

- Poulsen, H. (1973): Notes on the educational use of zoo guide books. *Int. Zoo Ybk* Vol. 13, p. 249.
- Reed, T.H. (1961): Where do visitors come from? *Int. Zoo Ybk* Vol. 3, pp. 43-46.
- Rosenfield, S. (1980): *Informal learning in zoos: naturalistic studies of family groups*. Ph.D. thesis (unpublished), University of California.
- Ross, J. (1981): The Insect World at Cincinnati Zoo. *Int. Zoo Ybk* Vol. 21, pp. 36-40.
- Serrell, B. (1981): Zoo label study at Brookfield Zoo. *Int. Zoo Ybk* Vol. 21, pp. 54-61.
- Smith, L.F. (1981): Educational graphics in the National Zoological Gardens of South Africa, Pretoria. *Int. Zoo Ybk* Vol. 21, pp. 27-36.
- Thomas, W.D., and Downing, C. (1961): The role of the zoo in public education. *Int. Zoo Ybk* Vol. 3, pp. 46-48.
- Van den Brink, J. (1981): The role of labels in the zoo. *Int. Zoo Ybk* Vol. 21, pp. 61-62.
- White, J., and Marcellini, D. (1986): HERPlab: a family learning centre at the National Zoological Park. *Int. Zoo Ybk* Vol. 24/5, pp. 340-343.
- White, R.T. (1988): *Learning Science*. Blackwell, Oxford.
- Whitehead, M. (1989): A week in the life of Twycross Zoo's education department. *International Zoo News* Vol. 36/6 (No. 217), pp. 12-16.
- Wolf, R., and Tymitz, B. (1981): Studying visitor perception of the zoo environment: a naturalistic view. *Int. Zoo Ybk* Vol. 21, pp. 49-53.

Sue Dale Tunnicliffe, Centre for Educational Studies, King's College, University of London, Cornwall House, Waterloo Road, London SE1 8TN.

Advertising Rates

COPY accompanied by cheques made out to International Zoo News should be sent to: IZN Advertising, Flint Cottage, Roundstone Lane, Angmering, West Sussex BN16 4AP, U.K. (Tel: 0903 774701)

[Please note that advertisements offering animals for sale are accepted only from bona fide breeders; it is no longer our policy to carry advertising from animal dealers. Zoos and similar non-profit institutions may advertise animals without charge in our Surplus and Wanted Stock section.]

Rates:

Full Page	£75.00	Half Page	£40.00
	\$150.00		\$80.00
Third Page	£30.00	Quarter Page	£20.00
	\$60.00		\$40.00

Small Adverts — 20p per word (Box Numbers £1.00 extra).

Insertions — Advertisers' own leaflets can be sent out with I.Z.N., either to all readers or targeted at particular categories or areas. Details on request.

THE ECONOMIC INCENTIVE: CONSERVATION AND WILDLIFE UTILISATION IN ZIMBABWE

BY A. M. PINCHIN

Possibly the most useful spin-off from the recent CITES conference in Kyoto, Japan, has been the intense debate generated as regards the controversial yet effective wildlife management policy adopted in southern Africa. People have been forced to think long and hard about how wildlife is best to be conserved, and the southern African approach is beginning to receive a much more universal mandate as conservationists examine and challenge their own preconceived perceptions of natural resources, economics and conservation. Deviating by necessity from utopian, developed world ideals of total preservation, those responsible for the management of wildlife in the region regard it as a valuable natural resource, which can be used for human benefit in addition to being preserved for its aesthetic appeal. Following on from this view is the pragmatic philosophy of sustainable utilisation — a strategy which aims to safeguard the long-term survival of wildlife habitats and populations. The countries of southern Africa are by no means alone in advocating the controlled economic use of wildlife, as this perception of 'living resources' is fully endorsed by the World Conservation Union (IUCN), and forms one of the cornerstones of the 1980 World Conservation Strategy.

No country has been more controversial than Zimbabwe in recent times, representing as it does the vanguard of the southern African movement. Whilst it has attracted more than its fair share of criticism from the developed nations, it is widely reputed to lead Africa in terms of wildlife management, and has some 46,000 km² — representing 12.7% of its total area — under the Department of National Parks and Wildlife Management (DNP & WLM). The Safari Areas within this estate are reserved almost exclusively for controlled sport hunting and make a very significant contribution to foreign exchange earnings, which in turn assures the retention of these areas for wildlife. The products of DNP & WLM culls are also widely marketed, providing further economic justification for this form of land use. To cater further for the tourist and the hunter, extension of infrastructure and general facilities within the Parks and Wildlife Estate is an ongoing process, and it is estimated that the level of development could be increased to receive five times the present number of visitors without serious impact on the natural environment (IUCN 1988). Both consumptive and non-consumptive forms

of wildlife utilisation are blended in such a way that maximum use is made of available natural resources, thus satisfying the requirements of conservation and economic viability alike.

