Massive Growth of Ecotourism Worries Biologists

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Something weird is happening in the wilderness. The animals are becoming restless. Polar bears and penguins, dolphins and dingoes, even birds in the rainforest are becoming stressed. They are losing weight, with some dying as a result. The cause is a pursuit intended to have the opposite effect: ecotourism.

The massive growth of the ecotourist industry has biologists worried. Evidence is growing that many animals do not react well to tourists in their backyard. The immediate effects can be subtle - changes to an animal's heart rate, physiology, stress hormone levels and social behaviour, for example - but in the long term the impact tourists are having could endanger the survival of the very wildlife they want to see.

Ecotourism has clear benefits. Poor countries that are rich in biodiversity benefit from the money tourists bring in, supposedly without damaging the environment. "Ecotourism is an alternative activity to overuse of natural resources," says Geoffrey Howard of the East Africa office of IUCN (the World Conservation Union) in Nairobi, Kenya.

"Many of our projects encourage ecotourism so that rural people can make a living out of something apart from using too much of the forests or fisheries or wetlands."

But while the IUCN and other organisations, and governments of nations such as New Zealand and Australia, try to ensure that their projects are ecologically viable, many ecotourist projects are unaudited, unaccredited and merely hint they are based on environmentally friendly policies and operations. The guidelines that do exist mostly address the obvious issues such as changes in land use, cutting down trees, making tracks, or scaring wildlife.

Increased stress

What is not considered are less obvious impacts. "Transmission of disease to wildlife, or subtle changes to wildlife health through disturbance of daily routines or increased stress levels, while not apparent to a casual observer, may translate to lowered survival and breeding," says Philip Seddon of the University of Otago in Dunedin, New Zealand.

For instance, Rochelle Constantine of the University of Auckland, New Zealand, and her colleagues have been monitoring schools of bottlenose dolphins along the country's north-eastern coast since 1996. In an upcoming paper in Biological Conservation, they report that the dolphins become increasingly frenetic when tourist boats are present. They rest for as little as 0.5 per cent of the time when three or more boats are close, compared with 68 per cent of the time in the presence of a single research boat.

Such changes in behaviour "are potentially serious for the population", says Gordon Hastie, a marine mammal expert at the University of British Columbia in Vancouver, Canada.

Hastie and his team have found that dolphins in the Moray Firth in Scotland spend significantly more time surfacing synchronously in the presence of boats than they do otherwise (*Marine Mammal Science*, vol 19, p 74). This could lead to the animals resting more at night, possibly reducing the time they spend socialising and foraging.

Polar bears

Land animals are affected too. Since the early 1980s, specialised vehicles have been taking people to watch polar bears during October and November in Manitoba, Canada, a time when the animals should be resting and waiting for Hudson Bay to freeze over so they can start hunting seals. But often the bears are not resting as they should.

Markus Dyck and Richard Baydack of the University of Manitoba, Winnipeg, have found that signs of vigilance among male bears increased nearly sevenfold when vehicles were around. Just one vehicle could disturb the bears (*Biological Conservation*, vol 116, p 343).

Like dolphins, the bears may pay a heavy price for such altered behaviour. The tourist visits could be increasing the animals' heart rates and metabolism when they ought to be conserving their energy, and this could be reducing their body fat and individual fitness, the researchers argue. "For slow-breeding animals the effects could take years to detect, by which time it may be too late to reverse the damage," says Constantine.

Such effects are seen among yellow-eyed penguins in the Otago peninsula in New Zealand. Observations by Seddon's team, also to be published in Biological Conservation, show that chicks in areas frequently visited by tourists weigh on average 0.76 kilograms less than chicks in an area not visited, a fall of over 10 per cent.

This could be a result of parents taking longer to reach the chicks after they finish foraging at sea. "Yellow-eyed penguins tend to delay landing if people are clearly visible at their beach landing sites," says Seddon. "Penguins will run back into the sea if approached on the beach, and will wait beyond the breakers until a beach is clear."

Such delays could mean that the birds digest some of the food that they would otherwise regurgitate to feed their chicks. Seddon found that the lighter chicks were less likely to survive, and he fears that heavy tourist traffic could ultimately spark the failure of a colony.

