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AN INTEGRATED PROGRAM FOR SEA TURTLE CONSERVATION AND DEVELOPMENT IN THE ARCHIPELAGO DE LOS ROQUES NATIONAL PARK, VENEZUELA

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The Archipelago de los Roques National Park is a coralline atoll in the south Caribbean some 70 nautical miles north of the central coastal area of Venezuela, and measures about 36.6 kilometers long and 24.6 kilometers wide. The National Park was declared in 1972, with an 221.12 Ha surface area, some 46 coralline keys, and the most important reef formations in the country and a great quantity of marine fanerogam habitats. The FCLR has carried out conservation works on turtles from 1976, and starting in 1999 began an integrated conservation and development program with five components that integrate the scientific work with that of conservation, environmental education, and integration of the local communities in the conservation processes for these species. Sea turtle nesting has been confirmed in 32 of the 46 islands with sandy beaches, with an annual nesting activity of about 262 nests, 180 of these by hawksbill (*Eretmochelys imbricata*), 61 of these green (*Chelonia mydas*), 11 by leatherback (*Dermochelys coriacea*) and ten loggerhead (*Caretta caretta*) turtles. The marine areas are important feeding habitats for hawksbill and green turtles. Work with the communities has been centered on the combining the work of local institutions and transmitting the information on problems in conservation of these species, concentrating efforts of sensitization among children of school ages, fishing communities and tourism associations, and training processes directed to the authorities, diving associations and fishermens' communities.

CONSERVATION AND SUSTAINABLE USE: SOME PRINCIPLES AND PROBLEMS *

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Introduction

The proposition that the conservation of sea turtles could be enhanced by allowing some consumptive use of sea turtles seems intuitively contradictory. Yet "conservation through sustainable use" (CSU), endorsed by the IUCN, CITES, CBD, and WWF suggests this is possible. I discuss some of the principles and problems with CSU, present case histories, and discuss how the results may apply to sea turtles.

What is Conservation?

It is difficult to expect people to agree on the merits of different approaches to conservation if they do not share a common vision about what conservation is. People have a long history of conserving things (paintings, buildings, stories, legends, religious icons, etc.), but have never expended resources conserving items considered useless, valueless, or to have only negative values. A pragmatic definition (Webb 1995, 1997, 2002) is: *Conservation is the sum total of actions taken to preserve and maintain items to which we attribute a positive value. Value* can be expressed in intrinsic or instrumental terms, and valuing wildlife for a diversity of reasons, may be more effective than promoting any one value, claiming others have no legitimacy.

People, Poverty and Conservation
All people have an inherent interest in wildlife conservation, in the sense that none promote the eradication of all wildlife species, and most would mourn the loss of some species. However, the capacity of individuals, communities, peoples and even nations to pursue conservation is highly variable. Poverty is the worst environmental threat (Brundtland *et al.* 1987), which is both obvious, but chilling. Obvious, because we would kill critically endangered animals to feed our own children if it were necessary. Chilling, because the time scale required to solve the problems of poverty are long relative to those needed to prevent irreversible losses of biodiversity today. We cannot alleviate poverty as a prerequisite for conservation action, but nor can we afford to ignore it. It is one of the major factors creating the conservation problems we are trying to solve at local, national and international levels.

Benefits to People
Local people, often living in poverty, are the proximate cause of many conservation problems, and are classically considered *the enemy* of conservation. An increasing body of people (Hutton and Dickson 2000) believe that conservation will be better served if local people are partners and beneficiaries of conservation efforts (IUCN 2003b). This requires tangible and sustainable benefits to be derived for them, most easily obtained through consumptive uses. Ecotourism can work in some contexts, but requires significant resources and infrastructure to promote visitation, especially to remote areas, and is highly prone to the uncertainty of world events.

To "Use" or "Not Use"?
Decisions about whether consumptive uses of particular species are acceptable or not need to be made nationally, on the basis of culture, tradition, religion, ethics, needs, morality, politics, etc. The technical issue of sustaining uses only come into play after a use is deemed socially acceptable.

