

# Earth's sixth mass extinction event already under way, scientists warn

Researchers talk of 'biological annihilation' as new study reveals that billions of populations of animals have been lost in recent decades



'The lion was historically distributed over most of Africa, southern Europe and the Middle East. Now the vast majority of lion populations are gone.' Photograph: Xinhua / Barcroft Images

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A “biological annihilation” of wildlife in recent decades means a sixth mass extinction in Earth’s history is already well underway and is more severe than previously feared, according to new research.

Scientists analysed both common and rare species and found billions of regional or local populations have been lost. They blame human overpopulation and overconsumption for the crisis and warn that it threatens the survival of human civilisation, although there remains a short window of time in which to act.

The new study, [published in the peer-reviewed journal Proceedings of the National Academy of Sciences](#), eschews the normally sober tone of scientific papers and calls

the massive loss of wildlife a “biological annihilation” that represents a “frightening assault on the foundations of human civilisation”.

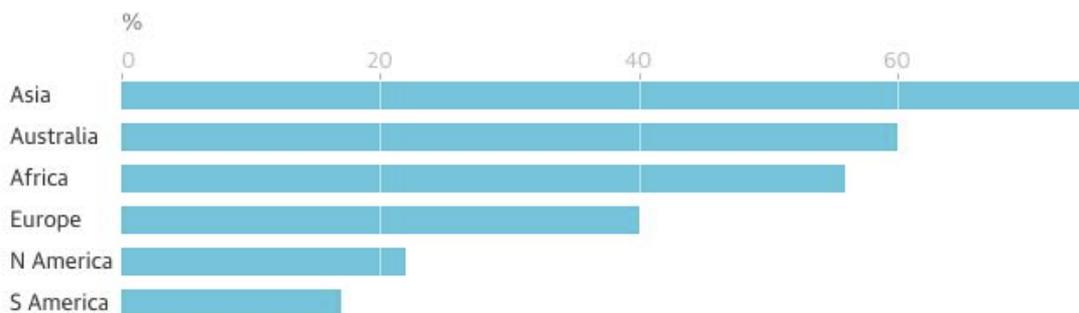
Prof Gerardo Ceballos, at the Universidad Nacional Autónoma de México, who led the work, said: “The situation has become so bad it would not be ethical not to use strong language.”

Previous studies have shown [species are going extinct at a significantly faster rate](#) than for millions of years before, but even so extinctions remain relatively rare giving the impression of a gradual loss of biodiversity. The new work instead takes a broader view, assessing many common species which are losing populations all over the world as their ranges shrink, but remain present elsewhere.

The scientists found that a third of the thousands of species losing populations are not currently considered endangered and that up to 50% of all individual animals have been lost in recent decades. Detailed data is available for land mammals, and almost half of these have lost 80% of their range in the last century. The scientists found billions of populations of mammals, birds, reptiles and amphibians have been lost all over the planet, leading them to say a sixth mass extinction has already progressed further than was thought.

### **Nearly half of the 177 mammal species surveyed lost more than 80% of their distribution between 1900 and 2015**

% of species which have lost more than 80% of their range



Guardian graphic | Source: PNAS

Billions of animals have been lost as their habitats have become smaller with each passing year.

The scientists conclude: “The resulting biological annihilation obviously will have serious ecological, economic and social consequences. Humanity will eventually pay a very high price for the decimation of the only assemblage of life that we know of in the universe.”

They say, while action to halt the decline remains possible, the prospects do not look good: “All signs point to ever more powerful assaults on biodiversity in the next two decades, painting a dismal picture of the future of life, including human life.”

Wildlife is dying out due to habitat destruction, overhunting, toxic pollution, invasion by alien species and climate change. But the ultimate cause of all of these

factors is “human overpopulation and continued population growth, and overconsumption, especially by the rich”, say the scientists, who include Prof Paul Ehrlich, at Stanford University in the US, whose 1968 book [The Population Bomb](#) is a seminal, if controversial, work.

