Integrated Conservation and Development Projects

Examples from Africa

Peter Alpert

Integrated conservation and development projects, or ICDPs, represent a new approach to the conservation of biodiversity and ecological systems in developing countries (Wells and Brandon 1993). ICDPs distinguish themselves from other approaches by setting a dual and equal focus on biological conservation and human development. Their main goal is to link conservation and development such that each fosters the other. Even though conservation and development have generally figured as antithetical alternatives, ICDPs have multiplied throughout the developing world in little more than a decade. More than 100 ICDPs have been described (Alpert 1993, Anderson and Grove 1987, BSP 1993, Butynski and Kalina 1993, Goldstein 1994, Hamilton et al. 1993, Lewis and Carter 1993, Lucas 1992, McNeely 1993, 1995, Potter et al. 1993, Redford and Padoch 1992, Wells et al. 1992, West and Brechin 1991, Western et al. 1994, Wright 1992), including more than 50 in at least 20 countries of sub-Saharan Africa.

Earlier reviews have judged ICDPs to be promising but unproven (Brandon and Wells 1992, Hannah 1992, Kiss 1990). After more recent visits to some projects in Africa, I believe that ICDPs have now indicated their worth, within limits. They can achieve medium-term solutions to local conflicts between biological conservation and natural resource use in economically poor, remote areas of exceptional ecological importance. ICDPs are no panacea for habitat loss. They are one useful strategy in the broad range of strategies needed to accommodate human societies, wild species, and natural processes in landscapes that will last.

ICDPs aim to fill the developing world's need for externally funded, locally based projects that link conservation with development

Of particular interest to biologists, ICDPs need biological research to work. Their central question concerns managers, local communities, and scientists alike: What types, intensities, and zonations of resource use are compatible with the conservation of biodiversity and the maintenance of ecological processes? Unfortunately, few ICDPs are collecting the scientific data to answer this question (Kremen et al. 1994), probably because of a lack of suitable research mechanisms.

An ICDP primer

To introduce ICDPs, a brief history and a discussion of general characteristics are helpful.

A marriage of convenience. The attempt to integrate conservation and development has been inspired largely by the failure of either to succeed on its own. As the following sketch suggests, ICDPs consummate a gradual convergence of interest between two camps that have traditionally viewed the world from opposite points of view. From the conservationist perspective, over two decades ago natural area boundaries began to seem a slim defense against advancing fronts of habitat loss. In response, Unesco's Man and the Biosphere Programme of Biosphere Reserves proposed that protected areas be "buffered" by a surrounding zone of low-intensity resource use (Batisse 1986). Individual protected areas independently implemented their own "people and park" programs, including experiments with local management of small protected areas (Cox and Elmqvist 1991) and extraction from reserves (Browder 1992). As resource use was tested within reserves, biological conservation was tested outside them. Interest heightened over the ecological functions that semi-natural areas might serve, and Europeans pioneered the conservation of "protected landscapes" as a way to main-

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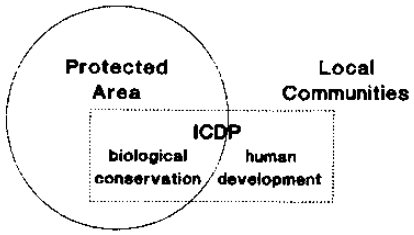

Figure 1. Basic geography of an Integrated Conservation and Development Project (ICDP).

tain remaining levels of biodiversity in settled countrysides (Lucas 1992).

From the vantage of town and cropfield, natural resource managers and development agencies were attempting to learn from the checkered history of integrated rural development (e.g., Carrasco and Witter 1993). In many lower-income countries, development projects had undermined their own natural resource base. Most infamously, roads built to carry rural produce to urban markets sped logging trucks and new settlers in the opposite direction, leading to massive tropical forest loss (Liu et al. 1993). One answer to these unintended consequences was more support for community-based conservation projects in agriculture and forestry (Western et al. 1994). In the 1980s, ICDPs established formal partnerships between conservation organizations and development agencies, with projects that promised to join the philosophy of Biosphere Reserves to the methods of community-based conservation.

Distinguishing characteristics. No one characteristic distinguishes all ICDPs from all other conservation efforts, but projects generally combine three main features. First, ICDPs link the conservation of relatively intact natural habitats with the development of better living conditions in local human communities. Second, most ICDPs are concerned with an individual site and tailor their design to its specific problems and prospects. The organizers are usually outsiders responding to the impending loss of an exceptional natural area. This means that projects often begin without active community participation, but it enables projects to "think globally and act locally." Organizers attract international expertise and support for action at their local site and broker remote sources of income for local households and resource management.

Third, ICDPs are adapted to conditions in the Third World. In many developing countries, almost all of the land is inhabited, people depend heavily on local natural resources, and population growth is high. Protected areas impose opportunity costs on local communities and may expose them to increased risks of property damage from errant wildlife. Unless the local costs of conservation are offset by local benefits, the designation of protected areas sets parks and local residents against each other as mutual trespassers (Brown and Wyckoff-Baird 1992, Wells et al. 1992). Governmental attempts to resolve these conflicts have been frustrated by limited budgets, poor communication, impassable roads, and corrupt politics. ICDPs aim to fill the developing world's need for externally funded, locally based projects that link conservation with development at individual sites.

Three types of links. ICDPs craft geographical, administrative, and functional links between conservation and development. Geographically, most ICDPs center their conservation activities in a protected area or in a set of nearby areas and base their development activities in the surrounding communities (Figure 1). Administrative designs vary greatly, but ICDPs often team a nongovernmental organization, a foreign donor agency, and a national agency in charge of forestry, wildlife, or parks (Figure 2). Local communities, sometimes represented by traditional leaders as well as official ones, are the fourth administrative partner, at least in theory.

