

Sixth mass extinction of wildlife also threatens global food supplies

Plant and animal species that are the foundation of our food supplies are as endangered as wildlife but get almost no attention, a new report reveals



Farmers evaluating traits of wheat varieties in Ethiopia. Photograph: J.van de Gevel/Bioversity International

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Damian Carrington Environment editor

[@dpcarrington](#)

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The sixth mass extinction of global wildlife already under way is seriously threatening the world's food supplies, according to experts.

“Huge proportions of the plant and animal species that form the foundation of our food supply are just as endangered [as wildlife] and are getting almost no attention,”

said Ann Tutwiler, director general of Bioversity International, a research group that [published a new report on Tuesday](#).

“If there is one thing we cannot allow to become extinct, it is the species that provide the food that sustains each and every one of the seven billion people on our planet,” she said in an article for the Guardian. “This ‘agrobiodiversity’ is a precious resource that we are losing, and yet it can also help solve or mitigate many challenges the world is facing. It has a critical yet overlooked role in helping us improve global nutrition, reduce our impact on the environment and adapt to climate change.”

Chips, chocolate and coffee – our food crops face mass extinction too

M Ann Tutwiler

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Three-quarters of the world’s food today comes from just 12 crops and five animal species and this leaves supplies very vulnerable to disease and pests that can sweep through large areas of monocultures, as happened in the [Irish potato famine](#) when a million people starved to death. Reliance on only a few strains also means the world’s fast changing climate will cut yields just as the demand from a growing global population is rising.

There are tens of thousands of wild or rarely cultivated species that could provide a richly varied range of nutritious foods, resistant to disease and tolerant of the changing environment. But the destruction of wild areas, pollution and overhunting has started [a mass extinction of species on Earth](#). The focus to date has been on wild animals – [half of which have been lost in the last 40 years](#) – but the new report reveals that the same pressures are endangering humanity’s food supply, with at least 1,000 cultivated species already endangered.

Tutwiler said saving the world’s agrobiodiversity is also vital in tackling the number one cause of human death and disability in the world – poor diet, which includes both too much and too little food. “We are not winning the battle against obesity and undernutrition,” she said. “Poor diets are in large part because we have very unified diets based on a narrow set of commodities and we are not consuming enough diversity.”

The new report sets out how both governments and companies can protect, enhance and use the huge variety of little-known food crops. It highlights examples including the gac, a fiery red fruit from Vietnam, and the orange-fleshed Asupina banana. Both have extremely high levels of beta-carotene that the body converts to vitamin A and could help the many millions of people suffering deficiency of that vitamin.



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

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Quinoa has become popular in some rich nations but only a few of the thousands of varieties native to South America are cultivated. The report shows how support has enabled farmers in Peru to grow a tough, nutritious variety that will protect them from future diseases or extreme weather.

Mainstream crops can also benefit from diversity and earlier in 2017 in Ethiopia researchers found two varieties of durum wheat that produce excellent yields even in dry areas. Fish diversity is also very valuable, with a local Bangladeshi species now shown to be extremely nutritious.

“Food biodiversity is full of superfoods but perhaps even more important is the fact these foods are also readily available and adapted to local farming conditions,” said Tutwiler.

Biodiversity International is working with both companies and governments to ramp up investment in agrobiodiversity. The supermarket Sainsbury’s is one, and its head of agriculture, Beth Hart, said: “The world is changing – global warming, extreme weather and volatile prices are making it harder for farmers and growers to produce the foods our customers love. Which is why we are committed to working with our suppliers, farmers and growers around the world to optimise the health benefits, address the impact and biodiversity of these products and secure a sustainable supply.”



Global warming brews big trouble in coffee birthplace Ethiopia

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Pierfrancesco Sacco, Italy's permanent representative to the UN's Food and Agriculture Organisation, said: "The [latest OECD report](#) rates Italy third lowest in the world for levels of obesity after Japan and Korea. Is it a coincidence that all three countries have long traditions of healthy diets based on local food biodiversity, short food supply chains and celebration of local varieties and dishes?"

He said finding and cultivating a wider range of food is the key: "Unlike conserving pandas or rhinos, the more you use agrobiodiversity and the more you eat it, the better you conserve it."

