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## Special report - Biodiversity: The long view; The effects of growth

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**Abstract:** Comparisons between adjoining countries separated by politics or economics can be instructive. North Korea's forests have been shrinking by around 2% a year for 20 years; South Korea's are stable. Satellite pictures of the island of Hispaniola in the Antilles show that the western side (Haiti, with a GDP per person of \$771 a year) is barren, whereas the eastern side (Dominican Republic, GDP per person \$5,736) still has plenty of dense forest. Economic growth is widely believed to damage species other than man. But as the contrasting fortunes of forests (a fair proxy for biodiversity) on the Korean peninsula and Hispaniola suggest, it is not so much growth as poverty that reduces biodiversity. Poverty without growth, combined with lots of people, is disastrous. Poverty combined with growth can be equally calamitous. But once people enjoy a certain level of prosperity, the benefits of growth to other species outweigh its disadvantages.

**Links:** [Linking Service](#)

**Full text:** Contrary to popular belief, economic growth may be good for biodiversity

COMPARISONS BETWEEN ADJOINING countries separated by politics or economics can be instructive. North Korea's forests have been shrinking by around 2% a year for 20 years; South Korea's are stable. Satellite pictures of the island of Hispaniola in the Antilles show that the western side (Haiti, with a GDP per person of \$771 a year) is barren, whereas the eastern side (Dominican Republic, GDP per person \$5,736) still has plenty of dense forest.

Economic growth is widely believed to damage species other than man. But as the contrasting fortunes of forests (a fair proxy for biodiversity) on the Korean peninsula and Hispaniola suggest, it is not so much growth as poverty that reduces biodiversity. Poverty without growth, combined with lots of people, is disastrous. Poverty combined with growth can be equally calamitous. But once people enjoy a certain level of prosperity, the benefits of growth to other species outweigh its disadvantages.

There appears to be an environmental version of the Kuznets curve, which describes the relationship between prosperity and inequality in an inverted U-shape. At the early stages of growth, inequality tends to rise; at the later stages it falls. Similarly, in the early stages of growth, biodiversity tends to suffer; in the later stages it benefits. The Living Planet Index (LPI), put together by the Zoological Society of London and WWF (see chart 4, next page), shows a 61% decline in biodiversity between 1970 and 2008 in tropical areas, which tend to be poorer, but a 31% improvement over the same period in temperate areas, which tend to be richer. Similarly, poor countries tend to chop down forests, and rich countries to plant them (see chart 5, next page).

Some of the improvement might be due to rich countries exporting their growth to poorer countries, but that is clearly not the only factor at work. Nobody exported growth to North Korea and Haiti, and their environments still got trashed. Meanwhile in countries that were poor until fairly recently--such as South Korea and Brazil--things are looking up for many species.

The evidence suggests that, above a fairly low level of income, economic growth benefits other species. As the previous article showed, when people get richer, they start behaving better towards other species. And as countries grow they become cleaner, more urban, more peaceful, more efficient and better-informed, and their people have fewer children. Other species benefit from all those effects, and from the scientific and technological progress that comes with growth.

Though all species benefit from fresh water, it is principally for their people's benefit that societies clean up their rivers. London started building its sewage system the year after the "Great Stink" in 1858 because many people were dying of cholera and life in the city became unbearable. Parliament temporarily had to move out of its premises on the bank of the Thames. In the 1960s President Johnson called the Potomac a "national disgrace"

not so much because it killed fish but because it was filthy. Shortly afterwards he signed the Water Quality Act. Forty years ago two-thirds of America's rivers were unsafe for swimming or fishing. Now only a third are. A clean-up programme designed primarily to benefit people was good for other species too.

Even after sewage treatment had become widespread, rivers were still being poisoned by industrial effluent and pesticides. Controls on those pollutants have done their bit to help clean up rivers. Britain's Environment Agency says that in 1990 the water quality in 55% of rivers was graded good or excellent; now the share is 80%. That not only makes the rivers safe for recreation, it has also encouraged the return of once-common creatures that became rare in the 20th century. Otters, for instance, were present in only 6% of 3,300 sites surveyed by the Environment Agency in 1977-79; in 2009-10, they had spread to 60%.

When countries get richer, farming tends to become more intensive. Output increases, marginal land is left fallow, the agricultural labour force shrinks and people move to the towns. Abandoned land is used for recreation and turned back to forest or wilderness. That is the main reason why in 2005-10, according to figures from the United Nations' Food and Agriculture Organisation, forest cover grew in America and was stable or increasing in every country in Europe except Estonia and Albania.

Sharing or sparing?

Many greens argue that intensification of agriculture harms biodiversity. It is true that pesticides and fertiliser tend to reduce the number of species where they are used, but intensive agriculture employs less land than extensive farming to produce the same amount of food. The question, then, is whether the net benefits to other species of "land-sharing" (farming extensively on a larger area) outweigh those of "land-sparing" (farming intensively on a smaller area). A couple of recent papers--a theoretical one by David Tilman of the University of Minnesota and an empirical study by Ben Phalan of Cambridge University, looking at data from Ghana and India--suggest that land-sparing wins.

