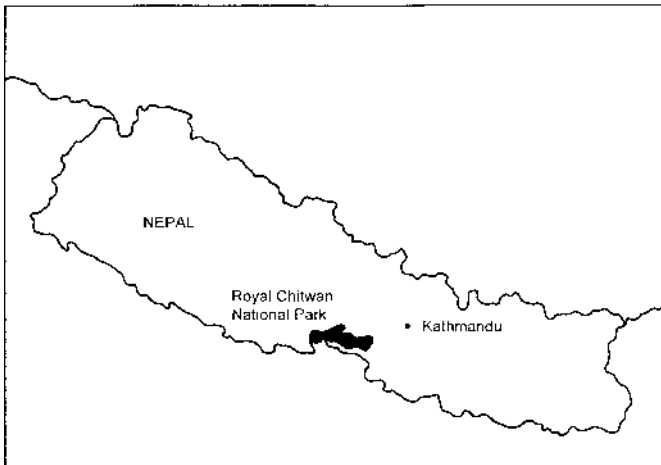
by the public. Each national park authority (NPA) is also required “to seek to foster the economic and social well-being of local communities within the Park”, though the legislation emphasises that this is principally the responsibility of other bodies and expects NPAs to foster well-being without incurring significant expenditure in doing so. (A proposal to make “fostering social and economic well-being” a third statutory purpose of British national parks was debated, but rejected, by central government, during the passage of the Environment Act through Parliament.)

The Royal Chitwan National Park was established under the National Parks and Wildlife Conservation Act of 2029 [1972]. Nepali legislation defines a national park as an area set aside for conservation, management and utilisation of mammals, birds, vegetation and landscape together with the natural environment. The Act allows entry into national parks by permit. Tourism, which is Nepal’s largest industry and biggest earner of foreign exchange, is very much dependent upon treks and tours to national parks and protected areas. The purposes of managing the Royal Chitwan National Park are to conserve and enhance the Churia and Inner Terai ecosystem, and the Tharu culture (that of the local indigenous population), and to promote opportunities for understanding and enjoyment of the park.

Communicating with the local community in Nepal

His Majesty’s Government of Nepal has an enviable record, not only in creating national parks, wildlife reserves and other protected areas, but also in successful conservation within these areas. The Royal Chitwan boasts increasing populations of rhino and tiger, even at this time when tiger numbers continue to fall elsewhere on the Indian sub-continent. However, the gains for conservation have been secured at a cost to relations between the national park and the local community (see Mishra 1984, Heinen and Kattel 1992). Basnet (1992) has charted the move from bottom-up, and largely sustainable, conservation measures, practised by the local people up to the 1950s, through to the top-down measures introduced by the government, involving first the nationalisation of forests and then the imposition of wildlife reserves. In the case of the Royal Chitwan, its local population was resettled outside the confines of the park and rules were introduced to prohibit building, cultivation, grazing livestock, and cutting and removing grass and trees. Illegal grazing, firewood

Royal Chitwan National Park, Nepal.



collection and grass cutting quickly became problems while the destruction of crops (and loss of human life), caused by ‘protected’ wild animals was blamed on the park. It is little wonder that relations became strained between the national park and local people!

The support and participation of the local community is essential in achieving the management and conservation objectives of any protected area. A major task facing the park authorities in the Royal Chitwan has been to get the local people to value the park, and to realise that its conservation is of benefit to them. Most successful poaching depends on

access to local knowledge and local people are likely to part with that knowledge, especially for large financial inducements, much more willingly if they do not see any value to them in protecting the park's wildlife. Explaining indirect benefits to local people is always difficult and in the case of the Royal Chitwan the most obvious benefits, those from tourism, were accruing to accommodation owners and tour organisers based far away in Kathmandu.

The DNPWC, in collaboration with the United Nations Development Program, has established the "Parks and People Project", a community development initiative operating in five of the Terai parks and reserves. There are 36 Village Development Committees (VDCs) in the Royal Chitwan buffer zone, representing something over 275,000 people. The Parks and People Project here began in 1994 as a pilot in two VDCs and was extended to six VDCs in 1995. It aims to improve the socioeconomic conditions of local people through a range of activities including an income development programme, training people in the skills of fabric working, tailoring and sewing, tourist guiding and TV/radio repair. Small poultry/vegetable farming and weaving projects have been supported with expert advice and training brought in from outside and funding has been provided to match savings schemes devoted to community health, education, drinking water and other programmes, selected by the VDCs. An awareness and conservation education programme is an important part of the effort to develop trust and understanding between the park and the local people.

