Peripheral development: position paper for the Directorate of the South African National Parks

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The principle of peripheral development and its relevance to South African National Parks has been a recurring subject for debate. One viewpoint is that the principle should be applied as a general rule, and that in future all major developments of infrastructure should be on the periphery rather than the interior of national parks. The Scientific Services units of South African National Parks were asked to provide their views, and this note is the result. The consensus was that, although there is much to be said in general for the principle, there are circumstances in which developments on the periphery of a park could be deleterious. Hence, the principle does not merit the status of a rule.

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Introduction

The principle of peripheral development states that the infrastructure necessary for tourism and general management in a national park should be located at or near the boundary, rather than in the interior. Infrastructure inevitably introduces a degree of disturbance to the natural environment. The idea behind peripheral development is to limit such disturbance to the edges of protected areas, and to maintain the interior in as pristine a state as possible. In general, this makes good sense but, like many generalisations, peripheral development is open to controversy. How rigidly can it be applied? Are there exceptions to the rule? What are the advantages, and the disadvantages? This note attempts to address these questions.

There are four different categories of issues that are relevant to the principle of peripheral development: economic/logistic, aesthetic, social and ecological. These are each examined individually.

Economics and Logistics

From the economic point of view peripheral development (provided that it is appropriately situated) offers certain major advantages:

- Staff can live outside the park, saving the cost of building and maintaining staff accommodation, shops and recreation facilities.
- Provisioning and servicing of the camp and associated infrastructure should be cheaper: for example, the possibility of outsourcing or provisioning from outside could make it unnecessary to have laundry or warehouse buildings.

- Heavy trucks would have quicker and easier access, saving the cost of building and maintaining long stretches of roads that are suitable for heavy vehicles.
- Supply lines for electric power, water and telecommunications (telephone lines or masts) could be shorter and cheaper.

While these considerations may not be relevant in every case (a peripheral camp may still be very far from the nearest town), the opportunities need to be born in mind. In some cases opportunities have been missed: for example, in the Kruger National Park the staff in the Crocodile Bridge, Malelane, and Berg-en-Dal rest camps could reside outside the park, and these camps could be serviced largely from outside, instead of from Skukuza.

Aesthetic issues

Aesthetic considerations affect the quality of the experience on offer to visitors. The advantages of the periphery from the economic point of view—nearness to supply centres, towns, communities—may be disadvantageous from the aesthetic point of view. Examples are the Crocodile Bridge and Malelane rest camps in the Kruger National Park, Twee Rivieren in the Kalahari Gemsbok National Park, and the camp in the Addo Elephant National Park, where outside developments and activities have a negative impact on the wilderness qualities experienced by visitors. It is also true that large-scale tourism infrastructure placed in the interior of a small park may seriously restrict options for an aesthetically pleasing wilderness experience.

Social Issues

One of the most important advantages of peripheral development is that nearby communities can benefit more easily from employment opportunities, without having to be away from their homes and families for long periods. As noted above, peripheral development creates opportunities for supply services to be outsourced, thereby enhancing the potential for local communities to derive economic benefits.

Ecological considerations

From the ecological point of view, the advantages of peripheral development are not always clear cut. It is probably true that the periphery of many national parks tends to be of lower conservation value than the core areas. This is because the periphery tends to be vulnerable to various forms of disturbance (e.g. poaching, man-induced fires, invasion by alien vegetation, pollutants, wind blown litter, all of which have a negative effect on ecosystem functioning and biodiversity). Because of the vulnerability of the periphery, a well designed and well conceived national park should be geographically positioned so that the areas of greatest value are at the core. However, this is not always possible. The geographical layout of national parks is seldom the result of perfect planning and knowledge; more often it is a matter of making the best of what remains after years of human exploitation. It may therefore be impossible to avoid ending up with important conservation-worthy resources, such as threatened vegetation types or populations of rare plants, being situated on the periphery.

To appreciate the potential consequences of infrastructural development on biodiversity and ecosystem processes it is necessary to examine a body of ecological theory known as island biogeography. During the 1960s the study of the biota of islands developed a set of principles relating the size and isolation of islands to the number of species they can support over a period of time (Waller 1991). The smaller the island the smaller the number of species of animals and plants that are found there. The smaller areas cannot hold enough members of certain species, especially the larger animals, to maintain a stable gene pool. Small insular populations lack the genetic flexibility to cope with changes in the environment, and are vulnerable to the effects of inbreeding. Small

isolated populations are also extremely susceptible to chance events, such as catastrophic storms, or spells of extreme cold. Sooner or later the result is extinction. This explains why smaller islands hold few species.

