

THE CRUCIAL DECADE:

PLANETARY BOUNDARIES,
DOUGHNUT ECONOMICS AND EARTH JUSTICE

20
22

magazine

■ THE CRUCIAL DECADE: PLANETARY BOUNDARIES,
DOUGHNUT ECONOMICS AND EARTH JUSTICE ■
REVIEW 2021 ■ CAMPAIGNS ■ ANNIVERSARY BOOK
PREVIEW & MORE





WELCOME



to the thirteenth issue of the annual Biosphere Expeditions Magazine.

We are all tired of the pandemic, about to come back with an omicron vengeance as I write this at the beginning of December 2021. We were poised to re-start expeditions in 2022, but this may all be about to change. After almost two years of a persistent pandemic that is destroying lives and livelihoods around the world, all but the wilfully ignorant must by now understand that humanity has put our planet in dire straits.

So we decided that this 2022 Magazine will be about the crucial decade that we have entered. Because the issues we face with climate change and humanity's impact on our planet, make the current pandemic – as tired as we all are of it – seem like child's play.

On last year's magazine welcome page, I said that it was "live or die, boom or bust" for Biosphere Expeditions. Well, we are still here, hanging on – thanks to your support. However, what I said also holds true for the planet as a whole: This decade will show what humankind wants to do with all the knowledge we now have about our destructive impact on the planet and the degradation of Earth's life support systems that we as a species are solely responsible for.

This greater crisis, of which the pandemic is but an offshoot, is now much bigger than a single organisation, country or continent. It is a global challenge that needs a global response. I do hope we can turn this supertanker around and that we will be here to take stock with pride and relief in a decade. The next few years will tell and, as always, Biosphere Expeditions will play its small part in trying to avoid a terrible crash landing. Thank you for working with us on this.



Dr. Matthias Hammer
Founder & Executive Director

ABOUT US



ÜBER UNS



A PROPOS

Citizen science | ethical adventures | wildlife conservation



Our planet is in crisis, with nature under attack like never before. We believe everyone has the power to change this. We are mindful of nature and empower people through citizen science and hands-on wildlife conservation. We are a non-profit, visionary, award-winning and ethical conservation organisation. We are a member of the IUCN and the UN's Environment Programme. Working hand-in-hand with local biologists and communities, we champion change and protect nature. And we succeed - the creation of protected areas on four continents is just one example.

Come and join us! Make your holiday time count as a wildlife volunteer and share in our vision of a healthier planet. Whatever your age or background, make your voice heard and spend a week or more on a wildlife conservation expedition with us. Travel with us to remote and beautiful places, learn new skills, meet like-minded people from around the world and experience conservation in action. Together - for nature, not profit - let's act like our world depends on it. Because it does.

Bürgerwissenschaft | nachhaltiges Reisen | ethische Abenteuer | Artenschutz



Unsere Planet steckt in der Krise - noch nie stand die Natur so unter Druck. Wir glauben daran, dass es in der Macht jedes einzelnen liegt, das zu ändern. Wir achten auf die Natur und befähigen Menschen sie zu schützen - durch Bürgerwissenschaft und angewandten Naturschutz. Wir sind eine gemeinnützige, visionäre und nach ethischen Standards handelnde Naturschutzorganisation. Wir sind Mitglied der IUCN und des UN-Umweltprogramms. Wir arbeiten Hand in Hand mit Menschen und Biologen vor Ort in unseren Projektgebieten, setzen uns für einen Wandel ein und schützen unsere aller Natur. Und unser Konzept ist erfolgreich - die Einrichtung von Schutzgebieten auf vier Kontinenten ist nur ein Beispiel.

Helfen Sie mit und gestalten Sie Ihre Urlaubszeit besonders wertvoll. Teilen Sie unsere Vision eines intakteren Planeten und verschaffen Sie Ihrer Stimme Gehör als Teilnehmer an unseren Natur- und Artenschutzexpeditionen. Erfahren Sie - für eine Woche oder auch länger - Neues an wunderschönen, entlegenen Orten, erwerben Sie neue Fähigkeiten, treffen Sie Gleichgesinnte aus der ganzen Welt und erleben Sie Naturschutz hautnah. Lassen Sie uns gemeinsam so handeln, als hinge das Wohl des Planeten von uns ab - denn genau das tut es.

Actions participatives | voyage durable | aventure éthique | protection des espèces



Notre planète est en crise - jamais encore la nature n'a autant été en danger. Chacun a le pouvoir de changer les choses. Nous en avons conscience, et c'est pour cela que nous donnons les moyens nécessaires aux hommes de la préserver, au travers d'actions participatives et scientifiques, sur le terrain. Nous sommes une organisation à but non lucratif, visionnaire, plusieurs fois récompensée, éthique et durable, qui vise à promouvoir la protection de la nature. Nous sommes également membres de l'IUCN (Union internationale pour la conservation de la nature) et du programme des Nations Unies pour l'environnement. Nous travaillons main dans la main avec les communautés et les biologistes locaux. Nous incitons au changement et protégeons la nature. Nos efforts sont couronnés de succès : la création d'espaces protégés sur l'ensemble des quatre continents est juste un exemple de tout ce que nous avons réussi à accomplir.

Rejoignez-nous et donnez de votre temps. Partagez notre vision d'une planète préservée. Quel que soit votre âge ou vos compétences, faites compter votre voix et participez à une mission pour la préservation de la nature pendant une semaine ou plus. Partez avec nous vers des endroits magnifiques et reculés. Développez vos connaissances et rencontrez des personnes du monde entier, qui ont la même volonté que vous. Participez concrètement à la préservation de la nature. Ensemble, agissons pour le bien de notre planète car notre futur en dépend.



The backbone of Biosphere Expeditions

MEET THE STAFF

Biosphere Expeditions employs a global team of wildlife professionals who all contribute to the success of the organisation: expedition leaders, scientists, field-based and administrative staff. Their roles are as diverse as their backgrounds, but they all share a love of the outdoors and wildlife.