What is Sustainable Use?
To sustain anything is to keep it going, and humans have a long history of keeping activities going that provide them with benefits - vegetable gardens, televisions, personal transportation, marriages, etc. The critical elements are always: use, monitoring, assessment and adjustment (Webb 1995, 1997). Sustainable use is thus: *use associated with a process aimed at ensuring the use and the benefits it provides can be continued indefinitely and that its impacts are maintained within acceptable or defined limits*. Whether a particular use was sustained or not can only be decided in hindsight: *was the use kept going?* The probability of a use being sustained can sometimes be predicted from available information, but in most cases, the data needed can only be obtained once use starts. The gap between *what I think might happen* and *what did happen* can be vast. *Experimental management* and *adaptive management* are the two critical learning tools. If use is defined broadly in terms of consumptive and/or non-consumptive uses, and values as intrinsic and/or instrumental, the argument that conservation is sustainable use is sound. No uses can be sustained unless the species being used is conserved.

Confusing Elements
Confusion about CSU comes mainly from a failure to differentiate between the separate goals of animal rights, animal welfare and conservation. The concept that animals have rights is a philosophical issue - much like a religion, it is a matter of personal choice. However, actions that transfer rights of access from people to animals, for example moving local people off their lands for the creation of national parks, can alienate the people and undermine any interest they have had in conservation. Animal welfare can be justified on anthropocentric grounds - people have little to gain from inflicting unnecessary pain and suffering on animals - but it is context-specific issue. An Aboriginal immobilising a kangaroo with a spear cannot be expected to follow the same codes of animal welfare as people caring for an orphaned kangaroo in an urban backyard. Conservation can be seriously undermined by actions taken or not taken because of animal rights and animal welfare concerns (King 1988; Webb 2002).

The Critical Elements
All wildlife conservation problems involve interacting social, cultural, biological, economic and political variables. Biological variables are often the easiest to solve, and the failure to consider social and economic variables is a major impediment to conservation success (Freese 1998; Ahmed *et al.* 2001; Campbell 1998; Campbell *et al.* 2002). Within the biological variables, the distinction between population dynamics and dynamic populations is important. When wildlife densities are reduced through harvest, adjustments (compensations) take place which promote recovery. The late Graeme Caughley likened wildlife populations to a metal spring. Initial harvesting reduces the population and compresses the spring. A sustainable harvest removes the annual expansion thereafter. Maximum sustainable yield (MSY) is the maximum annual harvest obtained by compressing the spring to an optimal level. Exceeding MSY means the annual harvest is not as big as it could be (an economic problem) and not that extinction is approaching! Severe overharvests can lead to "depensation", where the ability to recover is compromised.

Case History 1: Kangaroos:
In the 1960s in Australia, kangaroos were being killed by farmers as agricultural pests, and by commercial kangaroo hunters for skins and meat - to feed urban pets. It was presumed that a serious conservation problem existed. Today, 40 years later, we know that the "calls for action" were largely unnecessary. Kangaroo populations are remarkably well adapted to compensating for harvests (Environment Australia 2003a). The annual, sustainable quota for kangaroos to be killed in Australia in 2003 is 6.55 million (Environment Australia 2003b). The kangaroo industry provides employment for 4000 people, is valued at some

$AUD200 million per year (Kelly 2002), and provides sound economic reasons for Government to act if any conservation problems arise. There is another aspect of the consumptive use of kangaroos in Australia that is important. Within Australia, sheep cause serious erosion problems and promote the loss of biodiversity (Grigg and Beard 1996). If kangaroos could replace sheep as standard grazing animals, generating equivalent wealth [which is under test (FATE 2003)], the conservation advantages would be profound. However, opposition to the annual cull, to any consumptive use of kangaroos, and to the replacement of sheep with kangaroos, remains strong amongst animal rights and welfare groups, even if it involves questionable logic [see reviews in Grigg and Beard (1996), Environment Australia (2000a) and Kelly (2002)]. In this case, conservation is being seriously constrained (Grigg and Beard 1996) by arguments that the public and politicians assume are coming from the conservation community!