Functionally, ICDPs deploy four main tactics to link conservation with development. Whenever possible, they promote inherent local self-interest in biological conservation (e.g., regulating the harvest of wild plants used for fiber or food) by spreading public awareness, removing disincentives, and galvanizing community action. At sites with high tourism potential, ICDPs channel gate receipts to residents or promote local enterprises (e.g., sales of crafts), so that natural attractions become a source of cash income. At other sites, or for resources that cash will not replace, ICDPs propagate alternative local sources of natural goods (e.g., tree plantations for fuelwood and poles). Finally, ICDPs distribute quid pro quo benefits (e.g., schools or clinics) in exchange for resource use foregone.

Examples from Africa

Five examples from sub-Saharan Africa illustrate some of the variations that ICDPs play on these themes and provide a basis for assessing their role in conservation (Table 1). Examples were selected in part to represent the diversity of ICDPs in the region. Each example is in a different country from central or

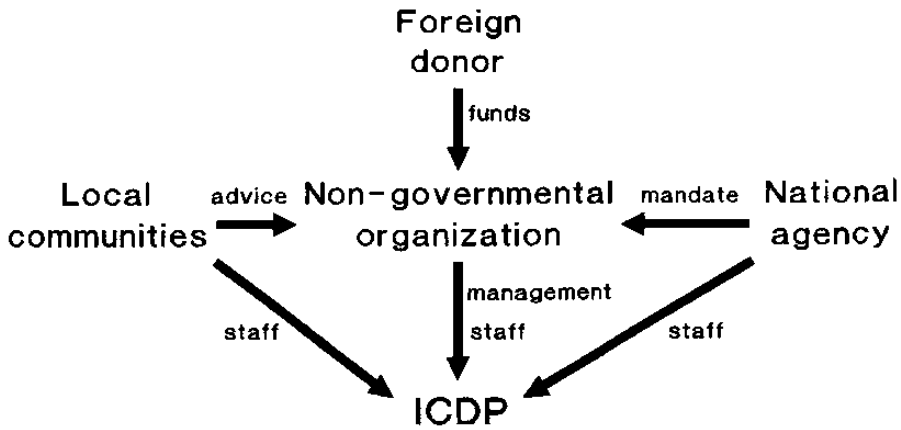

Figure 2. Basic administrative organization of many Integrated Conservation and Development Projects (ICDPs).

Table 1. Structure of five African Integrated Conservation and Development Projects.

Project	Protected area	Main habitat	Nongovernmental organization	National agency	Foreign aid agency[a]
Korup Forest[b]	Korup National Park (1260 km^2), Cameroon	Moist lowland forest	World Wide Fund for Nature	Ministry of Environment	United Kingdom
Korup Forest Research[b]	Korup National Park (1260 km^2), Cameroon	Moist lowland forest	Wildlife Conservation Society	Ministry of Environment	United States
Nyungwe Forest Conservation[c]	Nyungwe Forest Reserve (900 km^2), Rwanda	Mid-elevation forest	Wildlife Conservation Society	Office of Tourism and National Parks, Directorate of Waters and Forests	United States
Amboseli revenue sharing	Amboseli National Park (360 km^2), Kenya	Savanna	African Wildlife Foundation[d]	Kenya Wildlife Service	None
Administrative Management Design (ADMADE)	Game Management Areas (more than 5000 km^2) nationwide, Zambia	Dry forest	World Wildlife Fund[e]	National Parks and Wildlife Service	United States
Integrated Rural Development and Nature Conservation (IRDNC)	No formal protected area, Namibia	Desert shrubland	Namibian Wildlife Trust	Ministry of Wildlife Conservation and Tourism	Norway[f]

[a]United Kingdom: Overseas Development Agency (ODA); United States: US Agency for International Development (USAID); Norway: NORAD.
[b]Collaborative projects at the same site.
[c]Component project in regional plan.
[d]Catalytic role only.
[e]Off-site technical assistance only.
[f]New educational program only.

southern Africa (Figure 3). Three examples center on a park or reserve, one covers a nationwide set of semi-protected areas (Administrative Management Design, or ADMADE), and one operates without any associated protected area (Integrated Rural Development and Nature Conservation, or IRDNC, referred to as "Namibia"). Each is in a different tropical habitat: three are in contrasting forests (moist evergreen lowland, moist evergreen mid-elevation to montane, and dry seasonal), and two are in drier grasslands or shrublands. One of the examples (Korup) is made up of two component ICDPs, each specialized for a complementary function; another (Nyungwe) is a specialized component of a regional plan. The other three ICDPs are designed to stand alone.

Examples were also selected for their longevity and their success. They should therefore illustrate the most that ICDPs have achieved. On the other hand, Africa poses stringent tests (Wright 1994). Compared to Asia or Latin America, poverty is often more severe, population growth more rapid, and environmental organizations less strong. I visited each project for five to ten days in 1991–1992 as part of an American Association for the Advancement of Science (AAAS) Diplomacy Fellowship in the Bureau for Africa of the US Agency for International Development (USAID) and updated the descriptions in 1994 with information provided by project staff.

Korup Forest, Cameroon. In 1986, Korup National Park conferred official protection on 1260 km^2 of a primary, moist lowland forest that had been historically preserved by isolation and by a low density of commercially valuable trees. Korup's storybook-like rain forest is home to more than 400 species of trees, an important population of African forest elephants, and high diversities of primates, birds, and fish (Gartlan 1990).

Unfortunately, the biological wealth of Korup pays limited dividends from tourism. The main park entrance lies a day's journey by unpaved roads from the nearest city, Douala. In the rainy season, some stretches of the roads dissolve into a soupy clay. Groups of local residents wait for the inevitable plunges of passing vehicles into the meter-deep roadside ditches and earn seasonal income by pushing the cars back onto the road. Those travelers that reach the park find that the superb forest conceals the animals from view, that the high humidity grows fungal films over camera lenses, and that the malaria resists chloroquine. In 1990, 300–350 intrepid visitors generated user fees of only US $2800 (Weber 1993).