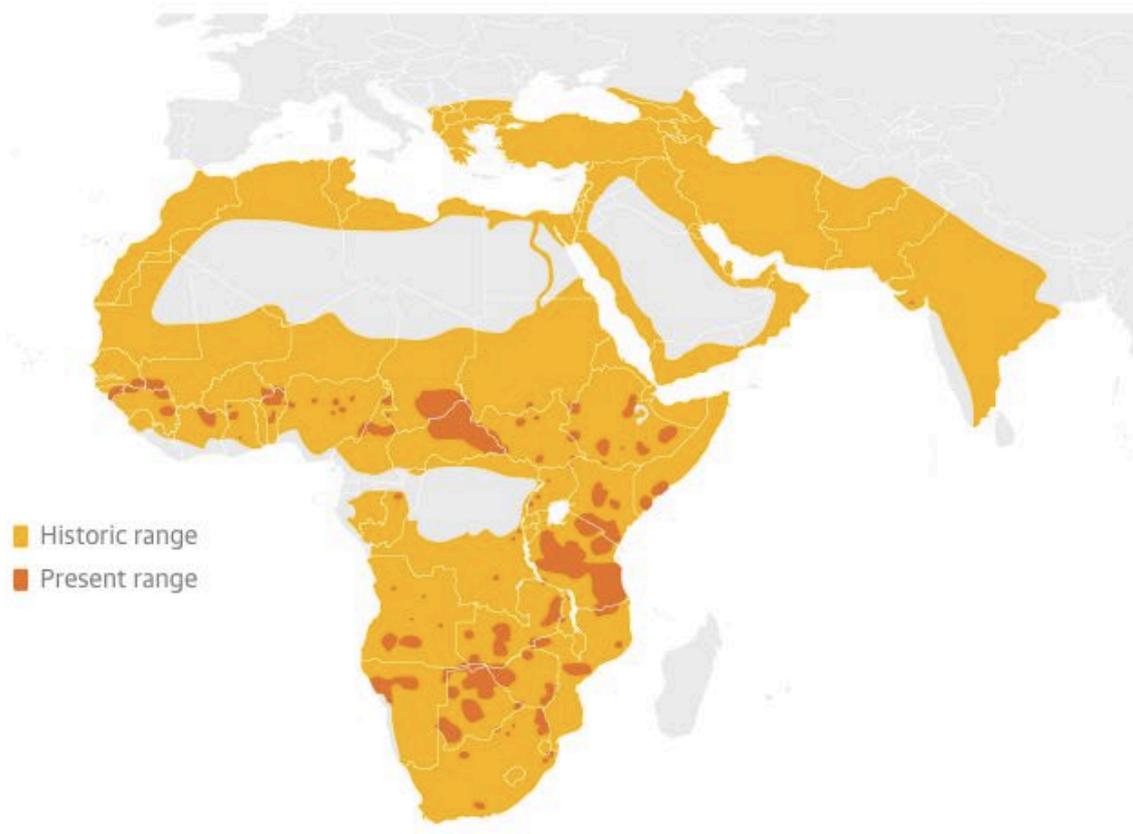
“The serious warning in our paper needs to be heeded because civilisation depends utterly on the plants, animals, and microorganisms of Earth that supply it with essential ecosystem services ranging from crop pollination and protection to supplying food from the sea and maintaining a livable climate,” Ehrlich told the Guardian. Other ecosystem services include clean air and water.

“The time to act is very short,” he said. “It will, sadly, take a long time to humanely begin the population shrinkage required if civilisation is to long survive, but much could be done on the consumption front and with ‘band aids’ – wildlife reserves, diversity protection laws – in the meantime.” Ceballos said an international institution was needed to fund global wildlife conservation.

The new research analysed data on 27,500 species of land vertebrates from the IUCN and found the ranges of a third have shrunk in recent decades. Many of these are common species and Ceballos gave an example from close to home: “We used to have swallows nesting every year in my home near Mexico city – but for the last 10 years there are none.”

The researchers also point to the “emblematic” case of the lion: “The lion was historically distributed over most of Africa, southern Europe, and the Middle East, all the way to northwestern India. [Now] the vast majority of lion populations are gone.”

## Current and historic distribution of lions



### Guardian graphic | Source: PNAS

Historically lions lived across Africa, southern Europe, the Middle East, all the way up to Northwestern India. Today their habitat has been reduced to a few tiny pockets of the original area.