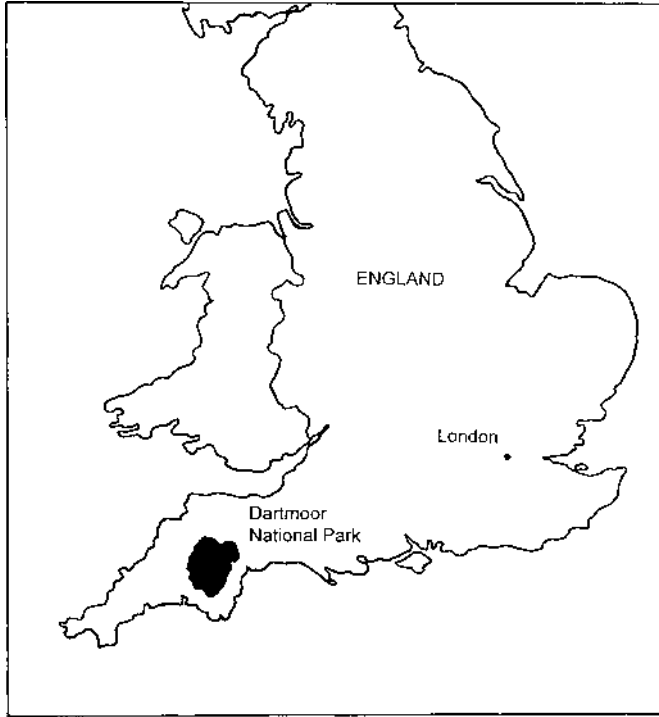
This Project is itself a pilot for a future in which there is to be a direct transfer of the economic benefits of the national park to the local people. The Buffer Zone Management Rules of 2052 [1996] now require that between 30% and 50% of all national park revenue is ploughed back into the communities of the buffer zone. Over the next few years, the national park will be working closely with local communities on a buffer zone development programme, on tourism development projects, and on the preparation of management plans for the park and buffer zone areas. In this way, indigenous systems of sustainable conservation management will be revived within the buffer zone and local people will become involved in supporting and achieving national park objectives.

Communicating with the local community and visitors to Dartmoor

Despite the lack of such fundamental conflicts as would have been raised by policies of resettlement, relations with local communities have also been strained, to a greater or lesser extent, within British national parks. The National Parks Review Panel (1991), which examined and reported upon all aspects of British national parks, concluded that "local people consider that their interests are not properly represented" in national park administration. The Panel recommended the establishment of new,



Hookney Tor, Dartmoor National Park. Photo: Dartmoor National Park Authority.



Dartmoor National Park, England.

free-standing national park authorities, with an increased proportion of District Council representatives. At that time Dartmoor was administered by a Committee of 21 members, seven appointed by central government (to represent the national interest), 11 County Councillors (the higher tier of local government), and one District Councillor (lower tier) from each of the three principal Districts which have land on Dartmoor. There is a lower level of Parish Council within individual communities, of which there are over 50 on Dartmoor. Parish Councils have very few powers but are assumed to represent local interests at 'grass roots' level.

The Panel suggested that the proportion of District Councillors should match that of County Councillors, and that Parish Councillors should not be represented, upon the new authorities. However, by the time the British

government had responded to the Panel's report by preparing the Environment Act of 1995, the political arguments in favour of local representation had strengthened. The new Dartmoor National Park Authority (NPA), established in April 1997, has 26 members. It still has seven government appointed members representing the national interest, together with seven County Councillors, seven District Councillors, and five appointed Parish Councillors. The marked switch in favour of local representation, at the expense of the 'national interest', has raised expectations that the authority will give local issues and considerations a higher profile in decision-making, despite the Act making it clear that socioeconomic development remains the primary responsibility of agencies other than the NPA.

The Environment Act requires Dartmoor NPA to prepare and publish a National Park Management Plan (NPMP), to set out objectives for the national park, describe the management policies of the NPA and form the basis for the coordination and integration of the management policies of other bodies, to achieve national park objectives. The plan should "provide a means of informing the public and involving them in management policy" (Countryside Commission 1997).

The first stage in preparing the NPMP has involved a major exercise in communication. In the spring of 1997 the Dartmoor NPA published a consultation leaflet which served several purposes. It provided an opportunity to explain the role of the new NPA, what it is responsible for, and what it is not responsible for. Responsibilities have changed little as a result of the change of status but public misunderstanding of 'who does what' in British local government meant that these messages were worth repeating! The leaflet set out the revised purposes of the national park. It included a draft 'vision' statement, describing a desired Dartmoor of the future, upon which public comment was requested. Finally, it

asked the public to identify the special qualities of Dartmoor and challenged them to select those issues which they felt the new NPMP should address. Over a thousand responses were received, from individuals, residents and visitors, school children, local communities and various interest groups. The analysis of responses has enabled the vision statement to be refined to reflect wider opinions, and it has usefully highlighted where such opinion is divided. It has also provided a sound starting block from which to develop strategic management policies which reflect the concerns and aspirations of both residents and visitors, which are very often, but not always, coincident. This two-way communication exercise, seeking both to inform and to gather comment, was the first public gesture from the new NPA and therefore played an important role in establishing its public image and standing.