By special agreement, the park is officially managed, not by the national government, but by the Korup Forest Project. This ICDP is run by the World Wide Fund for Nature with support from the British Overseas Development Administration (Table 1). In 1989, the Korup Forest Research Project assumed responsibility for research, inventory, and training in the park. This separate ICDP is run by the Wildlife Conservation Society with support from USAID and assistance from US Peace Corps volunteers.

Research at Korup has emphasized inventories of biodiversity. The

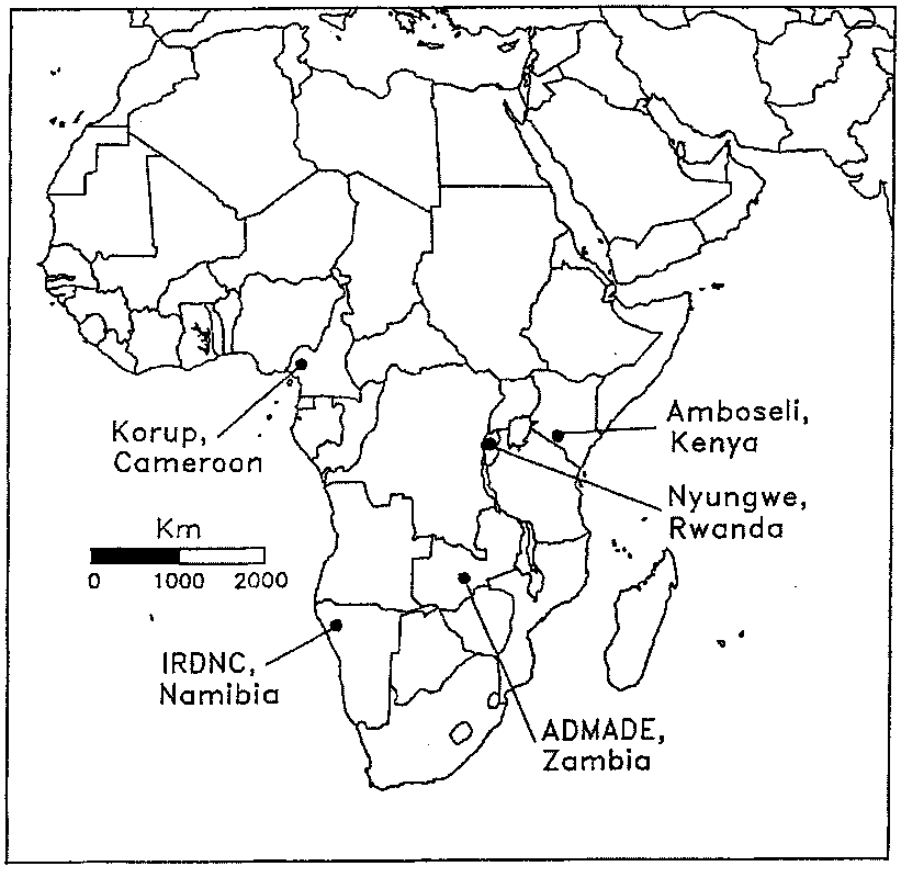

Figure 3. Location of five examples of Integrated Conservation and Development Projects (ICDPs) in Africa.

project has made use of vegetation maps prepared by independent academic researchers (Letouzey 1985) and floras and manuals commissioned by French and Canadian foreign aid agencies (e.g., Vivien and Faure 1985). During its planning phase, the Korup Forest Project contracted for more than 12 social and biological surveys. The Korup Forest Research Project has encouraged further inventories by visiting scientists (e.g., Dejaifve 1991).

A recent episode at Korup shows how ICDPs can fall victim to external forces and how the exigencies of management can claim the time of in-house research staff. The Forest Research Project's field station, reachable only by footpath, lies 10 km inside the park boundary but only 2 km from the village of Ikenge. In Cameroon, it is illegal to live in a national park, but 12 villages including Ikenge were inside Korup when it was established. These villages were small and initially posed more of a political problem than a threat to wildlife. The people of Ikenge cleared cropfields within approximately 1 km of the village. They grew coffee and cocoa for cash income and hunted wild animals for subsistence. Hunting had seriously depleted only the slow, tasty giant pangolin (a medium-sized mammal).

However, when a downswing in international markets made coffee and cocoa less profitable, the villagers sought a new cash crop suited to transport by trail, that is, something else with low spoilage and a high price per kilo. The new choice was dried meat from wild game, and hunting turned from subsistence to commerce. The first major casualty was project research. Villagers found that the grid of trails cut for primate studies around the station was equally handy for primate hunting. After six months of negotiations, the project hired 12 residents as research assistants and construction workers, and the village stopped hunting on the grid.

Nyungwe Forest, Rwanda. The Nyungwe Forest Conservation Project has several parallels to the Forest Research Project at Korup. The Nyungwe project also centers on a major national protected area with low tourism revenues and includes an international nongovernmental organization, a national ministry, and a foreign donor as partners. It is a research-oriented ICDP designed to complement projects that are more development oriented at the same site, although it has provided community benefits through direct employment and conservation education. However, Nyungwe is set in a different ecological and social context from that of Korup—a readily accessible montane forest surrounded by a dense human population. These differences have burdened Nyungwe with more urgent conservation threats but have helped make the protected area a vacation destination for Rwandans as well as foreigners.

Nyungwe Forest constitutes 90% of Rwanda's remaining forest cover. It is a major remnant of the central Afromontane forest, one of Africa's conservation priorities (Pomeroy 1993). At least 182 species of trees and shrubs, 13 primate species, and 275 bird species inhabit a variety of upland habitats (Dowsett 1990).[1] On the middle slopes (1700–2000 m), 55-m trees (e.g., *Parinara excelsa, Newtonia buchananii*) emerge through the forest canopy, tree ferns (*Cyathea manniana*) and giant lobelias feather cascades and seeps, and duikers (small antelopes) shadow isolated swamps. On upper slopes, ericaceous heathlands and stands of the tropical conifer *Podocarpus milanjianus* call temperate-zone habitats to mind.