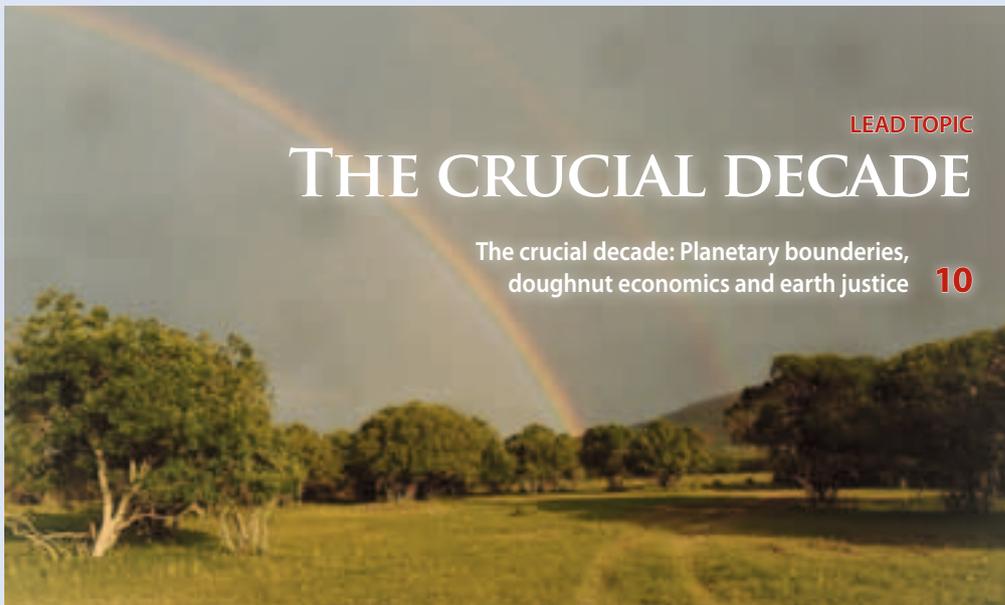
Here are just two of our team. More can be found at www.biosphere-expeditions.org/staff.



Paul Franklin was born in Oxford and studied zoology at Swansea University. His Masters Degree was based on research of the migratory behaviour and ecology of amphibians. After graduation, Paul spent a year working as a naturalist guide in the Peruvian Amazon. There, among other things, he was bitten by the travel bug. Since then he has led many expeditions and treks to far-flung corners of the globe. Travels overseas have been interspersed with time spent in the UK working, among other things, as a Nature Reserve Warden and Environmental Consultant. Never far from a camera, many of his wildlife and travel images have been published in magazines and books. When not travelling on foot through the world's wild places, his preferred modes of transport are a kayak, mountain bike or occasionally a horse.

Andrea Friebe was born in Germany and studied biology at the Goethe University in Frankfurt. She has worked in the Scandinavian Brown Bear Research Project (SBBRP) since 1998 and wrote her master thesis and dissertation about brown bear hibernation and ecology in Sweden. In 2001 she founded the company Björn & Vildmark, which is an interface between bear research and information for the public and for managers. Andrea is the SBBRPS researcher responsible for all den descriptions and also its appointed field technician.





LEAD TOPIC

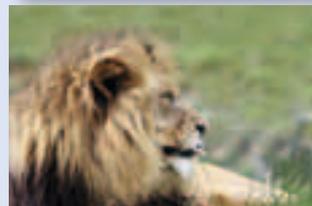
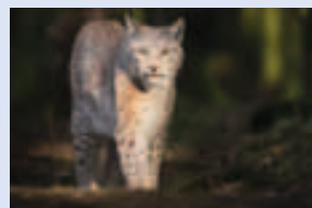
THE CRUCIAL DECADE

The crucial decade: Planetary boundaries, doughnut economics and earth justice **10**



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EDITORIAL
 PUBLISHER Biosphere Expeditions
 info@biosphere-expeditions.org
 EDITOR Matthias Hammer,
 Kate Silverthorne
 ARTWORK Malika Fettak
 m.fettak@biosphere-expeditions.org
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EXPEDITIONS WORLDWIDE

GERMANY

Wolf

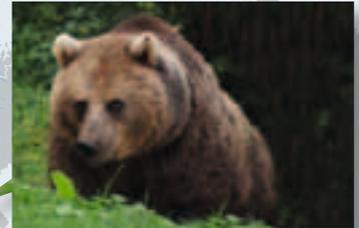


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SWEDEN

Brown bear



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AZORES (Portugal)

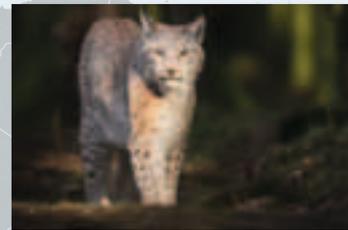
Whales, dolphins, turtles



📖 page 34

ARMENIA

Leopard, lynx, bear, wolf



📖 page 32

MALAWI

Elephants, cats & African biodiversity



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ARABIA (UAE)

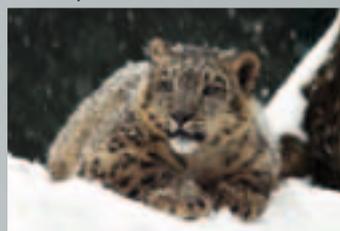
Oryx, wildcat, sand fox & others



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TIEN SHAN (Kyrgyzstan)

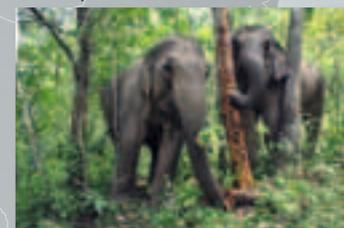
Snow leopard



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THAILAND

Asian elephant



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KENYA

Big Five & others



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MALDIVES

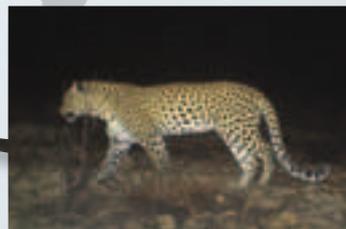
Coral reef & whale shark



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SOUTH AFRICA

Leopard, caracal & biodiversity



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THE CRUCIAL DECADE:

PLANETARY BOUNDARIES,
DOUGHNUT ECONOMICS
AND EARTH JUSTICE

Quo vadis humankind?