Richer countries tend to be better informed about the value of ecosystems and take a longer view. That is why China, having destroyed so much of its forest, is now paying its farmers to plant trees. The ecological value of some of the resulting forest is open to doubt--a lot of it is monoculture of imported varieties that do not always suit the local climate--but the numbers are impressive. Forest cover increased by a third between 1990 and 2010.

Better-off countries also have more effective governments, without which conservation would be impossible. Elephants are doing better in southern Africa than in East or Central Africa. South Africa, Zimbabwe and Botswana all have well-administered parks and reasonably effective police forces; in Congo, Chad and Tanzania, those institutions are shakier.

Richer countries are generally more peaceful, too. That is good for their people, but not always for other species. Biodiversity sometimes benefits from conflict: where it keeps people out, it may conserve habitats for other creatures. The 1,000-sq-km demilitarised zone between North and South Korea, for instance, has become a de facto nature reserve of great interest to scientists. On balance, though, conflict tends to do more harm than good to biodiversity, destroying habitats and undermining states' efforts to protect other creatures. That is another reason why elephants are doing better in southern Africa than in Central and East Africa, where militias have plenty of guns and a financial interest in selling ivory to fund their wars.

The impact of prosperity on human demography also benefits biodiversity, but it takes time. In its early stages economic growth often causes people to multiply faster as death rates come down but birth rates stay high, as is happening in Africa now. That intensifies competition for resources between humans and other species. But when countries become richer, more women get educated and take jobs, more people move away from farms and into cities and birth rates start falling. In East Asia fertility has fallen from 5.3 children per woman in the 1960s to 1.6 now. In some countries--Japan, Russia, much of eastern Europe and some of western Europe--the population is already declining. But in Africa it is still rising fast, which is the main reason why the UN expects the world's population to continue expanding to the end of this century.

Lastly, growth brings scientific advance, which makes it easier to mitigate threats to biodiversity. So far conservation has been dominated by men in shorts with not much more than a pair of binoculars. Now the digital revolution is transforming it. The data are building up and becoming easier to access. Three centuries-worth of information on natural history is sitting in museums and universities around the world, and is now being digitised. The Global Biological Information Facility, an intergovernmental effort, is working to make this information available to everybody, everywhere.

The IUCN's Red List, globally recognised as the repository of information about endangered species, was started as a card-index system in 1954 by Colonel Leofric Boyle, a British army officer who helped to save the Arabian oryx. Now it is online and accessible, but still not much more than a list. Microsoft Research, through a partnership with the IUCN, is building a platform on which scientists all over the world will be able to map the threats to the species they are interested in and discover threats posted by other scientists.

The display of data is getting better, too. ESRI, a technology firm that dominates the mapping business, enables users to build up maps with layers of information on them. It provides its software free to conservation organisations and has moved it onto the cloud. David Yarnold, the boss of America's Audubon Society, says his organisation had data on land use, hydrology and 114 years of bird counts from 470 local groups, none of it shared. Now, thanks to ESRI, all of it is accessible.

Communications technology can also help collect information on wildlife movements. Large animals--elephant, giraffe, lion, hirola--are now often fitted with GPS collars to track them. Miniaturisation is opening up new uses for such tools. Technology for Nature--a collaboration between Microsoft Research, the Zoological Society of London and University College London--is developing "Mataki tags", tiny devices attached to animals that can relay information wirelessly and communicate with each other. The idea is that a tag on, say, an elephant will download its information to a tag on, say, an oxpecker--a bird that rides on an elephant's back--and all the information will be downloaded to a base station near the oxpecker's nest.

The most useful technology for conservation is remote sensing, now widely used for monitoring deforestation and species distribution. Peter Fretwell of the British Antarctic Survey, for instance, has been using remote-sensing data to estimate penguin populations from guano stains. The data can distinguish between different kinds of penguin because the infrared signature of the guano varies between species. As a result he has doubled his estimate of emperor-penguin numbers.

The tools are improving and getting cheaper. Serge Wich, professor of primate biology at Liverpool's John Moores University, has been using drones to calculate orang-utan densities in the Indonesian rainforest. Orang-utans make a nest every day--"quite comfortable ones, with a blanket woven from branches", explains Mr Wich--so orang-utan populations can be guessed from nest numbers. "We were slogging through the rainforest thinking how nice it would be to have a camera fly over it to monitor nest frequency," he says. But he assumed it would be too expensive--until he found an American website, diydrones, which enabled him to make one for \$700. A bunch of conservation organisations has set up ConservationDrones.org to share information about this handy tool; Research Drones, a Swiss company, makes drones specifically for environmental and research purposes. "It's our hope that an unmanned aerial vehicle will become like a pair of binoculars," says Mr Wich. Remote sensing, combined with economic progress, has also helped sharply to reduce deforestation in Brazil--the most important country for biodiversity.

### **Illustration**

Caption: Returning to a river near you

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