An estimated 350,000 people depend on Nyungwe Forest for resources, and human use has left its marks throughout the forest. National agency patrols have largely checked logging and hunting in the 40% of the forest, approximately 900 km^2, that is now a natural reserve. However, regrowth in some old clearings appears choked by the invasive exotic vine *Sericostachys scandans*, the African buffalo is gone,

[1]The Nyungwe Forest Conservation Project has also sponsored a set of unpublished surveys of biodiversity.

and the forest elephants are reduced to a handful. Additional resource demands have come to Nyungwe Forest in the form of several thousand hopeful goldminers, who work the lower stream beds. Local demand for fuelwood and construction poles outpaces the growth of the *Podocarpus*, *Eucalyptus*, and pine plantations around the forest boundaries.

In 1984, a national action plan divided Nyungwe Forest into four management units, within which multiple international donors and nongovernmental organizations implement projects in agroforestry, biological inventory, and forest protection. Tourism, ecological inventory, and monitoring in the reserve are the responsibility of the Nyungwe Forest Conservation Project. The project is led by the Wildlife Conservation Society in cooperation with the National Office of Tourism and Parks, with support from USAID and assistance from Peace Corps volunteers trained in park management (Table 1).

Research at Nyungwe has focused on the impacts of human use. The ICDP's senior scientist, Samuel Kanyamibua, won a Biodiversity Support Program Small Grant funded by USAID to inventory avifauna as a baseline against which to measure impacts of tourism. Under his direction, graduates from the nearby national university at Butare have studied the effects of goldmining on riparian invertebrates, the effects of roadside grazing on vegetation, and the ecology of *Sericostachys*. The project has also cooperated informally with an independent study of seed dispersal in the forest that is led by zoologists from the University of Wisconsin and jointly funded by the US National Science Foundation (NSF) and USAID. This cooperation has enhanced facilities for research and for training research assistants.

The Nyungwe Forest Conservation Project is one of few African ICDPs to focus on low-cost tourism (Hannah 1992, Kiss 1990, Weber 1993, Wells et al. 1992). By virtue of its elevation, Nyungwe enjoys a mild and healthful climate. A paved road bisects the forest, so ordinary passenger cars and public buses can easily reach the project reception center. The scarcity of large animals means that visitors can explore on foot, and the project maintains 50 km of trails and several campgrounds. On the other hand, the absence of dangerous but thrilling wildlife obliges the project to set modest visitor fees (approximately US $1.50 to hike and $4.00 to camp in 1992). Receipts of approximately $10,000 per year during 1990–1991 covered only the costs of managing visitors and maintaining facilities. Other than salary for some local residents employed by the project, tourism has generated little revenue for local communities.

Nyungwe presents an extreme example of the force of externalities at ICDPs. During the early 1990s, chronic political instability in the central Africa highlands took a toll on project staff and revenues. The office manager fled the country after political imprisonment. A flare-up in civil fighting preceded a drop from 3327 visitors in 1990 to 2480 in 1991. In 1994, civil war eclipsed the project.

Amboseli, Kenya. Like Korup and Nyungwe, the revenue-sharing program of the Kenya Wildlife Service at Amboseli National Park centers on a protected area of international significance and tries to channel revenues from tourism to local communities. Unlike those areas, Amboseli has a high potential for income from tourism, and the local residents have strong traditions that favor wildlife conservation. As a result, Amboseli does not depend on international management or aid and includes active community participation.

Amboseli National Park was established in 1974 on 390 km^2 of semi-arid savanna 240 km southeast of Nairobi. Good roads, luxurious accommodations, and the virtual certainty of seeing giraffes and elephants set against the splendid backdrop of Mt. Kilimanjaro lure crowds of visitors—180,000 people in 1991. Unfortunately, the park protects only one-tenth of the ecological system. In the wet season, the Amboseli's ungulates spread far outside the park to graze (Western 1994). The surrounding lands are owned by approximately 20,000 Maasai. As pastoralists, the Maasai do not regularly hunt wild animals for food or sale. However, the wild herbivores compete with their livestock for forage and indirectly reduce the food available to the Maasai. In the dry season, wildlife regroups in the park, which encloses the main source of permanent water in the system. This swamp was also the main dry-season water source for the Maasai goats and cattle, which the park officially excludes. Park managers and local residents were thus set at odds over water and primary productivity.

Revenue sharing is the latest in a 20-year history of efforts to resolve the conflict (Hannah 1992, Western 1994). In 1990, the Kenya Wildlife Service assumed management of the national parks. Exceptionally, this new agency was given the privilege of raising and retaining its own revenues. This privilege opened the way for revenue sharing with the Maasai. Acting as catalyst, the African Wildlife Foundation sent its staff member, Peter Lembuya, to meet with the committees that manage the Maasai group ranches around Amboseli. In January 1991, the Kenya Wildlife Service agreed to make one-eighth of the visitor fees earned by the park in 1990 (approximately US $150,000) available for local community development projects. This arrangement was renewed the next year. Together with the development of tourist concessions on the ranches themselves and with direct national aid for water projects, revenue sharing appears to have relieved much of the strain between the Maasai and Amboseli. For instance, earlier threats to fence off ranch lands were abandoned.

The experience at Amboseli shows that active community participation can actually slow initial results, although it may help guarantee continued ones. Maasai ranch committee priorities were clear enough: boreholes (deep wells) for water, school buildings and scholarships, clinics, anti-tick dips for cattle, electric fences to protect crops, and craft markets. But ranch committees had little experience in project administration: allocations for boreholes proved too small, and matching contributions for buildings from com-

munity fundraisers and nongovernmental organizations fell through. By summer 1992, residents had spent only half of their 1990 revenue share.

However, ranches showed evidence that they were developing capacity for future management. The Maasai endowed construction projects with individual management committees and hired their own members as caretakers at the boreholes. Approximately 20 Maasai became community game wardens, paid by the community to track movements of wildlife and report illegal wildlife to government wardens. In 1992, ranch committees selected fewer projects and concentrated on completing unfinished ones.