Dartmoor calculates its visitors in millions and they now come to enjoy the open country all the year round. In recent years the erosion effects of high visitor use have become increasingly pronounced. Tourism is the most important industry in the south-west of England and many businesses, on and around Dartmoor, depend upon the maintenance of an attractive landscape to ensure that visitors enjoy, and repeat, their stay.

In 1997 Dartmoor NPA launched its “Moor Care, Less Wear” campaign, which aims to raise public awareness of the potential impacts which each visitor has on the national park. This is part of a “Moorcare Programme”, which was successful in attracting European Agricultural Guidance and Guarantee Fund support under the European Commission’s Objective 5b Programme. The package comprises two elements: a repair programme, under which physical damage to paths, popular access land, archaeological sites and stone walls is being remedied; and a protection programme, which includes training local people in stone walling and hedging skills, careful management and signing of access, surveys of visitor disturbance to ground-nesting birds, and the launch of a major awareness campaign. This is the first time that effort has been concentrated on explaining to users of the national park why recreation has to be managed and the ways in which they, as individuals, can avoid adding to the erosion pressures.

The campaign has involved a staffed travelling exhibition caravan, which is taken to popular visitor sites and to areas where erosion damage is occurring or being repaired. This is being supported by the preparation and distribution of codes of practice for different park users – walkers, riders, cyclists etc. – a leaflet to promote the campaign, and a number of information staff, guides and student rangers, trained to spread the word by talking to visitors. Merchandising also forms an important part of the effort to raise awareness with T-shirts, car stickers and other products carrying the specially designed “Moor Care, Less Wear” logo, simultaneously raising more income to be ploughed back into erosion repair work.

Shepherd and flock of sheep on Dartmoor. Photo: Chris Chapman/DNPA.





*Rapti River,
Royal Chitwan
National Park.*
Photo: Jeff Haynes.

The role of the Partnership Agreement

Under the Partnership Agreement a Work Plan for technical cooperation between the protected areas has been developed. This includes the sharing of information and publications, exchange of professional staff, complementary programmes of monitoring and research and joint projects, exhibitions and training opportunities. In the Introduction to the Work Plan the partners set out their commitments: "They believe that becoming familiar with their Partner's work will help national park staff to better promote the ideas of global

landscape/wildlife conservation and sustainable development among their own target audiences. They believe that learning about each other's experiences can generate novel ideas and improved perspectives on their own working methods. They believe that staff exchanges are an efficient and effective means of developing long term collaboration and creating a sense of solidarity and common purpose among national park managers. Above all they are committed to investing staff time and available financial resources to explore the wider horizons of international cooperation between European and Asian protected areas, and particularly between the national parks of Britain and Nepal."

Both parks are beginning the process of preparing new management plans and will be sharing their documentation and experiences with each other. Both parks play an active role in community development and staff stand to learn much from shadowing each other in this work. In many other areas of protected area management, particularly in scientific research and survey (the Royal Chitwan is the most researched park in Nepal, perhaps in the whole of Asia), and in visitor information and interpretation (Dartmoor's High Moorland Visitor Centre is renowned for its 'state of the art' displays), staff will gain from sharing, learning and communicating with each other.

Perhaps above all else, the global perspective will strengthen that essential bond between park authority and local community. Part of the message to the people of the Terai is that many thousands of miles away people in Britain, and of course all over the world, are depending upon them to conserve and safeguard the future of the tiger, the rhino and everything that makes up the unique landscape of the Royal Chitwan. Similarly, the local residents of Dartmoor, justly concerned over their own socioeconomic well-being, and now having a bigger say in the administration of 'their' national park, will also benefit from being reminded that many thousands of miles away people in Nepal, and elsewhere, are depending upon them to conserve and safeguard the heather moorland, the high brown fritillary butterfly, the prehistoric standing stones and everything else that makes up the unique landscape and culture of Dartmoor.

Europarc's Partnership and Exchange Programme is facilitating communication between protected area managers across the world, including the all important face-

to-face communication permitted through the funding of 24 return journeys for staff, over a three year period. Anything that they can learn from each other about communicating effectively with local communities will contribute to the very basis of sustainable conservation policies.