Prof Stuart Pimm, at Duke University in the US and not involved in the new work, said the overall conclusion is correct, but he disagrees that a sixth mass extinction is already under way: “It is something that hasn’t happened yet – we are on the edge of it.”

Pimm also said there were important caveats that result from the broad-brush approach used. “Should we be concerned about the loss of species across large areas – absolutely – but this is a fairly crude way of showing that,” he said. “There are parts of the world where there are massive losses, but equally there are parts of the world where there is remarkable progress. It is pretty harsh on countries like South Africa which is doing a good job of protecting lions.”

Robin Freeman, at the Zoological Society of London, UK, said: “While looking at things on aggregate is interesting, the real interesting nitty gritty comes in the details. What are the drivers that cause the declines in particular areas?”

Freeman was part of the team that produced a 2014 analysis of 3000 species that indicated that [50% of individual animals have been lost since 1970](#), which tallies with the new work but was based on different IUCN data. He agreed strong language is needed: “We need people to be aware of the catastrophic declines we are seeing. I do think there is a place for that within the [new] paper, although it’s a fine line to

draw.”

Citing human overpopulation as the root cause of environmental problems has long been controversial, and Ehrlich’s 1968 statement that hundreds of millions of people would die of starvation in the 1970s did not come to pass, partly due to [new high-yielding crops that Ehrlich himself had noted](#) as possible.

Ehrlich has acknowledged “flaws” in The Population Bomb but said it had been successful in its central aim – alerting people to global environmental issues and the role of human population in them. His message remains blunt today: “Show me a scientist who claims there is no population problem and I’ll show you an idiot.”

## **Earth’s five previous mass extinctions**

### **End-Ordovician, 443 million years ago**

A severe ice age led to sea level falling by 100m, wiping out 60-70% of all species which were prominently ocean dwellers at the time. Then soon after the ice melted leaving the oceans starved of oxygen.

### **Late Devonian, c 360 million years ago**

A messy prolonged climate change event, again hitting life in shallow seas very hard, killing 70% of species including almost all corals.

### **Permian-Triassic, c 250 million years ago**

The big one – more than 95% of species perished, including trilobites and giant insects – strongly linked to massive volcanic eruptions in Siberia that caused a savage episode of global warming.

### **Triassic-Jurassic, c 200 million years ago**

Three-quarters of species were lost, again most likely due to another huge outburst of volcanism. It left the Earth clear for dinosaurs to flourish.

### **Cretaceous-Tertiary, 65 million years ago**

An giant asteroid impact on Mexico, just after large volcanic eruptions in what is now India, saw the end of the dinosaurs and ammonites. Mammals, and eventually humans, took advantage.

# **Earth is on its way to the biggest**

# mass extinction since the dinosaurs, scientists warn

By [Kristine Phillips](#) July 12 at 11:56 AM

Lions at a zoo near Tel Aviv. (Abir Sultan/European Pressphoto Agency)

**Have humans damaged the Earth's ecosystems so severely that we're well on our way to the biggest mass extinction since the dinosaurs vanished 66 million years ago? And are we running out of time to reverse the negative impacts of our actions?**

**Three scientists who have studied extinctions of thousands of species of vertebrates believe so, though others are skeptical of the doomsday-like findings.**

**A new study** published Monday paints a grim picture: The populations of nearly 9,000 vertebrate species, including mammals such as cheetahs, lions and giraffes, have significantly declined between 1900 and 2015. Almost 200 species have gone extinct in the past 100 years alone — a rate of two per year. The study says the losses are indicative of the planet's “ongoing six major extinction events” and has cascading consequences for human life on Earth.

“This is the case of a biological annihilation occurring globally, even if the species these populations belong to are still present somewhere on Earth,” Rodolfo Dirzo, the study's co-author and a Stanford University biology professor, **said** in a news release.

The researchers analyzed 27,600 species of birds, amphibians, mammals and reptiles — about half of all known vertebrate species — and found that 8,851 (about 32 percent) have seen declining populations and shrinking areas of habitat. A more detailed analysis on 177 mammal species found that

more than 40 percent have experienced significant drops in population. The findings, the study says, mean that billions of animal populations that once roamed the Earth are now gone.