Game Management Areas, Zambia. The Administrative Management Design (ADMADE) for Game Management Areas in Zambia shares three of the important advantages of Amboseli (Lewis and Carter 1993). International tourism generates large revenues from wildlife in this ICDP area. Local communities are well organized and have established leaders who can work with the project. The national government has agreed to return a portion of tourism revenues to the communities. However, ADMADE differs from most other ICDPs in that it has grown from a pilot project at one site into a nationwide program. Another difference is that the bulk of tourism revenues come, not from viewing wildlife, but from shooting it.

Like national forests in the United States, Zambia's Game Management Areas buffer its national parks and greatly extend the total wildlife habitat. These areas allow limited hunting and human settlement and form part of the communally owned lands traditionally administered by village chiefs and *indunas* (headmen). Most of these areas are poor, rural, and sparsely populated; their climate, soils, or tsetse flies make ranching and agriculture relatively unprofitable.

The trophy-sized cats and antelopes in the wild habitats of the Game Management Areas had long provided happy hunting for international sportsmen. The most famous hunting grounds were in the Luangwa Valley, site of ADMADE's pilot ICDP (Lewis et al. 1990). At rates of approximately $1000 per day, the 100 or so tourists that come yearly to hunt in Zambia recommend themselves both by large revenues and by low numbers. However, almost no revenues from the safari industry were reaching local Zambians or wildlife managers, the two groups most able to protect local wildlife. In the 1970s and 1980s, illegal hunting greatly reduced the populations of large mammals in Zambia.

Started in 1989, ADMADE now channels profits from trophy hunting to wildlife management and community development, hoping to safeguard both the wildlife and the industry. ADMADE is run directly by the Zambian National Parks and Wildlife Service. A Wildlife Revolving Conservation Fund collects a portion of the governmental fees charged to safari clients and earmarks them for wildlife management, local community development, and National Parks and Wildlife Service administration. ADMADE returns the shares for management and development to the Game Management Areas where they were earned and helps to translate them into jobs and community facilities. Fees paid to the fund probably amount to less than 10% of the total cost of safaris to clients but provide considerable income by Zambian standards. In 1991, the fund earned approximately $370,000. Revenues have risen since then, although not steadily. In 1993, unfavorable publicity over a new hunting lease policy was followed by a significant drop in the year's trophy hunting market.

The revenues passed through ADMADE have helped to pay for community development projects in at least 17 participating Game Management Areas. ADMADE has also hired more than 500 local residents as Village Scouts, who enforce wildlife regulations and construct management facilities. At approximately $320 per year, a scout's 1994 salary equalled 1.3 times the mean Zambian per capita income.[2] There are no direct data to confirm that scouts have reduced the number of animals killed by illegal hunters. However, where ADMADE has operated, arrests have increased and local attitudes toward wildlife conservation have improved (Lewis and Carter 1993).

ADMADE enlists its scouts to collect data on wildlife sightings and trophy hunting kills. These data are now recorded on maps generated by a geographical information system, which doubles as a tool for land-use planning (Lewis 1995). A second line of research is using exclosure plots to measure the impacts of elephant populations on vegetation.

Kaokoveld, Namibia. In the dry northwestern corner of Namibia, historically known as the Kaokoveld, annual rainfall ranges from 350 mm in the east to 15 mm near the Atlantic Coast. Inland woodlands dominated by mopane (*Colophospermum mopane*) grade westward into brushlands, dunes, and desert flats. The arid landscape is arresting. Craggy ridges part twisted, tree-lined washes. Omurunga palms (*Hyphaene petersonia*) fringe rare desert springs. By tradition, the 3000 Himba and Herero residents in the 30,000-km^2 project area are semi-nomadic agropastoralists (Jacobsohn 1993). Like the Maasai at Amboseli, they hunt wild animals only in times of famine. For regular sustenance, they depend on goats and cattle, which they drive between dry- and wet-season pastures. When asked what use wild animals serve, people often reply that they are good to have around, that it is important that children see them.[3]

In the 1960s, lions, ostriches, giraffes, rhinoceros, elephants, mountain zebra, gemsbok, springbok, and greater kudu were still frequent sights in the Kaokoveld (Cloudley-Thompson 1990, Viljoen 1987). In 1968, the territorial government opened parts of a reserve that had covered much of the region to hunting on a fee-for-permit basis. These fees exceeded local means and effectively prohibited the residents from their emergency hunting. At the same time the new policy encouraged outsiders to come and hunt for sport. This combination of injury and insult

[2]D. Lewis, 1992, personal communication. ADMADE, Zambia.

[3]P. Alpert, 1992, personal observations.

helped persuade residents to cooperate with outside commercial poachers. Trade in ivory, horn, feathers, and skins, abetted by a severe drought in 1980–1982, reduced wildlife populations by up to 90%.

In 1983, the government and a new ICDP, the IRDNC, stepped in to save the situation (Owen-Smith and Jacobsohn 1989). The government banned sport hunting and reinforced its ranks of game guards. The Namibian Wildlife Trust, the local nongovernmental organization created to run the ICDP, began a community game guard program. Himba and Herero headmen chose six local residents as guards. In exchange for some equipment and approximately $10 and a sack of cornmeal per month, each community guard patrolled within approximately 25 km of his herds, tracking and reporting poachers to government guards. The total annual budget for the project was less than $5000.

Resident support for poachers was stymied by the watchfulness of the community guards and replaced by new associations between antipoaching and income. The status conferred by employment was amplified by the wide sharing of benefits common in African societies; a ration of cornmeal might help feed 15 people. By 1992, the program had grown to 30 guards. Although no quantitative data were gathered, IRDNC staff are confident that the killing of most wild animals has stopped. The community game guard program has been replicated in northeastern Namibia, and IRDNC has attracted funding from the World Wide Fund for Nature and the Norwegian foreign aid agency.