Alongside the Government National Parks Estate, it is now considered that private landowners have an increasingly important role to play in wildlife conservation. The game ranch industry — practised with much success in South Africa — is now gaining ground in Zimbabwe, and following the 1975 Parks and Wildlife Act (arguably the most enlightened piece of conservation legislation the continent has seen), which enabled farmers and ranchers to sell sport hunting, the amount of private land under wildlife has increased dramatically. Many farmers have introduced wildlife onto their farms in response to the government's policy of purchasing land which is being under-utilised in order to use it for resettlement, and the present drought in southern Africa has seen a fresh wave of interest in game, which is more resilient than domestic stock and is beginning to be viewed as a more appropriate form of land use than cattle ranching. The Wildlife Producers Association (WPA) — established in 1985 to promote the ranching of game — has as its main objective the reintroduction of wildlife onto agricultural land wherever it existed in the past, on the basis that it should pay for itself.

Given that WPA members have over 2.5 million acres under wildlife in Zimbabwe, it is clear that game ranches can make a very real contribution to species preservation. South African ranchers have built up a good reputation in this regard (Bothma, 1989) and have had notable success in conserving the bontebok (*Damaliscus dorcas dorcas*), the sable antelope (*Hippotragus niger*) and the Cape mountain zebra (*Equus zebra zebra*). Where breeding units of endangered species are established on ranches, these may serve as reservoirs which can ultimately be used to restock national parks. In this context, the ranch is fulfilling very much the same 'stationary ark' role as the good modern zoo. The conservation potential of the game ranch goes much further, however, for by preserving those species of game which are utilised economically, it also preserves entire areas of habitat, with all their attendant diversity of flora and fauna.

An endangered species subcommittee has recently been established by the WPA, under whose auspices efforts are currently being made to conserve the black rhino (*Diceros bicornis*), Lichtenstein's hartebeest (*Alcelaphus lichtensteini*) and roan antelope (*Hippotragus equinus*). On one ranch in the Wedza district, a revolutionary project is under way, using technology from the U.S.A., to implant black rhino embryos into white rhino (*Ceratotherium simum simum*) surrogate mothers. If this is successful, it might be a technique which could be employed in zoos worldwide to increase the captive population of this highly endangered mammal. The government of Zimbabwe has recently published a Black Rhino Conservation Strategy, in which captive breeding both at home and overseas is identified as a major objective in safeguarding the survival of the species. It is therefore to be hoped that zoos in the developed world will respond to this clear mandate to become more heavily involved in conserving the black rhino, and make such resources as they possibly can available to this end. On the game ranch, revenue is generated largely by a combination of photographic safaris, venison

production and trophy hunting. In South Africa, hunting constitutes a larger proportion of the total revenue than in Zimbabwe, but it must be conceded that, in both cases, the responsible hunter has become an important nature conservation asset. A hunter, for example, will pay up to Zim. \$5,000 to shoot a prime sable (which might, in any case, have been designated as a cull animal), and it is this sort of return which makes game ranching a viable land use alternative to domestic stock ranching or arable enterprises such as cotton and tobacco. Game ranching is a particularly appropriate form of land use in marginal areas which are unsuitable for agriculture or resettlement, and can be employed to make very full use of the available habitat if the game species are carefully chosen to suit the area.



Black rhino on an 11,000 acre game ranch in Zimbabwe. These animals are shortly to be involved in an inter-specific embryo transfer project. (Photo: A.M. Pinchin)