*[Earth is on brink of a sixth mass extinction, scientists say, and it's humans' fault]*

The authors describe the shrinking population of species as “a massive erosion of the greatest biological diversity in the history of Earth.”

“Thus, we emphasize that the sixth mass extinction is already here and the window for effective action is very short, probably two or three decades at most,” the authors wrote. “All signs point to ever more powerful assaults on biodiversity in the next two decades, painting a dismal picture of the future of life, including human life.”

A few examples: There were **only a little more than 7,000 cheetahs** in existence last year, and their population may drop another 53 percent over the next 15

years, according to National Geographic. Borneo and Sumatran orangutans have been considered endangered for years mainly because of loss of habitat.

The population of African lions has dropped by more than 40 percent in the last 20 years. West African lions, in particular, are nearing extinction, with only about 400 animals left. Historically, lions roamed southern Europe, the Middle East, northwestern India and most of Africa. Today, there are only scattered populations in sub-Saharan Africa and a few remnants at Gir Forest National Park in India, according to the study.

The driving force is a steady drumbeat of human activities that result in habitat losses, pollution and climate disruption, among others.

“This is the first mass extinction which the cause knows what it's doing and is harming itself,” another co-author, Stanford University biology professor Paul Ehrlich, said. “When the asteroid hit 66 million years ago, the asteroid wasn't making a choice. Now the driver is human

**overpopulation and overconsumption by the rich, and that's generally accepted.”**

**For instance, wildlife habitats have been plowed, paved and replaced with buildings, strip malls and agricultural lands, Ehrlich said.**

**“The massive loss of populations and species reflects our lack of empathy to all the wild species that have been our companions since our origins,” the study's lead author, Gerardo Ceballos, an ecology professor at the Universidad Nacional Autónoma de México, said in the news release. “It is a prelude to the disappearance of many more species and the decline of natural systems that make civilization possible.”**

**Some in the scientific community disagree with the study's grim findings.**

***[The world might see a mass extinction of primates if humans don't act]***

**Doug Erwin, curator at the Smithsonian National**

Museum of Natural History, said placing the ongoing extinctions of animal species in the same playing field as the [mass extinction events in history](#), or the Big Five, amounts to “junk science.”

“Many of those making facile comparisons between the current situation and past mass extinctions don't have a clue about the difference in the nature of the data, much less how truly awful the mass extinctions recorded in the marine fossil record actually were,” [he told the Atlantic last month](#). “It is absolutely critical to recognize that I am NOT claiming that humans haven't done great damage to marine and terrestrial, nor that many extinctions have not occurred and more will certainly occur in the near future. But I do think that as scientists we have a responsibility to be accurate about such comparisons.”

Stuart Pimm, head of conservation ecology at Duke University in North Carolina, said the study unnecessarily raises alarms by saying the Earth is already in the midst of a cataclysmic event. Pimm

believes the sixth mass extinction is just beginning, and not well on its way.

“It's a little bit dramatic,” Pimm said. “Yes, we are driving species to extinction a thousand times faster than we should. So yes, there is a problem. But on the other hand, telling people that we're all doomed and going to die isn't terribly helpful.”

Ehrlich said the point of the research is exactly that — to cause alarm.

“I am an alarmist. My colleagues are alarmists. We're alarmed, and we're frightened. And there's no other way to put it,” he said. “It's largely a political and economic problem. We have a government that's doing everything they can to push these things in the wrong direction. We have economists who think they can actually grow forever in a finite problem.”

Others agree with the authors, saying the study's findings are bleak — and rightfully so.

Kieran Suckling, executive director of the Center for

**Biological Diversity, said the researchers accurately show that population losses are not just confined to a certain geographic area or within certain species of animals.**

**“What they show is it's a mass, global phenomenon,” Suckling said. “I think they made the case very strongly that we are right now in the sixth extinction, and if we continue the trend we're on, we're going to be looking at 50 to 75 percent of our species lost over the next hundred years.”**

**Noah Greenwald, endangered species director for the Center for Biological Diversity, agreed with the researchers' conclusion that the window for humans to take action is quickly getting narrow.**

**“The study is right in raising alarm bells ... especially with our change in climate,” Greenwald said. “We really need to protect as much habitat as we can now. Our population continues to expand, our consumption continues to expand. We're going in the wrong direction,**

quickly.”