Recent biological research in the project area consists largely of unpublished censuses of mammal populations. The most endangered large species is a rhinoceros, and the IRDNC staff have cooperated with ongoing monitoring coordinated by national wildlife officials to help determine whether active intervention is needed to maintain the population. Observations by IRDNC staff also suggest that the small remaining elephant population in the area is in annual contact with a larger population further inland. Maintenance of the main migration corridor has become a project concern.

The role of ICDPs

What can patterns in these examples tell us about the role for ICDPs in biological conservation and human development? The one conservation interest common to all sites was populations of large mammals (Table 2). Two projects were also motivated by conservation of primary forests or indigenous cultures. All sites had some exceptional conservation interest on a regional scale.

There was no focus of activities common to all five ICDPs. In this respect, projects were highly individualistic (Figure 4). The most common conflict between local residents and conservation involved hunting (Table 2), although the actual hunters at ADMADE and Namibia were mainly nonresidents. Conflicts over land use or forest resources were also important at three sites. In general, the main conflict matched the main conservation interest of the site.

Advantages that appeared to favor project success at two or more sites were: political support from the national government, remoteness, amenable local traditions, and high potential to earn tourist revenues. Because none of these was a major factor at all projects, no single advantage appears indispensable. Each ICDP likewise seemed to encounter a unique set of obstacles. Limited potential to earn tourist revenues was a major disadvantage at two projects. Where revenues were high, the volatility of luxury markets or the local capacity to manage accounts and projects sometimes

Table 2. Main functions at five African Integrated Conservation and Development Projects.

Project	Korup Forest/ Korup Forest Research	Nyungwe Forest Conservation	Amboseli revenue sharing	ADMADE (Zambia)	IRDNC (Namibia)
Conservation interest	Primary rain forest, primates	Major forest remnant, primates	Traditional culture, large mammals	Large mammals	Traditional culture, large mammals
Focus	Park management, rural development/research	Low-cost tourism, research	Community development	Anti-poaching, community development	Anti-poaching, tourism, education
Conflicts	Hunting, clearing	Resource demand, goldmining	Land use	Hunting	Hunting
Advantages	Government mandate, remoteness	Climate, infrastructure, government mandate	Tourism revenues, local traditions, government policy	Safari hunting revenues, government policy, remoteness	Long-term leadership, local traditions, remoteness
Disadvantages	Residents in park, low tourism potential	Civil strife, limited revenues, dense human population	Slow use of revenues by communities	Volatile safari market	Lack of formal protected area
Main community benefits	Employment, agricultural extension/employment, training	Employment, training	Tourism revenues for community projects	Tourism revenues for employment and community projects	Employment, craft sales, esthetics
Main conservation benefits	Public awareness, research	Public awareness, research	Extension of wildlife habitat	Reduced hunting	Greatly reduced hunting

became limiting. Political unrest, large human populations, customary rights to land or resources enclosed by reserves, or the absence of an official protected area posed ongoing problems at one or more sites.

All projects produced tangible benefits for local communities (Table 2). In four of the five cases, the main benefit has probably been cash income for individual residents directly employed by the project. Only the two projects in which international tourism is lucrative, Amboseli and ADMADE, have also provided significant revenue for community facilities such as schools and clinics. At both of these ICDPs, the two key links between wildlife tourism and local income were a nationally mandated financial policy to collect revenues and a local administrative structure to distribute them. Running the latter was the main business of the ICDP. Other community benefits included training as guides, clerical staff, and research assistants. At Namibia, residents cited an intangible benefit—their esthetic enjoyment of wildlife.[4]

Overall, benefits for conservation were less demonstrable (Table 2). Although undocumented, reductions in illegal hunting were undoubtedly significant at ADMADE and Namibia. Both projects had hired local residents as game guards. The more complete success was probably in Namibia, even though wages were much lower. This finding testifies to the efficacy of the "bottom-up" approach of the IRDNC. The three ICDPs that best resolved their main conflict between conservation and resource use (Amboseli, ADMADE, and IRDNC) were also those with the most community participation. A second benefit for conservation at each of these projects was a turnaround in local attitudes toward conservation. Apparently even modest additions to household income or community facilities can make a large difference in residents' willingness to help conserve local wildlife, especially where the people are poor and few, and when they are asked to participate.

One final pattern is that all projects relied primarily on external, foreign support, whether as contributions to nongovernmental organizations, taxes paid to donor agencies, or fees paid to tour companies or government agencies. In no case did local conservation directly pay for local community benefits. The most convincing instance of a direct link between conservation and