The 2020s will decide where we are headed.

Will it be towards our own self-made demise
or into a more sustainable future?

We have the knowledge and the tools.

The question is whether we will apply them all in time.

The next few years will tell.

Ten key findings of the IPCC (Intergovernmental Panel on Climate Change) report on climate change, published in August 2021

1. There is now no doubt left that humans are to blame for the current climate emergency

The summary of the IPCC report begins with a stark opening message: "It is unequivocal that human influence has warmed the atmosphere, ocean and land." Humans have caused the world to heat up by around 1.1C since the 1850s.

2. Compound extreme weather events are on the rise

There is now no doubt left that concurrent heatwaves, droughts, heavy rainfalls, hurricanes and other extreme weather events are on the rise as the result of human-induced warming.

3. Every region on Earth is affected

No region on Earth has escaped the impacts of the human-made climate crisis.

4. CO2 levels are at their highest in two million years

Humans pumping carbon dioxide into the atmosphere has resulted in levels not seen before the evolution of our own species. Levels of methane and nitrous oxide, the second and third biggest drivers of warming respectively, were higher in 2019 than at any time in at least 800,000 years.

5. The climate goals of 1.5C and 2C are slipping beyond reach

Under the historic Paris Agreement in 2015, countries agreed to limit global warming to 2C above pre-industrial levels, with an aspiration of keeping the temperature rise to below 1.5C. The 1.5C mark will be reached sometime between 2021 and 2040. Immediate, rapid and large-scale cuts to greenhouse gas emissions are needed to reach the 2C goal. Anything above 2C will have dire consequences for human civilisation as we know it today.

6. Strong and rapid cuts to methane are needed

In addition to slashing CO2 emissions, the world must also deliver strong, rapid and sustained reductions in methane in order to get to grips with the climate crisis. Human-caused methane emissions largely come from agriculture, particularly livestock rearing, as well as from the production of fossil

fuels. Humankind must go cold turkey on its addiction to eating meat and burning fossil fuels if it wants to avoid the worst crisis in its recorded history.

7. Humans are the main driver of worsening heat

Some of the heat extremes seen over the past decade would have been extremely unlikely to occur without the climate crisis. Concurrent heatwaves and droughts also raise the risk of severe wildfires. The weeks before the report's release in August 2021, when wildfires burned across the globe, showed those predictions coming true.

8. Changes to ice, oceans and sea levels are already irreversible for centuries

It is now inevitable that sea levels will rise for centuries to millennia, and remain elevated for thousands of years, due to continuing ocean heating and the melting of ice sheets.

9. Climate tipping points can no longer be ruled out

Tipping points in Earth's climate – thresholds where a small change could lead to dramatic and irreversible change can no longer be ruled out. Such tipping points include ice sheet collapse or abrupt changes to ocean circulation patterns (there are clear signs that the Gulf Stream is already weakening). Taking urgent action to address greenhouse gas emissions would minimise the likelihood of such extinction event tipping points occurring.

10. We are not quite doomed yet and every bit of action matters

The findings of the new report are dire, but it is important to note we are not doomed yet, says Dr Friederike Otto, a report author and associate director of the Environmental Change Institute at the University of Oxford. She and her fellow report authors urge the world to take note of the fact that every action humankind now takes to reduce greenhouse gas emissions will make a difference. Because of the clear and present danger, there has never been a more urgent need to revive damaged ecosystems, protect the planet by all legal means possible and shift away from an economic system that puts profit above all else, degrading the planet as it ravages its resources. We are beginning to understand that healthy ecological and economic systems are intimately linked with a healthy planet and its people.

Ten years left to restore the planet

A decade may sound like a long time. But scientists say that the next ten years will count most in the fight, not only to avert climate breakdown, but also the loss of millions of species and with it the disintegration of our planet's life support and economic systems, and civilisation as we know it. Against this backdrop of crisis, the UN Decade of Ecosystem Restoration (2021-2030) is our best last chance to revive the natural world that supports us all.

When the UN climate panel launched its most comprehensive report in August 2021, the key takeaways were: humans are to blame for the climate crisis, temperatures will keep rising past a civilisation-threatening 2C by the end of the century without steep and immediate emission cuts, the weather will get more extreme, sea levels will rise, and humankind is running out of time to prevent total climate breakdown (see infobox on the left).

The repeatedly ignored warnings of scientists over past decades have now become reality. Humanity, through its actions, or lack of action, has unequivocally overheated the planet. Nowhere on Earth is escaping rising temperatures, worse floods, hotter wildfires or more searing droughts. And the future looks worse. "If we do not halt our emissions soon, our future climate could well become some kind of hell on Earth," says Prof Tim Palmer of the University of Oxford.

Little doubt then remains that the outlook is grim if we do not act decisively now. Luckily, the tide appears to be turning. All but the most wilfully ignorant and extreme now accept that climate change is real, caused by humans and needs to be reined in before it is too

late. New lines of thought in science (planetary boundaries) and economics (doughnut economics) now provide guidance on safe limits within which humankind can live and thrive without wreaking havoc on the rest of the planet and its inhabitants. There are also moves to make damage to the planet a crime on a par with war crimes and genocide, thereby leveraging the power of the law to protect the planet.

The question is whether it is all too little too late, or whether the 2020s will be the decade to turn around this supertanker, currently on course to steam over a precipice that is perilously close.