Climate change: global reshuffle of wildlife will have huge impacts on humanity

Mass migration of species to cooler climes has profound implications for society, pushing disease-carrying insects, crop pests and crucial pollinators into new areas, says international team of scientists



Tropical fish like this Blue-barred Parrotfish are expanding their distribution towards the poles and destroying economically important kelp forests in Australia. Photograph: Jason Edwards/NG/Getty Images

Damian Carrington, environment editor

@dpcarrington

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Global warming is reshuffling the ranges of animals and plants around the world with profound consequences for humanity, according to a major new analysis.

Rising temperatures on land and sea are increasingly forcing species to migrate to cooler climes, pushing disease-carrying insects into new areas, moving the pests that attack crops and shifting the pollinators that fertilise many of them, an international team of scientists has said.

They warn that some movements will damage important industries, such as forestry and tourism, and that tensions are emerging between nations over shifting natural resources, such as fish stocks. The mass migration of species now underway around the planet can also amplify climate change as, for example, [darker vegetation grows to replace sun-reflecting snow fields](#) in the Arctic.

“Human survival, for urban and rural communities, depends on other life on Earth,” the experts write in their analysis [published in the journal Science](#). “Climate change is impelling a universal redistribution of life on Earth.”

This mass movement of species is the biggest for about 25,000 years, the peak of the last ice age, say the scientists, who represent more than 40 institutions around the world. “The shifts will leave ‘winners’ and ‘losers’ in their wake, radically reshaping

the pattern of human wellbeing ... and potentially leading to substantial conflict,” the team warn. “Human society has yet to appreciate the implications of unprecedented species redistribution for life on Earth, including for human lives.”

Climate change driven by human greenhouse gas emissions is not just increasing temperatures, but also raising sea levels, the acidity of the oceans and making extreme weather such as droughts and floods more frequent. All of these are forcing many species to migrate to survive.

“Land-based species are moving polewards by an average of 17km per decade, and marine species by 72km per decade” said Prof Gretta Pecl at the University of Tasmania in Australia, who led the new analysis.

As temperatures increase and rainfall patterns change, pests such as mosquitoes are being pushed into new areas where people may have little immunity to the diseases they carry. Photograph: Anders Lindström/SVA
There are many documented examples of individual species migrating in response to global warming and some **examples of extinctions**. But Pecl said: “Our study demonstrates how these changes are affecting ecosystems, human health and culture in the process.”

The most direct impact on humans is the movement of insects that carry diseases, such as the mosquitoes that transmit malaria shifting to new areas as they warm and where people may have little immunity. Another example is the northward spread in Europe and North America of the animal ticks that spread Lyme disease: the **UK has seen a tenfold rise in cases** since 2001 as winters become milder.

Food production is also being affected as crops have to be moved to cooler areas to survive, **such as coffee**, which will need to be grown at higher, cooler altitudes, causing deep disruption to a global industry. The pests of crops will also move, as will their **natural predators**, such as insects, birds, frogs and mammals.

Other resources are being affected, with a third of the land used for forestry in Europe set to become unuseable for valuable timber trees in the coming decades. Important fish stocks are migrating towards the poles in search of cooler waters, with the mackerel caught in Iceland jumping from 1,700 tonnes in 2006 to 120,000 tonnes in 2010, prompting a “**mackerel war**” with neighbours in whose waters the fish had previously been.

The benefits to humans being provided by species, and the complex ecosystems they live in, are also at risk. Mangroves, for example, are migrating polewards in Australia and in the southern US, meaning the storm protection and fish nurseries provided are being lost in some places.

As mangroves migrate polewards in Australia and the southern US, the storm protection and fish nurseries they provide are being lost in some places. Photograph: Marta Jarzyna

The shifting of animals and plants into new areas can sometimes lead to drastic changes, as those areas have not evolved with the incomers and lack natural defences. In Australia’s seas, kelp forests are being destroyed by an influx of tropical

fish that eat them, threatening the important rock lobster trade.

The scientists also warn of feedback effects that can exacerbate climate change, citing the poleward spread of bark beetles in northern hemisphere forests. The beetles attack trees that may already be weakened by warmer, drier conditions, leading to more severe pest outbreaks and tree deaths. This in turn provides more fuel for forest fires, releasing more planet-warming carbon dioxide.

“Climate-driven species redistributions shouldn’t only be a concern for conservation biologists – they should worry everyone,” said Nathalie Pettoirelli, at the ZSL Institute of Zoology in the UK, and one of the analysis team. “The world as a whole isn’t adequately prepared to handle the range of issues emerging from species moving across local, national, and international boundaries.”