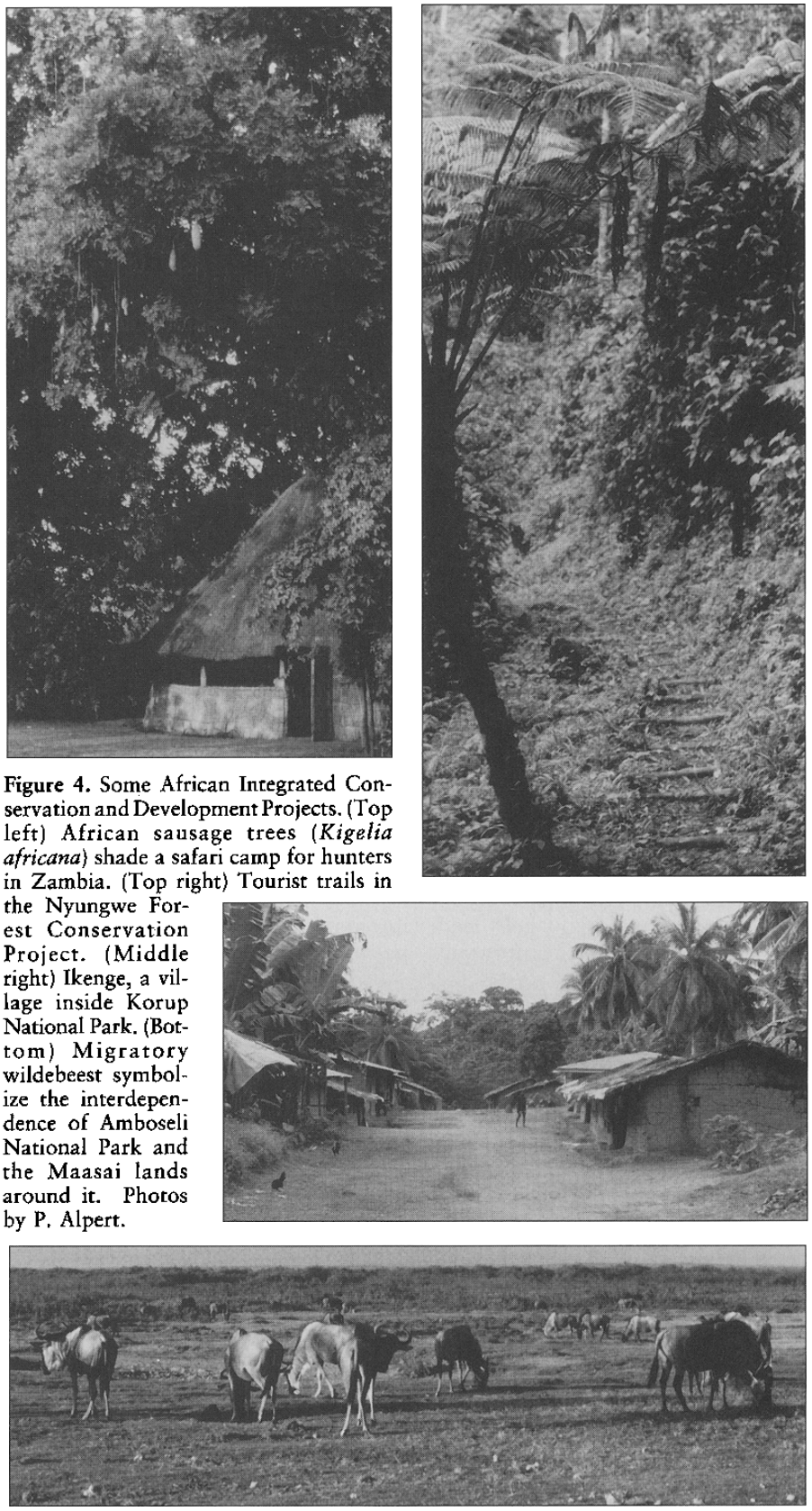

Figure 4. Some African Integrated Conservation and Development Projects. (Top left) African sausage trees (*Kigelia africana*) shade a safari camp for hunters in Zambia. (Top right) Tourist trails in the Nyungwe Forest Conservation Project. (Middle right) Ikenge, a village inside Korup National Park. (Bottom) Migratory wildebeest symbolize the interdependence of Amboseli National Park and the Maasai lands around it. Photos by P. Alpert.

[4]See footnote 3.

development, by promoting self-interest in maintaining a locally used resource, was at Namibia, where the project helped a community regulate its harvest of wild palm fronds (Jacobson 1993).

Reliance on overseas tourism or foreign aid may mean that projects have a limited life expectancy and a maximum number. Philosophically, the notion that sites of international ecological importance merit permanent international support merely extends the concept that national parks deserve a share of federal taxes. Pragmatically, it clashes with the realpolitik of donor agencies, whose constituencies frown on prolonged self-insufficiency in aid recipients. Survivorship of the ICDPs may be further reduced by their vulnerability to external forces, such as international economics (Korup), regional movements of people (Nyungwe), and warfare (Nyungwe). Even under the best of circumstances, if ICDPs are competing globally for the same pots of private and government gold, their combined success may still plateau as their number goes up.

In sum, these patterns suggest that ICDPs can be a viable medium-term strategy for conservation and development at a limited number of sites that are biologically rich, esthetically attractive, economically poor, geographically isolated, sparsely populated, and culturally traditional. They work best where the national government extends them a formal mandate and when specific individuals are highly committed to seeing them work. In Africa, this may translate mostly, if not exclusively, to relatively dry sites with splendid populations of large animals.

How does this assessment of ICDPs compare with earlier ones? Based on their visits to more than 20 ICDPs in the late 1980s, Wells and Brandon (1993, summarizing Wells et al. 1992) concluded that such projects could be effective only with political commitments from local leaders and national agencies, that the projects had so far contributed little to biodiversity conservation, and that the main reason for promoting ICDPs was because there seemed to be no other choices. The examples here agree with virtually all of the authors' suggestions about factors that favor project success but argue that at least some projects have now demonstrated conservation benefits, mainly by helping to maintain wild animal populations.

Southgate and Clark (1993), who did not report actually visiting any ICDPs, nevertheless issued a more damning critique. Their sharpest points were that local infrastructure development is bound to accelerate habitat destruction and that the conservation of biodiversity is unlikely to be of local economic interest. The examples in this article do not bear out the first point. The education and health facilities that local residents have chosen to fund with project benefits at ADMADE and Amboseli do not seem likely agents of habitat destruction. On the other hand, at no project was biodiversity per se a source of benefits or revenues. Conservation of biodiversity at ICDPs may have to be a byproduct of conserving particular species.

Hannah (1992) noted that the potential contribution of ICDPs to conservation is limited by their small scale. My examples support this contention. Even the nationwide project in Zambia works in a set of local areas, and in monetary terms projects have generated only small amounts of community benefits. However, Brandon and Wells (1992) pointed out that small scale also encourages ICDPs to be more flexible, participatory, and targeted. Many of the shortcomings of ICDPs seem to arise from the same qualities that underlie their successes. ICDPs have been justly criticized as inadequate to ensure conservation and development (Brown and Wyckoff-Baird 1992). A more constructive way to put this may be to say that they can probably play a useful role in combination with other strategies.