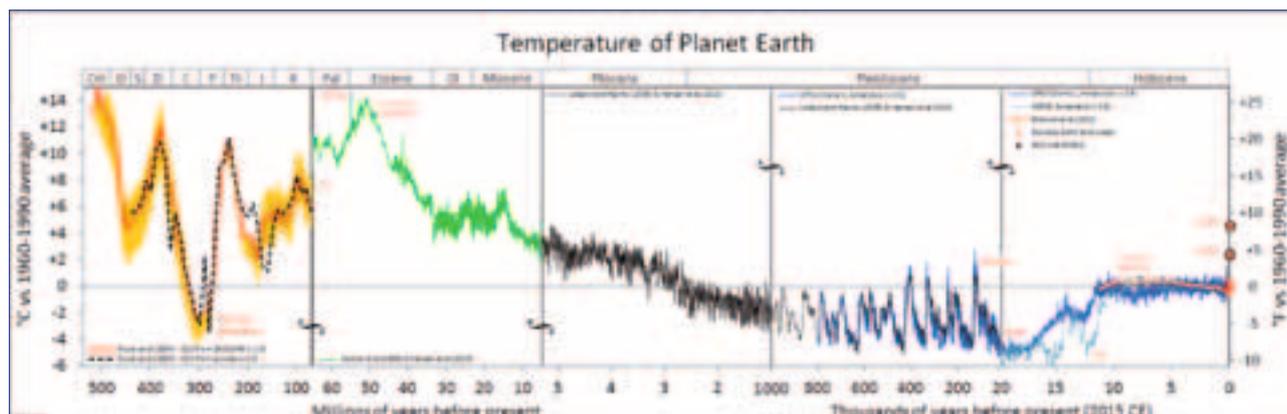
Planetary boundaries

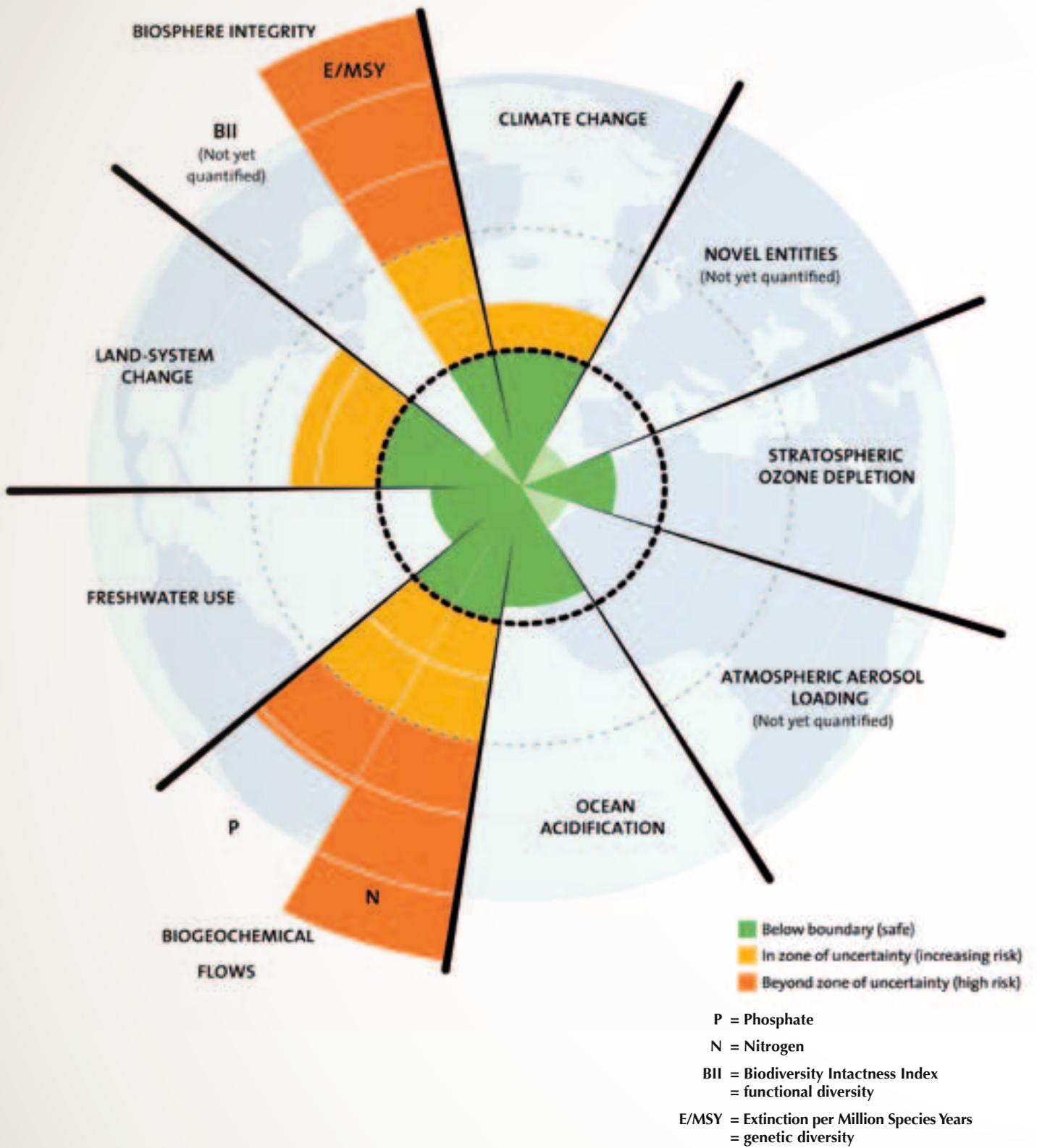
Advanced human societies emerged during an unprecedented period of climatic stability on Earth, called the Holocene. During the 12,000 years prior to the Industrial Revolution, our planet's surface temperature varied by less than 1C above or below the average for that entire time. As a result, life — both human and wild — thrived and human civilisations emerged.

But over the past two centuries, humanity has dramatically increased greenhouse gas concentrations in the atmosphere, pushing us outside this 'safe' climate zone around which civilisations developed.