Crocodiles and Sea Turtles

Crocodiles and sea turtles are both large, semi-aquatic reptiles, that at a broad level of resolution share many basic biological characteristics and conservation problems. They are long-lived, slow growing, late-maturing, and share similar life histories. Juvenile sea turtles play these life stages out in a greater geographic area than crocodiles, but there are many parallels. One striking difference is that CSU programs are common with crocodilians (Hutton and Webb 2003), but not with sea turtles (Webb 2000), despite the same basic biology. So one may well ask whether all the dire predictions made about using sea turtles occurred with crocodiles?

Case History 2: American Alligators

By the late 1960s the total population (juveniles, subadults, adults) of American Alligators (*Alligator mississippiensis*) in the coastal marshes of Louisiana (USA) was down to around 130,000 individuals, and 6000-7000 nests per year. Adult nesting females were around 5% of the total population (Joanen and McNease 1987), which is a similar to an estimate derived for hawksbill turtles in Cuba (4%; CCMA 1998). Nest surveys and extrapolations to total number of nests per year was used to monitor the population recovery. The recovery started with an annual rate of increase of 13-14% per year (1971-72), and stabilised between 1996 and 2002 at 34,250 $\pm$ 2872 (SE; N= 7) nests per year: a wild population of about 700,000 individuals (Joanen and McNease 1987; additional data provided by Ruth Elsey). However, throughout the period of recovery an annual wild harvest of larger alligators occurred: 1350 removed in 1972, increasing to 35,263 in 1999. Mean size of harvested animals fluctuated around a stable mean of 218.2 $\pm$ 7.0 cm total length (SE; N= 23 years; range 200 to 231 cm). In addition to this, in 1986 an egg harvest program (ranching) was introduced, which increased from 2903 eggs taken in 1986 to 354,636 eggs taken in 2001. To compensate for the egg harvest, farms were obligated to return 18% of raised juveniles to the management agency each year, for release back to the wild. The wild population recovered dramatically in Louisiana between 1972 and 2002, despite 602,541 alligators and 3.62 million eggs being harvested, which generated some $US342 million. Landowners were primary beneficiaries, and with income from other wildlife species (eg ducks, nutria, crayfish, catfish, frogs) the wetlands became valuable assets in their natural state.

Case History 3: Chinese Alligators

Chinese Alligators (*Alligator sinensis*) were historically distributed throughout the Yangtse River basin, but by 1992 less than 1000 survived in the wild, in 13 small ponds (Webb and Vernon 1992). By 1999, this was down to 150 individuals in 10 ponds (Thorbjarnarson *et al*. 2000a,b), within a 600 sq km Chinese Alligator Reserve shared with 2 million people pursuing intensive agriculture (Thorbjarnarson *et al*. 2000a). To most local people the alligators were pests that ate domestic ducks and burrowed into and drained rice fields, and few supported the concept of enhancing their recovery. In the early 1980s, the Government of China captured 20-30% of the remaining wild population and successfully promoted captive breeding. CITES gave China permission (1992) to trade internationally in captive bred stock, despite the critically endangered status of the wild population. In 2000, the Government of China embarked on an ambitious recovery program and is committed to engaging local people as partners. Even a modest payment for new clutches of wild eggs may be all that is needed to create a vested interest in the wild population recovering.