*[Cheetahs are racing toward extinction]*

The concept of a sixth mass extinction is not new, and the study is not the first to make the case that Earth is already in the middle of it.

Two years ago, some of the same researchers argued that species are disappearing at a rate unparalleled since the Cretaceous mass extinction of dinosaurs. The **2015 study** found that vertebrate species have been disappearing up to about 100 times the normal rate over the last century.

On a happier note, scientists point to efforts to save endangered species and their habitats.

“We've dramatically increased the area protected by national parks, increased the area of the oceans that's being protected. We have reduced deforestation rate in the Amazon,” Pimm said. “I'm not trying to say that it's all good news, but there's good news out there.”

And there's a chance to save endangered species — as long as humans fully commit to it, Suckling said.

“Because once they go on endangered species list, they go from neglect or maybe tacit management to very active, focused efforts to save them. And those work,” Suckling said. “The good news here is that once humans decide to save individual species — and we're quite good at it — we can actually reverse this negative trend.”

Concerned citizens can do practical things like planting native plants in their yard. They can also contact their representatives in Congress to show their support for habitat protection, Greenwald said, though he cautioned that the current Congress is “the most anti-endangered species in history.”

The Center for Biological Diversity has tallied 34 pending bills that would weaken protections for endangered species, Greenwald said.

Earth has lost half of its wildlife in the past 40 years, says WWF

Species across land, rivers and seas decimated as humans kill for food in unsustainable numbers and destroy habitats

- [See picture gallery of wild animals facing decline](#)

- [George Monbiot: It's time to shout stop on this war on the living world](#)



Rubbish dumped on the tundra outside Ilulissat in Greenland stand in stark contrast to icebergs behind from the Sermeq Kujullaq or Ilulissat Ice fjord – a Unesco world heritage site. Photograph: Global Warming Images/WWF-Canon

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The number of wild animals on Earth has halved in the past 40 years, according to a new analysis. Creatures across land, rivers and the seas are being decimated as humans kill them for food in unsustainable numbers, while polluting or destroying their habitats, the research by scientists at [WWF](#) and the Zoological Society of London found.

“If half the animals died in London zoo next week it would be front page news,” said Professor Ken Norris, ZSL’s director of science. “But that is happening in the great outdoors. This damage is not inevitable but a consequence of the way we choose to live.” He said nature, which provides food and clean water and air, was essential for human wellbeing.

“We have lost one half of the animal population and knowing this is driven by human consumption, this is clearly a call to arms and we must act now,” said Mike Barratt, director of science and policy at WWF. He said more of the Earth must be protected from development and deforestation, while food and energy had to be produced sustainably.

The steep decline of animal, fish and bird numbers was calculated by analysing 10,000 different populations, covering 3,000 species in total. This data was then, for the first time, used to create a representative “Living Planet Index” (LPI), reflecting the state of all 45,000 known vertebrates.

“We have all heard of the FTSE 100 index, but we have missed the ultimate indicator, the falling trend of species and ecosystems in the world,” said Professor Jonathan Baillie, ZSL’s director of conservation. “If we get [our response] right, we will have a safe and sustainable way of life for the future,” he said.