The parallels between island biogeographic theory and protected areas such as national parks are obvious (Soulé & Kohm 1989). The majority of protected areas are islands set within mosaics of pieces of land subjected to various land use practices. Some land use practices (e.g. extensive livestock production on natural veld) do not result in severe habitat destruction and fragmentation. Others (e.g. crop production or mining) tend to break up the habitat, leaving isolated fragments. A park surrounded by land use practices that destroy the habitat (e.g. Addo Elephant or Bontebok national parks) is much more of an 'island' than one surrounded by more or less natural habitat (e.g. Mountain Zebra or Karoo national parks)

Given the extent of habitat destruction and fragmentation by man, it is not surprising that very few protected areas are large enough to overcome the island effect. Many of the species of mammals that were known to be present in North American protected areas when they were proclaimed, have since become extinct. The indications are that this is due to fragmentation and the island effect (Newmark 1987, 1995).

Some of our national parks, especially the coastal parks, are long and narrow and surrounded by transformed land, making them particularly vulnerable to losses of biodiversity. Thoughtless placing of infrastructure within the interior of such parks could easily exacerbate habitat fragmentation, increasing the island effect.

It is important to note that development on the periphery could in some cases also exacerbate fragmentation and isolation. To explain this it is necessary to refer to another very important principle in island biogeography: the number of species an island can maintain is not only a function of its size, it is dependent upon its distance from the mainland. If the mainland is near enough to permit immigration and recolonisation the chance of extinction of species is much reduced. Islands situated near to the mainland, or near to other islands, tend to carry more species than very isolated islands.

Again there are parallels with the situation in national parks. There is evidence to show that the survival of species in protected areas is dependent on the ability of individuals to utilise, or at least to migrate across, adjacent lands (Newmark 1995). This is in accord with island biogeographic theory. Good conservation requires not only the establishment of large reserves, but also the maintenance of the landscape linkages adjacent to the reserves. We need to be aware that the borders of national parks, or at least certain sections of them, may be important corridors that permit immigration. A development placed on the periphery of a national park may have disastrous consequences if it happened to disturb a key landscape linkage.

Another important point is that the periphery of a protected area may be of considerable scientific value in that it can provide evidence of the impact of different forms of land use on biodiversity. Such evidence can clearly demonstrate the role played by the protected area in maintaining biodiversity. A good example is the study conducted by Moolman & Cowling (1994) on the border of the Addo Elephant National Park. These researchers compared the diversity of rare and endemic succulent plants between (1) the elephant camp, (2) the botanical reserves from which elephants and other large herbivores are excluded and (3) the veld on neighbouring farms which had been subjected to many years of browsing by goats. They found that the diversity of these plants was highest in the botanical reserve, lower in the elephant camp, and very low in the goat-browsed veld. The results clearly show that extensive livestock production in that part of the world is incompatible with biodiversity conservation, the rare localised succulent plants risk being driven to extinction. Maintaining elephants in an artificially confined situation also has a damaging effect on

biodiversity. This evidence has been critical for motivating for donor support for the enlargement of Addo. To provide this kind of evidence it is important to preserve the so-called fence line contrast between the park and surrounding land, a factor which needs to be taken into account when selecting sites for peripheral developments.

Conclusions and recommendations

The considerations discussed above show how difficult it is to generalise on whether development should be peripheral or not. The issues affecting the placement of infrastructure in national parks are highly complex. The ideal is to formulate a strategic development plan that can:

- achieve the purposes for which the development is intended, to the best extent possible;
- minimise expenditure;
- maximise socio-economic advantages for communities;
- minimise negative impacts on both the aesthetic and natural qualities of the environment.

Finding the optimum plan requires assessment of a wide range of different factors: economic; aesthetic; social; and ecological. These need to be considered in relation to the conservation objectives of the park and the accepted limits for visitor numbers and tourism development set in the park management plan. The procedures of Integrated Environmental Management (IEM) and Environmental Impact Assessment (EIA), which are in any case required in terms of the regulations (Environmental Conservation Act), are designed to do exactly this. All infrastructure needs to be planned according to these procedures, and they should be applied with full participation of interested and affected parties.

Perhaps in the majority of cases, the application of IEM and EIA would show peripheral development to be the right option. However, the exceptions make it clear that the principle of peripheral development should not be elevated to the status of a rule. It would be dangerous to use the principle as a substitute for thorough analysis; each case needs to be decided on its own merits.

In conclusion, it is clear that planning of infrastructure in national parks is a multi-disciplinary exercise. To achieve success South African National Parks needs to fully integrate the knowledge and expertise of all three of its major functional departments: Conservation Development, Social Ecology and Commercial Development and Tourism.

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