Case History 4: Saltwater Crocodiles

In 1971 the wild population of saltwater crocodiles (*Crocodylus porosus*) in the Northern Territory of Australia had been depleted by at least 95% (Webb *et al*. 2000). By 2003, 32 years later, it was back to pristine levels (70,000) occupying their complete historical range. The success of this program is linked to CSU. In 1971, the central goal was to increase the wild population. By 1979-80, 9-10 years later, when crocodiles were becoming common, calls for culling mounted. A public education program, problem crocodile removal program and commercial use program were all initiated to increase positive values and reduce negative values. An egg harvest program and wild harvest program were both introduced. Throughout the period of recovery, use occurred continually: Aboriginal subsistence harvest (150 animals per year); problem crocodile removal (200 per year); incidental catch in fishing operations (500 per year); ranching of eggs (220,000 eggs between 1983 and 2003); and landowner harvests (250 per year). Giving crocodiles an economic value was the key to winning public support and sustaining Government investment in crocodile conservation.

General Discussion

Like crocodilians and kangaroos, sea turtles are another group of wildlife species valued for a diverse range of reasons (Witherington and Frazer 2003). Each of these values can be used potentially to stimulate conservation action, and the argument

for relying on only non-consumptive uses (Witherington and Frazer 2003) is a weak one: if it applied to sea turtles, why not to crocodilians? Cuba's Hawksbill Turtle program (Manolis *et al*. 2003) is a good example of what can be achieved. The program is considered a model one in the Caribbean by Fleming (2001) and TRAFFIC (2002), and it generates social, cultural, economic, scientific and conservation benefits. The small amount of consumptive use that does take place, in less than 1% of available habitat, is demonstrably sustainable (Manolis *et al*. 2003). Yet this part of the program ruffles the feathers of some conservationists (Campbell 2002), and both science (Mrosovsky 1983, 2000, 2002) and Cuba's program are threatened.

With the exception of Cuba (Manolis *et al*. 2003), there are relatively few management case histories involving sea turtles that are directly comparable with those available for crocodilians. But given similar life histories and population dynamics, the two groups can be expected to respond in similar ways, as they appear to be doing in Cuba. With American Alligators and Saltwater Crocodiles, population reductions of 80-90% did not constrain the potential of the wild populations to recover when given the opportunity. Various results [Table 8 in IUCN (2002)] suggest sea turtles are the same. Economic incentives have assisted conservation with many crocodilian species, but the status of Chinese Alligators is a stark reminder of what can occur when local people have no incentives to participate. Density-dependent adjustments are continually operating in crocodilian populations (Hines and Abercrombie 1987; Webb and Manolis 1992), and may well prove common in sea turtle populations when research at the experimental management level becomes more widespread. Significant uses of wild crocodile populations have been made while the populations were recovering, without detrimental effect - the same is no doubt possible with sea turtles. There are now some 31 countries legally using and trading in crocodilians, and legal international trade has almost completely replaced illegal trade (Hutton and Webb 2003); these is no reason to expect that the same would not occur with sea turtles.

Whether we support CSU, understand it, are sceptical of its potential, or oppose it vehemently, it is now a mainstream conservation strategy, and this is unlikely to change. The IUCN Policy on Sustainable Use (IUCN 2003b) provides excellent guidance on the key elements needed to achieve sustainability. In the case of sea turtles, use is occurring all over the world at different levels, and it is not going to stop. Conservation interests may be better served if more resources were allocated to sustaining uses, rather than to trying to stop them.

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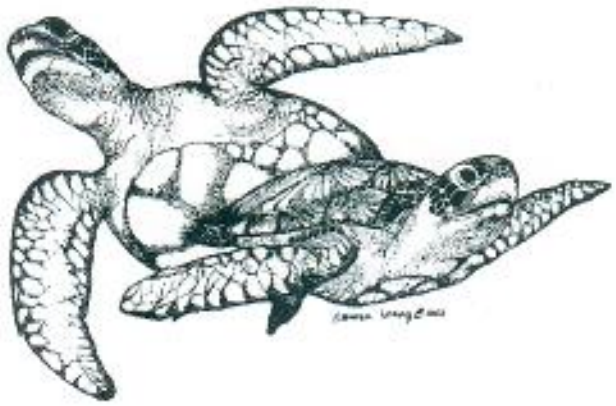

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