That, however, is just the tip of the iceberg, as it were. Recent research has shown that climate change - as threatening and worrying as it is by itself - is just one of nine critical planetary boundaries, which the imprudent actions of our species risk dangerously destabilising and overshooting, or have already done so.

Earth temperature changes since complex life first emerged. The Holocene period of stability can be clearly seen on the right in dark blue, but also the rapid rise in temperature in very recent times (red line in the blue), taking the planet out of the stable Holocene age.





The nine planetary boundaries.
Image courtesy of Steffen et al. 2015 (via Stockholm Resilience Centre).

The Planetary Boundaries Framework defines nine key Earth System processes and sets safe boundaries for human activities.

Climate change

Rising concentrations of greenhouse gases in the atmosphere are leading to increasing global temperatures. We passed the safe boundary of 350 parts per million (ppm) of CO₂ in 1988. By 2020, levels were 417 ppm.

Novel entities

One of the more elusive planetary boundaries, 'novel entities' refers to harmful chemicals, materials and other new substances (such as plastics), as well as naturally-occurring substances such as heavy metals and radioactive materials, released by human activities. We release tens of thousands of synthetic substances into the environment every day, often with unknown effects. These risks are exemplified by the danger posed by CFCs to the ozone layer, or of DDT to biodiversity.

Stratospheric ozone depletion

The depletion of ozone in the stratosphere as a result of chemical pollutants was first discovered in the 1980s and led to the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer. The ozone layer is now showing signs of recovery.

Atmospheric aerosols

Atmospheric aerosol pollution is a bane to human health and can also influence air and ocean circulation systems that affect the climate. For example, severe aerosol pollution over the Indian subcontinent may cause the monsoon system to switch abruptly to a drier state.

Ocean acidification

Rising atmospheric CO₂ levels are increasing the acidity of the world's oceans, posing a severe risk to marine biodiversity and particularly invertebrates whose shells dissolve in acidic waters.

Biogeochemical flows

We have profoundly altered the planet's natural nitrogen and phosphorus cycles by applying these vital nutrients in large quantities to agricultural land, leading to runoff into neighbouring ecosystems. For example, river runoffs into the ocean, full of fertiliser from plantations in Honduras, have smothered large swathes of coral reef in algae that thrive on over-nutrication, killing the corals and turning the reefs into algal wastelands.

Freshwater use

Agriculture, industry and a growing global population are putting an ever greater strain on the freshwater cycle, while climate change is altering weather patterns, causing drought in some regions and flooding in others.

Land-system change

Changes in land use, particularly the conversion of tropical forests to farmland, have a major effect on climate because of the impact on atmospheric CO₂ concentrations, biodiversity, freshwater and the reflectivity of the Earth's surface. Deforestation, for example, is now a massive 40% since pre-industrial times and rising, with some scientists suggesting that humanity will leave the safe zone at around 60% deforestation.

Biosphere integrity

The functional integrity of ecosystems is a core planetary boundary because of the many ecoservices they provide, from pollination to clean air and water. Scientists are alarmed about rapid declines in plant and animal numbers and diversity (a 86% loss since pre-industrial times by some latest estimate!), the degradation of ecosystems, and the loss of genetic diversity, which could disrupt essential biosphere services.

A safe operating space for humanity

In the mid-2000s, Johan Rockström, founding director of Sweden's Stockholm Resilience Centre, gathered an international, interdisciplinary team of scientists to unite behind a single goal: define the boundaries for a "safe operating space for humanity" on Earth. They asked themselves: what are the safe operating limits of our planet, and what changes can we force on it before we trigger rapid, catastrophic environmental harm?

In 2009, the centre published the Planetary Boundaries Framework, which outlined nine key processes influenced by humanity, which threaten the stability of the entire Earth System (see pages 14/15).

The researchers then estimated a limit of the extent that human activities could exploit and alter each of these processes before the global system would pass a tipping point — a threshold beyond which we risk sending the planet spiralling out of the stable state of the last 12,000 years, bringing extreme change that could crash civilisation and endanger humanity's survival.

As Rockström, now the director of the Potsdam Institute for Climate Impact Research, explains, systems — from the oceans and ice sheets to climate system and ecosystems — can have multiple stable states separated by tipping points. If those systems are pushed too far, they lose resilience and can transition, abruptly

and irreversibly, into a new self-reinforcing state — one that might not support humanity.

The original 2009 Planetary Boundaries report, and its updates since, emphasise that humanity is already existing outside the safe operating space for at least four of the nine planetary boundaries: climate change, biodiversity, land-system change and biogeochemical flows. Whilst all these limits are estimates, what is unknown is how long we can keep pushing these key planetary boundaries before combined pressures lead to irreversible change and harm. An apt, if alarming, metaphor is humanity walking, blindfolded, towards nine cliff edges at the same time.

The dynamics of large, complex and interconnected biogeochemical systems, such as those operating on Earth, can be thought of in terms of pathways or trajectories, weaving between different steady states. The Earth's trajectory can be altered by tipping points, which shift the planet from one steady state to another (akin to a car changing gears). A number of complex feedback processes can either reinforce the current steady state, or weaken it, and bounce the planet into a completely new state, like a bowling ball with too much spin careening towards the gutter.

Climate change, the best known of the nine planetary boundaries on which we are encroaching, offers a good example of how this equilibrium process works: today,

Oil palm plantations in Malaysia. Humanity's food systems, along with energy production, contribute most to destabilising planetary boundaries. Image courtesy of T. R. Shankar Raman.



according to social-ecological system modelling, we are at risk of triggering tipping points in the Earth System towards a 'Hothouse Earth' from which it would be very difficult to recover to a pre-industrial climate. However, models also show an escape route: with rapid decarbonisation we could still maintain a 'Stable Earth' within the safe window of conditions to which humanity has adapted to over the last 12,000 years.