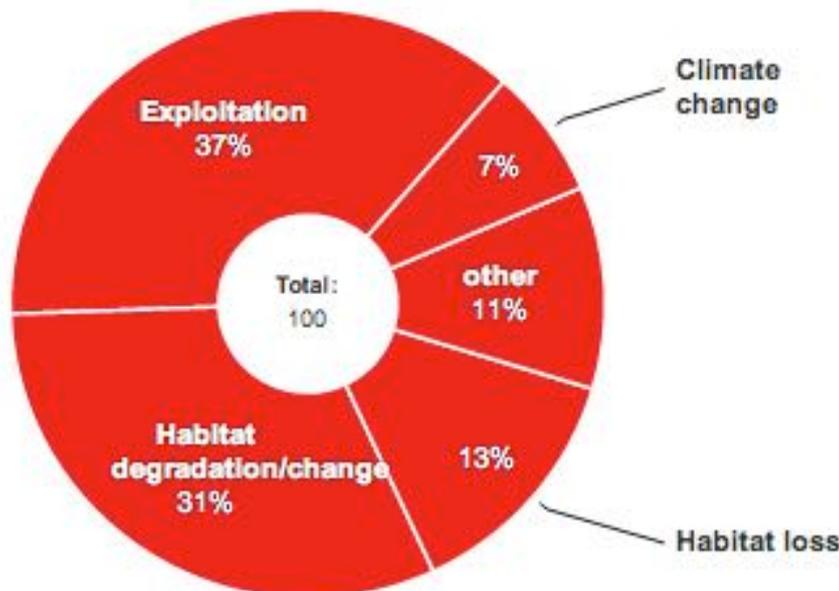
If not, he added, the overuse of resources would ultimately lead to conflicts. He said the LPI was an extremely robust indicator and had been adopted by UN’s internationally-agreed [Convention on Biological Diversity](#) as key insight into biodiversity.

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## Causes of wildlife declines globally

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WWF's 'Living Planet Index' categorises the causes of wildlife declines based on analysis of 3,430 species' populations



SOURCE: WWF

theguardian

A second index in the new [Living Planet report](#) calculates humanity’s “ecological footprint”, ie the scale at which it is using up natural resources. Currently, the global population is cutting down trees faster than they regrow, catching fish faster than the

oceans can restock, pumping water from rivers and aquifers faster than rainfall can replenish them and emitting more climate-warming carbon dioxide than oceans and forests can absorb.

The report concludes that today's average global rate of consumption would need 1.5 planet Earths to sustain it. But four planets would be required to sustain US levels of consumption, or 2.5 Earths to match UK consumption levels.

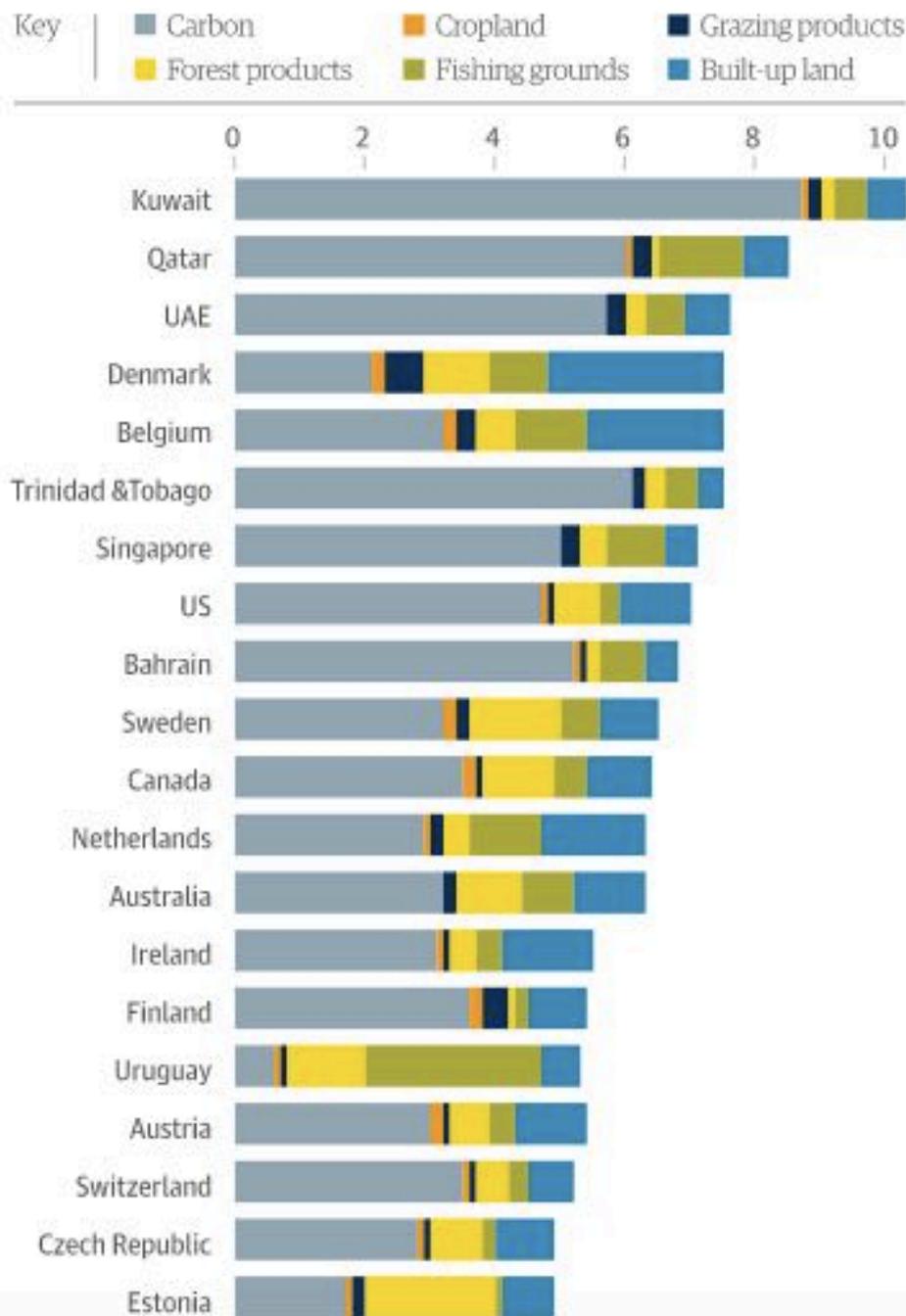
The fastest decline among the animal populations were found in freshwater ecosystems, where numbers have plummeted by 75% since 1970. "Rivers are the bottom of the system," said Dave Tickner, WWF's chief freshwater adviser. "Whatever happens on the land, it all ends up in the rivers." For example, he said, tens of billions of tonnes of effluent are dumped in the Ganges in India every year.