She said plans to cope with climate change urgently needed to take these issues into account and said everyone could play a part in collecting much needed data on shifting species. “Citizen science can really help,” she said, with people reporting when they see new species in a region and [some schemes are already set up](#).

Chips, chocolate and coffee – our food crops face mass extinction too

It’s not just animals, many seed crops are also endangered. So why is agrobiodiversity so overlooked? This valuable source of affordable, nutritious food could disappear if we don’t act

[. Read more: Sixth mass extinction of wildlife also threatens global food supplies](#)



A dead tomato bush in the drought-affected town of Monson, California. About 33% of the world's farmland is estimated to lack the nutrients essential for growing crops. Photograph: Mark Ralston/AFP/Getty Images

M Ann Tutwiler

Tutwiler is director general of Bioversity International

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“sixth mass extinction” is already under way, scientists are now [warning us](#). Species such as the Bengal tiger and blue whale are vanishing at an alarming rate, and mournful eulogies are being written on how those born in 20 years’ time may never see [an African elephant](#). But who is writing the eulogy for our food? Huge proportions of the plant and animal species that form the foundation of our food supply – known as agrobiodiversity – are just as endangered and are getting almost no attention.

Take some consumer favourites: chips, chocolate and coffee. Up to 22% of wild potato species are predicted to become [extinct by 2055](#) due to climate change. In Ghana and [Ivory Coast](#), where the raw ingredient for 70% of our chocolate is grown, cacao trees [will not be able to survive](#) as temperatures rise by two degrees over the next 40 years. Coffee yields in Tanzania have [dropped 50%](#) since 1960.

Sixth mass extinction of wildlife also threatens global food supplies

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These crops are the tip of the iceberg. Across the world, 940 cultivated species are threatened. Agrobiodiversity is a precious resource that we are losing, and yet it can also help solve or mitigate many challenges the world is facing. It has a critical yet overlooked role in helping us improve global nutrition, reduce our impact on the environment and adapt to climate change.

According to the World Health Organisation, poor diet is the biggest cause of early death and disability. Globally, 2 billion people are undernourished, while 2 billion are obese and at risk of contracting diabetes, heart disease and cancer. Focusing on large-scale intensive production of starchy crops for calories rather than nutritious diets has led to serious levels of obesity around the world, from the US to Kenya. Our agrobiodiversity base can be a source of affordable, nutritious food – provided we don't let it disappear.

Take [gac](#), a fiery red fruit from Vietnam with astronomical levels of beta carotene (which the body converts to vitamin A). Or the orange-fleshed Asupina banana, which has such high levels of carotenoids that a preschool child could meet 50% of their vitamin A requirement by consuming just one per day, when they would need to eat 1kg of some other varieties to reach the equivalent nutritional benefit.