The Anthropocene

The period of climate stability in which our societies have developed and thrived is known as the Holocene epoch. Beginning some 12,000 years ago, it marked the end of more than 100,000 years of alternating glacial and interglacial periods that saw the planet's temperature fluctuate by as much as 6°C (see graph on page 13).

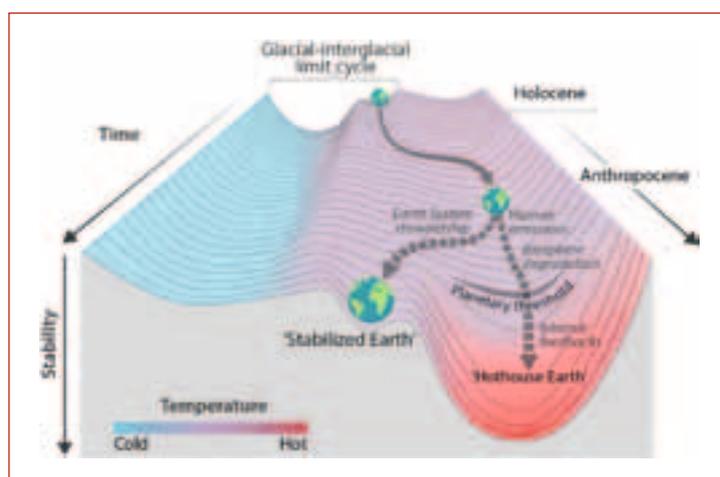
Modern humans have existed for about 200,000 years, but it was only in the last 10,000 years that we were able to develop civilisation as we know it. The very origins of modern civilisation, namely domestication of animals and plants and the establishment of agriculture, happened in the Holocene under stable conditions never experienced before in Earth's history.

The human journey has been a remarkable achievement. Yet it pales when compared to the challenges that lie ahead, even with a stable system. The world's crops will need to feed 8 billion people by 2023, putting significant extra pressure on Earth systems. Yet the very hallmarks of our extraordinary success — agriculture, sedentary living, industrial manufacturing — are today fundamentally altering many Earth System processes responsible for keeping conditions on Earth habitable for humans.

In fact, our transgressions of the nine planetary boundaries have been so severe that geologists believe that we have entered a new epoch in Earth's history. The start of the Anthropocene — a human-influenced period that was initiated with the industrial age that began around 1760 in Great Britain and later elsewhere — has been marked by rapid, human-triggered increases in greenhouse gas emissions, large-scale land-use change, extreme biodiversity loss, and massive global consumption and pollution brought on by rapidly advancing technology and a booming human population. The dawn of the Anthropocene needs to serve as a warning that we are starting to hit the ceiling of the biophysical coping-capacity of the whole Earth System.

On a path to climate and biodiversity overshoot

Worryingly, today there is little evidence that humankind has reversed course in order to avoid looming tipping points. The Covid crisis could help delay some of the worst excesses, but in fact, humans are even deeper



Earth Trajectories: Think of the Earth's climate taking different trajectories through time — pathways weaving between different climate states. Different paths through all the possible climate states can be influenced by distinct tipping points. Self-reinforcing feedback processes can lock the planet into a particular trajectory for centuries or millennia. There is no evidence that modern societies can exist, let alone thrive, in conditions substantially different from the Holocene.
Image courtesy of Steffen et al. (2018).

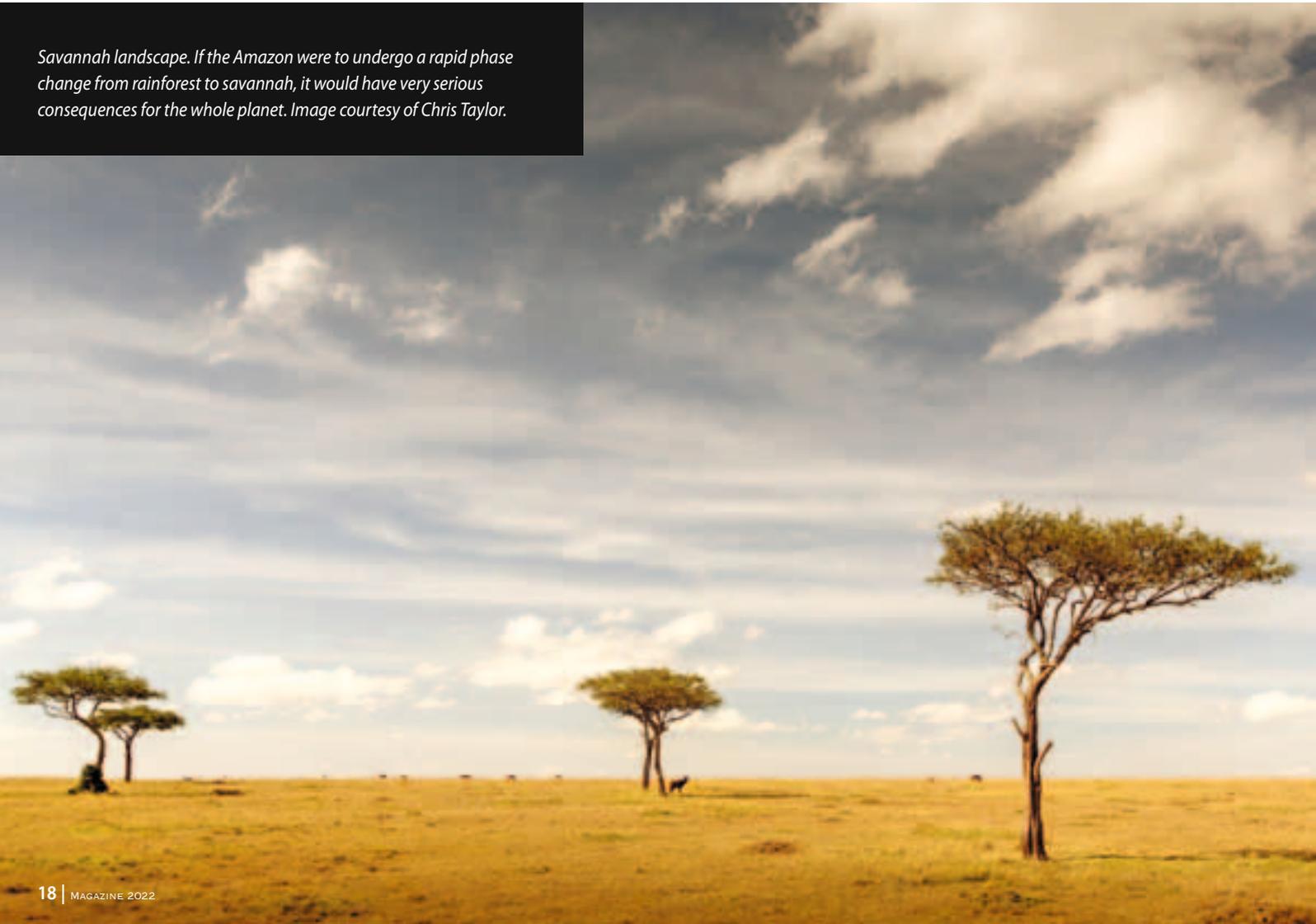
into the transgression on climate, biodiversity, land-use, and nitrogen and phosphorus. Of the four boundaries that researchers say we have already exceeded (see pages 14/15), climate change and biosphere integrity are considered core planetary boundaries because either one could change the course of Earth's trajectory and endanger humanity on its own. Human-induced climate change alone can knock the planet away from the Holocene state towards a thoroughly intolerable Hothouse Earth scenario. Similarly, if we continue causing mass extinction through the loss of more and more species from phytoplankton to top predators, there will come a point where the whole ecosphere collapses.