As well as pollution, dams and the increasing abstraction of water damage freshwater systems. There are more than 45,000 major dams – 15m or higher – around the world. "These slice rivers up into a thousand pieces," Tickner said, preventing the healthy flow of water. While population has risen fourfold in the last century, water use has gone up sevenfold. "We are living thirstier and thirstier lives," he said.

But while freshwater species such as the European eel and the hellbender salamander in the US have crashed, recoveries have also been seen. Otters were near extinct in England but thanks to conservation efforts now [live in every county](#).

## The world's 20 biggest ecological footprints

Ecological footprint per capita (global hectares demanded per person)



The number of animals living on the land has fallen by 40% since 1970. From [forest elephants in central Africa](#), where poaching rates now exceed birth rates, to the Hoolock gibbon in Bangladesh and European snakes like the meadow and asp vipers, destruction of habitat has seen populations tumble. But again intensive conservation effort can turn declines around, as has happened with [tigers in Nepal](#).

Marine animal populations have also fallen by 40% overall, with turtles suffering in particular. Hunting, the destruction of nesting grounds and getting drowned in

fishing nets have seen turtle numbers fall by 80%. Some birds have been heavily affected too. The number of [grey partridges in the UK](#) sank by 50% since 1970 due to the intensification of farming, while curlew sandpipers in Australia lost 80% of their number in the 20 years to 2005.

The biggest declines in animal numbers have been seen in low-income, developing nations, while conservation efforts in rich nations have seen small improvements overall. But the big declines in wildlife in rich nations had already occurred long before the new report's baseline year of 1970 – the last wolf in the UK was shot in 1680.

Also, by importing food and other goods produced via habitat destruction in developing nations, rich nations are “outsourcing” wildlife decline to those countries, said Norris. For example, a third of all the products of deforestation such as timber, beef and soya were exported to the EU between 1990 and 2008.

David Nussbaum, chief executive of WWF-UK said: “The scale of the destruction highlighted in this report should be a wake-up call for us all. But 2015 – when the countries of the world are due to come together to agree on a new [global climate agreement](#), as well as a set of [sustainable development goals](#) – presents us with a unique opportunity to reverse the trends.

“We all – politicians, businesses and people – have an interest, and a responsibility, to act to ensure we protect what we all value: a healthy future for both people and nature.”