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Resúmenes

Los impactos demográficos en las áreas protegidas de Tanzania y las opciones para actuar

DAVIS MWAMFUPE

El crecimiento de la población y la migración interna con la adición de los cambios en la propiedad de la tierra, están ejerciendo una presión creciente en el medio ambiente y en los recursos naturales de Tanzania. Este artículo examina la dinámica de la población que afecta a siete áreas protegidas y enfatiza factores tales como: la pobreza, la alienación de la tierra y los recursos, la sequía, y la falta de participación local en las actividades de conservación que están actualmente impidiendo los esfuerzos de conservación en el país.

El pueblo y la protección del medio

FRANCES WESTLEY, ULYSSES SEAL, ONNIE BYERS AND GAIL D. NESS

La población humana, la producción y el consumo están aumentando rápidamente y están poniendo gran presión en esas especies y habitats que la comunidad conservacionista está luchando por proteger. Una de las mayores flaquezas en nuestra capacidad organizada para lidiar con este problema yace en la especialización en múltiples disciplinas. La Red de Investigación de la Biodiversidad Global, una red científica internacional, ha sido desarrollada para brindar juntas las necesarias disciplinas de demografía humana, las ciencias organizativas, los estudios de desarrollo, la biología de conservación y la biología de la población, en un esfuerzo para: a) comprender el impacto de las poblaciones humanas locales en la sobrevivencia de los sistemas amenazados y las comunidades en residencia y b) desarrollar las herramientas y procesos para asegurar el involucramiento, la colaboración y la responsabilidad de una serie más amplia de propietarios locales de intereses dentro del país en los procesos de conservación de especies in situ, en el medio y en el manejo del ecosistema.

Hacia las mejores prácticas para las asociaciones entre la población y el entorno

CARLOS ARAMBURÚ, PETER R. WILSHUSEN Y FRANK D. ZINN

La conservación integrada y los proyectos de desarrollo (ICDPs) son un enfoque que se ha usado ampliamente cuando se busca la mejora de las condiciones socio- económicas de las comunidades dependientes de recursos naturales mientras protegen los habitats ecológicamente valiosos. Mientras tales proyectos se concentran frecuentemente en la generación de ingresos, educación y necesidades de salud de las poblaciones locales, a menudo pasan por alto cuestiones tales como el planeamiento de la familia y los servicios de salud relacionados con la reproducción. Desde 1993, el programa de los miembros de la "Población y el entorno" de la Universidad de Michigan ha fomentado asociaciones entre la conservación y las organizaciones de la población en varias áreas ecológicamente importantes alrededor del mundo con el fin de prestar atención a las determinadas preocupaciones de la población. Este artículo presenta ejemplos de dos de estas asociaciones, en Uganda y en Brasil. La asociación entre la población y el entorno parecen aumentar la confianza de las comunidades locales, incentivan el aprendizaje inter- organizador y en ciertos casos economizan en sus magros recursos. Con el tiempo, estas intervenciones integradas pueden contribuir a la estabilización de la población alrededor de las áreas protegidas.

La migración hacia áreas protegidas y las zonas amortiguadoras: ¿podremos contener la corriente?

ALEX DE SHERBININ Y MARK FREUDENBERGER

A través de una serie de casos tomados como ejemplo, este artículo examina los movimientos de la población en y alrededor de las áreas protegidas y sugiere una serie de respuestas políticas a nivel local y nacional. Estas incluyen entre otras, normas relacionadas con la infraestructura e inversión, tenencia de la tierra y el acceso y administración de los recursos naturales. Los autores llegan a la conclusión de

que las áreas protegidas se pueden beneficiar con la asociación estratégica entre los ONGs de conservación, los administradores de las áreas protegidas y los expertos en reglamentos públicos con el fin de determinar las tendencias demográficas que afectan la conservación.

Integrando las comunidades con la administración de las áreas protegidas: dos iniciativas contrastantes: en Nepal y en Gran Bretaña

JEFF S. HAYNES

El parque nacional de Dartmoor (Inglaterra) y el real parque nacional de Chitwan (Nepal) han entrado en un acuerdo para asociarse bajo los auspicios de la Asociación Europarc y su Programa de intercambio. Este artículo se concentra en el área crítica de la comunicación entre las autoridades del parque y las comunidades locales para asegurar la conservación y administración de las áreas protegidas. Contrasta los esfuerzos actuales para promover la intervención local en la administración de los parques de Nepal a través de la redistribución directa de los ingresos del parque hacia las comunidades locales, con los cambios en la representación sobre las autoridades del parque nacional británico, diseñado para aumentar la democracia y el involucramiento local en la toma de decisiones.