There is already strong evidence that we are currently in the midst of a global mass extinction event. A 2019 assessment by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) reported that 25% of plants and animals assessed — totalling 1 million species worldwide — are threatened with extinction. A separate study found that more than 500 vertebrate species are on the brink, each with fewer than a thousand individuals remaining in the wild. Finally, according to the World Wildlife Fund (WWF) and the Zoological Society of London's (ZSL) 2020 Living Planet Report, population sizes of mammals, birds, amphibians, reptiles and fish declined by 68% on average between 1970 and 2016 — a strong alarm call.

To make matters worse, researchers say that we are flying blind when it comes to both the quantity and quality of biodiversity loss that can be tolerated by ecosystems before triggering irreversible change.

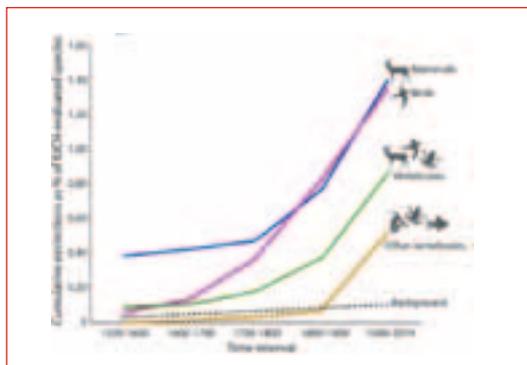


Greenland ice sheet: This great icebound northern island lost 3.8 trillion metric tonnes of ice between 1992 and 2017, contributing 10 millimetres to global sea level rise so far. Future ice loss is certain to accelerate as the planet warms. The flow of melting ice into the oceans is not only raising sea levels, but the influx of freshwater could alter global ocean currents and even the world's climate. Image courtesy of Christine Zenino.



Savannah landscape. If the Amazon were to undergo a rapid phase change from rainforest to savannah, it would have very serious consequences for the whole planet. Image courtesy of Chris Taylor.

Furthermore, data on total population declines are actually more informative for assessing biosphere health than data on extinctions, because by the time species are moving towards extinction, the majority of the damage has already been done.



The rapid rise of extinction rates in the Anthropocene. The black dotted line represents the estimated extinction rate according to natural causes compared to actual extinctions. Image courtesy of Science Advances.

Early warning signs

The flashing warning lights on the Earth System dashboard are now obvious to all but the most extreme or wilfully ignorant. They tell us that humanity is already pushing beyond the world’s safe operating space for multiple planetary boundaries and approaching tipping points. “We have changed the planet so much that it is very likely that there will be significant impacts, and we have started to see and feel those impacts in the last few years,” Rockström says.

For example, the melting of the Greenland and West Antarctic ice sheets has accelerated since the early 1990s, suggesting these colossal ice deposits may now have entered a new state of sustained and escalating retreat, after many centuries of stability. Contained within these now vulnerable ice sheets is enough water to raise the global sea level by more than 65 metres. Similarly, Arctic sea ice is retreating and scientists predict the region could be mostly ice-free in the summer as early as 2035 — with no certainty of what extreme changes this might bring.

Other early warning signs that we are approaching a climate tipping point include increasingly frequent and severe droughts, heat waves, storms and tropical cyclones. The 2000-2020 National Climate Assessment in the USA found that the number of heat waves, heavy downpours and major hurricanes has increased in the United States, and the strength of these events has increased, too. The 2021 extreme heatwave in North America and the catastrophic flooding in Europe are the latest case in point.

And no one knows how much stress civilisation can withstand before it starts to collapse.