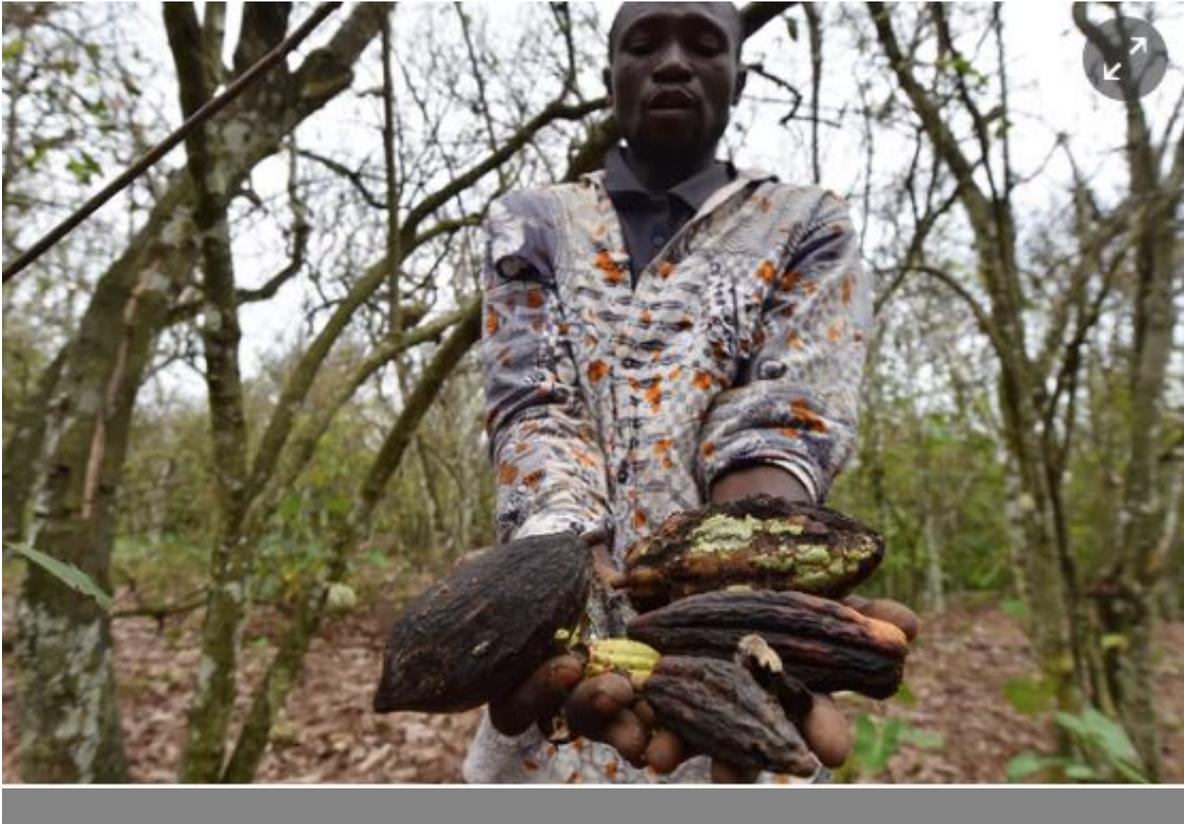
Chocolate industry drives rainforest disaster in Ivory Coast

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These relatively obscure species can offer incredible levels of nutrition, but only if they are still around and available to us. [Food](#) biodiversity is full of superfoods like gac – but perhaps even more important is the fact these foods are also readily available and adapted to local farming conditions. They open the way to year-round nutrition security.

About 33% of the world's farmland is estimated to be degraded, lacking the nutrients essential for growing crops. Agrobiodiversity once again has a solution. Planting cold-tolerant legumes and forages throughout winter has helped farmers in France naturally reduce weed infestation as well as increasing soil's nutrient content and capacity to hold water. Natural remedies such as this can enhance the sustainability of farms worldwide, reducing the sector's impact on the environment.

According to the Intergovernmental Panel on Climate Change, global warming will reduce agricultural production [by 2% every decade](#), while demand will increase every decade by 14% until 2050. Yet a wealth of traditional seed varieties have unique traits that make them tolerant to heat, drought and floods. They must be found, preserved and put to use in crop-breeding programmes.



A cocoa farmer holds dried cocoa pods in Ivory Coast where insects have eaten the cocoa trees. Photograph: Issouf Sanogo/AFP/Getty Images

This year in Ethiopia, researchers at [Bioversity International](#) discovered two varieties of durum wheat that were not previously on the market, but yield remarkably well in dry, marginal areas. Work is now underway to breed superior durum wheat crops using these high-performing traditional seeds, to help buffer farmers against recurring droughts and combat hunger in the region.

Global efforts to protect agrobiodiversity need to be stepped up urgently. But where can governments and agribusinesses start? [A new scientific review](#) of the evidence the agrobiodiversity can contribute to a better food system and wider sustainable development issues has been produced to answer this very question.

This assessment forms the basis for an [Agrobiodiversity Index](#) that can guide countries and companies towards the most impactful investment opportunities. These can range from increasing research and development on agrobiodiversity, to introducing more diversity into food supply chains. It will enable agribusinesses to estimate and monitor the impact of their supply chain investments and ensure future product lines are both sustainable and resilient. Similarly, governments will be able to channel funding into agrobiodiversity interventions that will safeguard domestic food supply and simultaneously improve environmental sustainability.

While wild elephants and rhinos thoroughly deserve our support, we should also be raising the alarm for our disappearing agrobiodiversity. After all, if there is one thing we cannot allow to become extinct, it is the species that provide the food that sustains the 7 billion people on our planet.

• *M Ann Tutwiler is director general of Bioversity International*