Relatively recently, the concept of the game ranch has been taken one step further with the establishment of large conservancies such as the Save Valley conservancy (approx. 3,200 km²) in south-eastern Zimbabwe, and the Sebakwe conservancy in the midlands, which is concentrating on black rhino conservation under the auspices of the Sebakwe Black Rhino Trust. These large-scale private initiatives are very much to be welcomed, for many of the problems associated with the smaller ranches are minimised, and the potential for conserving large continuous areas of habitat is that much greater. At the other end of the scale are the relatively intensive game farms, which, although run along tight commercial lines, can make a significant contribution to safeguarding the future survival of certain species. An excellent example of this is the crocodile farming industry in Zimbabwe, which Rick Van Malsen — manager of 'Lake Croc Park' in Kariba — maintains is responsible for

bringing the Nile crocodile back from being severely endangered thirty years ago to being relatively abundant in Zimbabwe today (BBC, 1992). The Zimbabwean shore of Lake Kariba alone is thought to be home to some 30,000 crocodiles (IUCN, 1988), and with additional healthy populations in major rivers such as the Zambezi, Save, Runde and Mwenzezi, the total number of wild crocodiles in Zimbabwe is estimated to be around 50,000 — with a further 150,000 in captivity. If at any time the wild population declines, it may be restocked from the farms, and 5% of a farm's crocodiles must by law be returned to the wild each year at an age at which they can survive on their own. Furthermore, local people are more inclined to tolerate the presence of wild crocodiles, because they are paid substantial prices by crocodile farmers to collect eggs. A situation is therefore created whereby wildlife utilisation benefits both conservation and local people.

The conflict of interest between conservation and the needs of a poor rural population who derive no benefit from the wildlife around them has long been endemic throughout Africa, and has hitherto resurfaced regularly as an apparently irreconcilable land use deadlock. To provide an incentive for rural people to conserve and value wildlife, an exciting new programme of sustainable rural development has been launched by the Zimbabwe government in the Communal Areas (areas reserved for rural settlement), whereby communities have been given the authority to manage, and derive gains from, wildlife in their area. The new scheme, known as CAMPFIRE (Communal Area Management Programme For Indigenous Resources), is designed to create social pressures in favour of wildlife conservation, and against illicit hunting or complicity with poachers. Benefits (revenue from safaris/trophy hunting and meat for the community) are received directly at grass-roots level, and this has done much to foster a conservation awareness and a sense of responsibility in resource management. The Communal Lands of Zimbabwe have enormous conservation potential, and CAMPFIRE projects create invaluable 'buffer zones' for wildlife around the National Parks and Safari Areas. The beauty of the CAMPFIRE approach is that the ethic of wildlife conservation and the interests of the rural population can at last be reconciled, and real progress can now be made in developing a conservation initiative based on a sound economic and social footing. The perceived potential is so great that other African countries have been quick to follow suit with similar schemes, which include the Luangwa Integrated Resource Development Project in neighbouring Zambia. In the words of Richard Bell — technical director of the project — 'it is intended to provide revenues for local people, and profits will enter a revolving fund which will be used to manage the area and benefit their standard of living.' As in Zimbabwe, both consumptive and non-consumptive forms of wildlife utilisation are practised, and the project has established its own safari hunting company which is bringing in much-needed revenue through offering an 'upmarket' service for overseas clients.

Much progress remains to be made in the management and utilisation of game, and problems, particularly with the more intensive private ranches and farms, continue to manifest themselves. One of these is the high risk of disease, which has necessitated the imposition of strict

quarantine and animal movement regulations. Perhaps the greatest potential long-term problem with ranching, however, is that of genetics, both in terms of inbreeding and in the possible interbreeding of different races, subspecies and even species. As ranch management becomes more scientifically based, it is likely that more attention will be paid to such factors, even to the extent where it may ultimately become necessary to mark individual animals and record their details using a studbook system. The experience of zoos in genetic management might well be used to good effect in the game ranch industry, and closer cooperation with the zoo community in this area could be mutually beneficial in the future.



Sable and wildebeest on a game ranch in Zimbabwe. (Photo: A.M. Pinchin)

If a holistic approach to conservation is adopted, with cooperation between the DNP & WLM, the CAMPFIRE schemes and the private ranches, large and ecologically important areas of land can be reserved for wildlife, and the interests of the country and all sections of the community may simultaneously be served. Whilst over a third of Zimbabwe is now under wildlife, 50% of the country is expected to host wildlife by the year 2000 — a figure which will only be attainable if wildlife is utilised in such a way that it can continue to justify its existence in the face of ever intensifying pressure on land. As was evident in the publicity surrounding the recent CITES conference, certain aspects of game utilisation are particularly controversial, and likely to remain so for the foreseeable future — particularly the management of elephant and rhino populations, which has come to be viewed as an increasingly political issue. The marketing of elephant products makes a very significant contribution to conservation in Zimbabwe, and is heavily relied on by the CAMPFIRE schemes at this critical stage in their development. It is therefore understandable that conservationists

in the region should be concerned about the decision by CITES to uphold the international trade ban on ivory and other elephant products, for a substantial potential input to the National Conservation Strategy is being lost.