Résumés

Incidences démographiques sur les zones protégées de Tanzanie et solutions envisageables

DAVIS MWAMFUPE

En Tanzanie, l'augmentation de la population et les migrations internes, lorsqu'elles interviennent parallèlement à des changements du régime foncier, exercent des pressions croissantes sur l'environnement et les ressources naturelles. Examinant les répercussions de la démographie sur sept zones protégées, l'auteur impute les obstacles aux initiatives en faveur de la conservation à des facteurs tels que la pauvreté, la réduction ou la perte de l'accès aux terres et aux ressources, la sécheresse et l'absence de participation locale aux activités liées à la conservation.

La population et la protection de l'habitat

FRANCES WESTLEY, ULYSSES SEAL, ONNIE BYERS ET GAIL D. NESS

L'accroissement rapide de la population, de la production et de la consommation pèse lourdement sur les espèces et les habitats que les instances pour la conservation s'efforcent de protéger. L'inaptitude de nos structures à résoudre cette question tient notamment à la spécialisation de chaque discipline. Un réseau scientifique international, le Global Biodiversity Research Network (Réseau mondial de recherches sur la biodiversité), a été créé en vue de regrouper les disciplines concernées : démographie, sciences de la gestion, étude du développement, biologie de la conservation et biologie démographique. Le double objectif est a) de comprendre l'incidence des populations locales sur la survie des écosystèmes menacés et de leurs habitants, et b) d'élaborer des instruments et des processus visant à garantir la participation, la collaboration et la responsabilité d'une plus grande diversité de parties prenantes sur le terrain en matière de gestion in situ des espèces, des habitats et des écosystèmes.

Sur la voie de meilleures pratiques pour les partenariats population-environnement

CARLOS ARAMBURÚ, PETER R. WILSHUSEN ET FRANK D. ZINN

En vue d'améliorer le statut socio-économique des communautés tributaires des ressources naturelles tout en protégeant les habitats importants sur le plan écologique, on a largement recours aux projets intégrés de conservation et de développement (ICDP en anglais). Si les projets de ce type prennent généralement en compte les besoins des populations locales en terme de création de revenus, d'éducation et de santé,

ils négligent souvent les aspects démographiques tels que la planification familiale et la santé de la reproduction. Depuis 1993, le Population-Environment Fellows Program (programme de bourses universitaires liées à la population et à l'environnement) de l'Université de Michigan encourage la création de partenariats entre des organisations pour la conservation et la démographie dans de nombreuses régions ayant une importance écologique à travers le monde, afin d'aborder les priorités définies par la population locale. Les auteurs présentent deux exemples de partenariats de ce type en Ouganda et au Brésil. Il semble que les partenariats population-environnement favorisent la confiance des communautés locales, encouragent les échanges d'expérience entre organisations et, dans certains cas, permettent d'économiser des ressources limitées. À long terme, ces initiatives étroitement liées pourraient contribuer à la stabilisation démographique à proximité des zones protégées.

Est-il possible d'endiguer la marée des migrations vers les zones protégées et les zones tampons ?

ALEX DE SHERBININ ET MARK FREUDENBERGER

S'appuyant sur plusieurs études de cas, les auteurs analysent les mouvements de population dans les zones protégées et à proximité. Ils proposent une série de mesures aux niveaux national et local, liées notamment à l'infrastructure et aux investissements, aux régimes fonciers et à l'accès aux ressources naturelles ainsi qu'à leur gestion. Ils concluent que, face aux tendances démographiques ayant des incidences sur la conservation, les partenariats stratégiques entre les ONG pour la conservation, les responsables de zones protégées et les experts publics présentent des avantages pour les zones protégées.

La participation des communautés à la gestion des zones protégées : deux initiatives contrastées au Népal et en Angleterre

JEFF S. HAYNES

Le parc national de Dartmoor (Angleterre) et le parc national royal de Chitwan (Népal) ont conclu un accord de partenariat sous les auspices du Europarc Partnership and Exchange Programme (programme Europarc de partenariat et d'échanges). L'auteur étudie la communication entre les responsables de parcs et les communautés locales, un facteur décisif lorsqu'il s'agit de garantir la conservation et la gestion des zones protégées. Il compare l'initiative visant à encourager la participation locale à la gestion du parc népalais, grâce à la redistribution directe de ses revenus aux communautés locales, avec la restructuration de la représentation des intérêts au sein des parcs nationaux britanniques, qui vise à accroître au plan local la démocratie et la participation à la prise de décision.

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