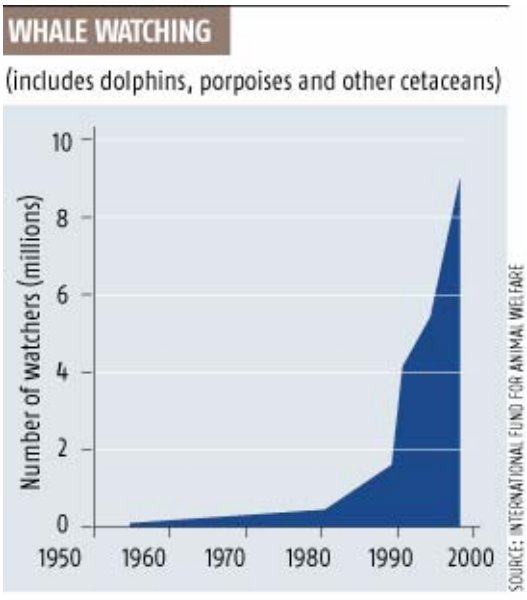
Dingo attack

These findings undermine the premise that ecotourism is an ecologically sustainable activity. And it can have a damaging effect even in regulated tourist areas. In Australia, nearly 350,000 tourists a year visit Fraser Island off the Queensland coast, many hoping to see the island's dingoes.

But in April 2001, after two dingoes attacked and killed a 9-year-old boy, the authorities culled 31 of the dogs in an effort to prevent further attacks (*Tourism Management*, vol 24, p 699).

Ecotourism can have an even more detrimental effect in the wilderness regions of Africa and South America. "In more remote places such as the Amazon, there's not much control," says ecologist Martin Wikelski of Princeton University in New Jersey.

Ecotourism is growing at a stunning 10 to 30 per cent per year, and now accounts for around one in five tourists worldwide. Whale watching - a category that also covers other cetaceans such as dolphins and porpoises - has become a billion-dollar industry. By 1998 it was attracting nearly nine million people a year in 87 nations and territories, compared with fewer than half a million 20 years earlier (see graph).



Carefully controlled

When ecotourism is done right, it can work. Wikelski points to the carefully controlled tourism of the Galapagos Islands, which brings in money for conservation and preservation of species such as marine iguanas. "Ecotourism is one of the main factors keeping the Galapagos safe," he says.

In a study of levels of the stress hormone corticosterone in marine iguanas in the Galapagos, Wikelski found that the reptiles are not stressed by humans. "They have apparently completely adapted to the fact

that the people are there," he says. "At least, that is one interpretation. We also don't see any survival problems."

But the same cannot be said for the hoatzin, a colourful, pheasant-sized bird of the Amazon rainforest whose chicks sport claws on their wings. A study by Antje Müllner of the Frankfurt Zoological Society in Germany, along with Wikelski, has shown that juvenile hoatzins in areas of the Cuyabeno reserve in the Ecuadorian Amazon visited by tourists had double the levels of corticosterone of chicks in areas where no tourists are allowed. The tourists appear to be affecting the chicks' survival.

The researchers found that 50 per cent of nests in restricted areas had at least one fledgling, while the number dropped to just 15 per cent in tourist zones. In a paper, again to be published in Biological Conservation, Müllner speculates that tourists may be scaring the chicks - which nest on branches overhanging water - into jumping into rivers and lakes infested with predators such as piranhas, caymans and anacondas.

But merely observing animals' behaviour is not enough to show whether ecotourism is taking a toll, Müllner says. In a study of adult hoatzins, she and her team examined how close they could get to birds sitting on their eggs before the birds fled.

They found there was no noticeable difference between the tourist and restricted areas, which might suggest that the birds had adapted to human presence. However, when the researchers placed microphones in the nests, they found that though the birds did not flee, their heart rates increased. "There is a physiological reaction in the adult too," she says. But its need to protect the nest forces it to stay.

Biologists are now calling for such studies before ecotourism projects are started. "Pre-tourism data should always be collected, where possible," Constantine says. Nature-based tourism needs to be developed cautiously, hand in hand with research, she adds. "The animals' welfare should be paramount because without them there will be no ecotourism."