Economic utilisation of wildlife, however one may feel about it, now underpins much of the conservation work in Zimbabwe — a situation which has developed in response to the interaction of a variety of factors, many unique to the region, such as the historical tradition of hunting in the area, the high economic value assigned to game, the presence of a large rural population and the need to generate foreign currency earnings. Zimbabwe has good reason to be proud of its pioneering approach to conservation, and it is through the continuation of such policies that the biological diversity of the region is most assuredly to be preserved. Even Kenya, which has long held out against hunting and the consumptive use of wildlife (both banned there in 1977), is now reviewing its policy in this respect, and there could perhaps be no greater tribute to the achievements of southern African conservationists than that implicit in the recent statement by Richard Leakey, director of the Kenya Wildlife Service, that 'it is our intention to reintroduce wildlife utilisation in consumptive form in Kenya, and we have nothing intrinsically against the utilisation of elephant.'

Acknowledgements

Thanks are due for assistance and information to Norman Travers, Imire Game Ranch, Zimbabwe; John Pile, Executive Director, Zimbabwe National Conservation Trust; the Wildlife Producers Association of Zimbabwe; and John Gripper, Chairman, Sebakwe Black Rhino Trust.

References

Cited:

IUCN (1988): *The Nature of Zimbabwe: a Guide to Conservation and Development*.

Bothma, J.Du P., editor (1989): *Game Ranch Management*. University of Pretoria.

B.B.C. (1992): *Assignment* (broadcast in U.K., 25th Feb.).

General:

Travers, N.M., (1975): *Wildlife on Your Farm*. The Game Association, Longman, Rhodesia.

Zimbabwe Wildlife magazine (1988,1989,1990,1991). The Wildlife Society of Zimbabwe.

IUCN (1990): *African Elephants and Rhinos: Status Survey and Conservation Action Plan*.

A.M.Pinchin, Department of Meat Animal Science, Bristol University, Langford, Bristol BS18 7DY, U.K.

MAINTENANCE AND BREEDING THE PANCAKE TORTOISE AT BRISTOL ZOO

BY JOHN DICKSON

The pancake tortoise (*Malacochersus tornieri*) is a small, flat tortoise rarely exceeding 180 mm in length. It has a soft, malleable carapace to enable it to squeeze into crevices in its rocky habitat, where it will inflate its body while simultaneously wedging itself with its legs, making it almost impossible to remove. Pancake tortoises are found only in Kenya and Tanzania where, according to the IUCN *Red Data Book* (Groombridge, 1982), their numbers are declining, although insufficient data is available to know at what rate. It is believed that collection for the pet trade is this species' major threat; this makes the animal an ideal subject for captive breeding and distribution among enthusiasts to stem the trade in wild-caught specimens. The species is listed on Appendix II of CITES, but there is evidence to suggest that this listing is abused.

There is currently only one species of *Malacochersus* recognised, although Loveridge described *M. procterae* from just one specimen, which has yet to be substantiated. The habitat is said to be rocky hills and outcrops in arid thornbush up to 1,800 m, to which the tortoise is perfectly adapted not only by its carapacial peculiarities but also by its striking speed and climbing abilities.

Bristol Zoo acquired an adult female (No. 1) on 29th July 1988, closely followed by a male and a female (No. 2) on 8th August. We knew that the latter two animals had been housed together for at least the previous two years without any breeding behaviour being observed. All three tortoises were housed in a cage 210 cm by 206 cm by 138 cm high, which was shared by a number of sail-finned lizards (*Hydrosaurus*). The cage furnishing consists of a pool 84 cm by 54 cm by 5 cm deep, surrounded by a low stonework wall incorporating a cave and several crevices. The wall is back-filled to provide a second level on which is a basking spot, several more crevices and a 30 cm square area of soft, dry soil for nesting. The animals have no trouble climbing between levels.

Heating in the cage is provided by a small, thermostatically controlled radiator incorporated into the rockwork, which maintains a mean temperature of 31.1°C in summer and 27.7°C in winter. Lighting consists of a 65W Tru-lite tube fixed to the ceiling of the cage and a 150W spotlight for basking, directly beneath which the temperature reaches 35°C. The lights are turned on at 08.00 hrs and off at 17.00 hrs throughout the year, although a local photoperiod is provided via