Placing ICDPs in a "lasting landscape"

Recent overviews of biodiversity conservation (McNeely 1994, Peres 1994, Potter et al. 1993, Robinson 1993), sustainable use of forest resources (Holdgate 1993), and ecosystem management (Grumbine 1994) have come to a common conclusion: Conservation and resource use involve inherent tradeoffs, and no one level of compromise will satisfy both needs. The solution may be to practice different tradeoffs in different places, that is, to purposefully design a patchwork of areas variously dedicated to strict protection, natural resource production, or intensive use. In one famous prescription for such a "lasting landscape," the US Forest Service plan for the Pacific Northwest maps out an archipelago of reserves set in a semi-natural matrix of rangelands, naturally regenerating forests, and wetlands, which in turn adjoin more intensively managed farms, plantations, and settlements (Thomas 1994).

In developing countries, strong pressures for local resource use and limited means for conservation may trim the range of possible tradeoffs between conservation and use. Strict protection may need to be softened. Along the continuum of increasing use and decreasing conservation, ICDPs fall between conservation approaches that insist on nonconsumptive use only and development approaches that promote forestry, agriculture, or settlement throughout an area. ICDPs have shown that they can provide enough community benefits to promote local cooperation with conservation. It remains to be seen whether long-term conservation will result. It also seems clear that many ICDPs will depend indefinitely on external support. However, they may repay the First World's investments with some lessons for home use. As wilderness shrinks at higher latitudes, site-specific coalitions of private land users and public resource managers are testing ICDP-like approaches at sites from Yorkshire in the United Kingdom to Wyoming in the United States (Western et al. 1994).

The research quandary

Although ICDPs have clear needs for biological research, they suffer from a lack of mechanisms to provide it.

The needs are clear. If there is to be no absolute wilderness in developing countries, then scientific knowledge of how the use of natural resources impacts wild species and

habitats becomes even more essential. In particular, ICDPs need biological research to inventory species and habitat diversity, to measure the impacts of consumptive and nonconsumptive uses on plant and animal populations, to assess the seriousness of threats to conservation, to develop alternative sources of natural resources, to apportion benefits, and to document successes.

For example, at Korup the government was willing to add part of the surrounding uplands to the park, but no biological surveys were available to guide the choice. At ADMADE, lack of systematic wildlife censuses obliged managers to set hunting quotas by guesswork. At Amboseli, admiring audiences on tour buses seem likely to compromise a cheetah's hunting success, but the real effects are unknown. At Nyungwe, the possible effects of riparian goldmining on aquatic fauna were just beginning to be measured. In Uganda and Madagascar,[5] project nurseries grow pines and eucalyptus instead of native species because the germination requirements of the natives are unknown. In Namibia and at ADMADE, the actual success of antipoaching programs remains largely unsupported by data.

Population biology and community ecology have ready techniques for such work. To cite just those working in Africa, published studies have identified indicator species for monitoring changes in biodiversity (Kremen 1992), correlated animal use and forest fragment size to indicate a minimum size for reserves (Newmark 1991), and recommended ways to reduce incident damage from selective logging (Skorupa 1986). Ginsberg and Milner-Gulland (1994) modeled ungulate population growth to suggest how size- and age-skewed trophy hunting might affect populations with different reproductive characteristics. Ben-Shahar (1992) assessed vegetation management as a tool for maintaining animal populations. Empirical tests of the ecological impacts of human use have examined grazing (Reid and Ellis 1995), tourism (Hawkins and Roberts 1993), and land conversion (Okwakol 1994).

[5]P. Alpert, 1991, personal observations.

But the means are lacking. ICDPs may be going without the biological science they need, not for want of techniques or intentions, but because of the relative fragility of research in the rough-and-tumble of project life. Virtually all ICDPs develop research and monitoring plans but then see them deferred and defeated. Each of the three common research mechanisms at the ICDPs—hiring contractors, dedicating a component project to research, and welcoming visiting academics—seems to provide only a partial solution.

ICDPs can dictate research topics and designs to contractors but must pay for the privilege. Contracts rarely carry much incentive to publish or include peer review, so the results are often unavailable to other researchers or projects. The geological, biological, and sociological surveys at Korup have mostly been archived as in-house reports. The two ICDPs with specialized research missions, Nyungwe and Korup, have probably produced more research than the three factotum projects. However, project management easily consumes the energies and resources intended for research when staff wear both research and management hats. Even the Multispecies Project in Zimbabwe, an ICDP that is dedicated solely to providing research to other African ICDPs, has been drawn into management.[6]

Externally funded academic visitors generally arrive with ample pressures to publish, but their research questions may be of more immediate interest to grant review panels than to ICDPs. Basic research projects do provide important incidental benefits by training assistants, sharing resources, and establishing collaborations, as at Nyungwe. A surprising number of ICDPs seem themselves to be partly an incidental benefit of basic research. The technical advisor at ADMADE, a coleader at Namibia, the conservation organization program manager responsible for Nyungwe, and one of the main planners at Korup were all doctoral students who came to do field work and later returned to help save their field sites.

The ideal research mechanism for an ICDP would deliver researchers eager to answer its practical questions and then stop up their ears to the siren song of daily crisis. One approach could be external research grants that favor a balance of basic and practical goals. USAID has begun to offer such programs (Alpert 1994). A more ambitious possibility might be to develop selected ICDPs as Long-Term Social and Ecological Research sites, after the model of the National Science Foundation's (NSF) Long-Term Ecological Research program. A third option could be to direct dissertation students toward research projects at existing ICDPs. In 1992, USAID and NSF offered special dissertation grants to fund African nationals enrolled at US universities to do field work at ICDPs in Africa.[7,8] As environmental problems become more pressing throughout the world, the application of basic biological research to practical problems becomes more urgent. New research mechanisms for ICDPs, like the projects themselves, might turn out to be models for problem-solving in the First World as well.

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[6]D. H. M. Cumming, 1992, personal communication. Multispecies Project, Harare, Zimbabwe.

[7]F. Li, 1992, personal communication. National Science Foundation, Washington, DC.
[8]T. Resch, 1992, personal communication. US Agency for International Development, Washington, DC.

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