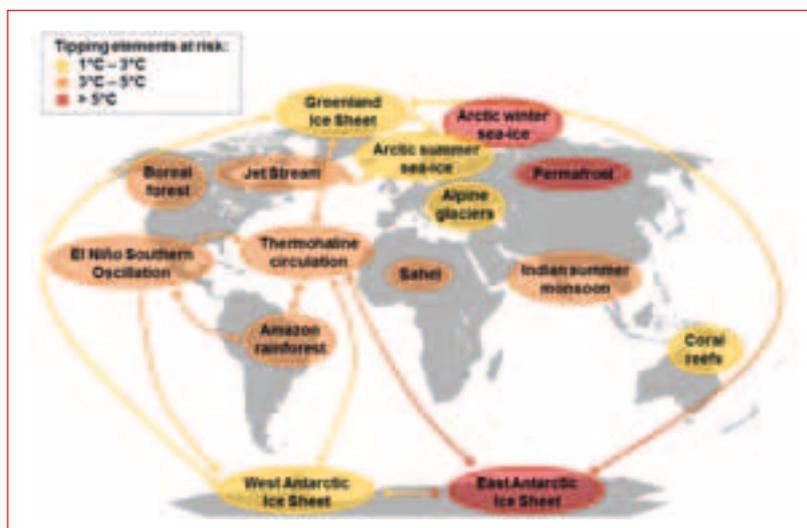
Feedback loops upon feedback loops

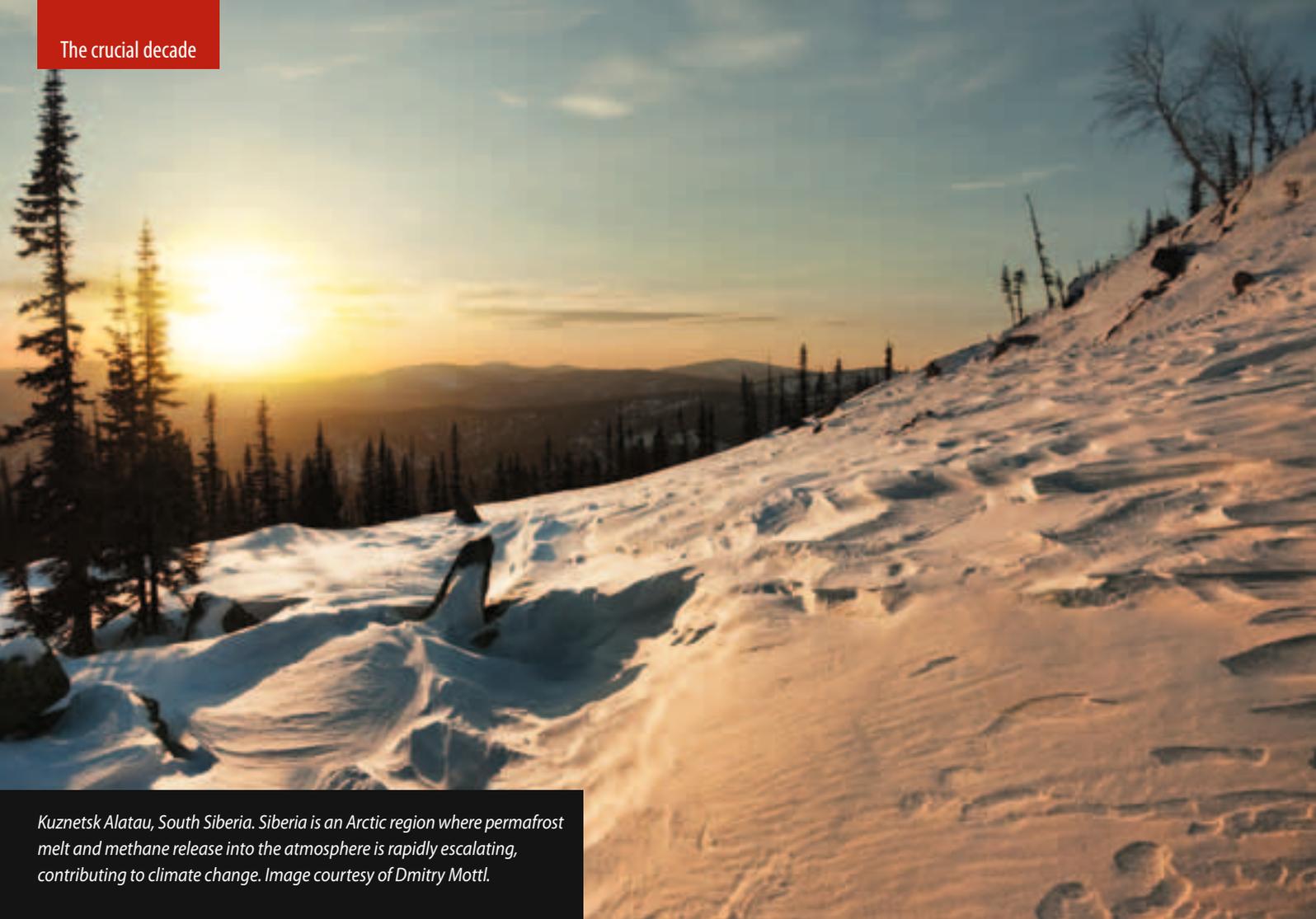
These changes are signs of an impending shift from once-stable Holocene conditions. What is further cause for concern is that many of them are expected to create positive feedback loops that further accelerate change, because Earth systems and the nine planetary boundaries do not exist in isolation. They form a web of interrelated processes and functions — i.e. unbalance one and the stability of others is impacted. Exactly how is a matter of debate and needs more research, but suffice it to say that in recent years the already dire predictions, such as the rate at which the world’s glaciers and ice sheets are melting, have had to be revised to more dismal projections. Pair this with the biodiversity collapse scientists are observing — much earlier and faster than predicted — and a perfect storm is brewing.

The continued melting of the Greenland ice sheet, for instance, will not only cause major sea level rise, but could also alter ocean surface temperature and salinity, potentially changing ocean circulation systems such as the Atlantic Meridional Ocean Circulation (AMOC), which in turn could drastically alter global climate, and even accelerate the loss of the East Antarctic Ice Sheet.

However, it is not all likely to be bad news: some feedback loops may have a balancing effect on the climate and on other planetary boundaries. Which of these feedback loops predominates, and when, is one of the big questions about our future climate. Still, these reinforcing loops could trigger more complicated cascades of change. “The whole Earth System is a complex self-regulating system,” Rockström says, “if you push one planetary boundary too far, it can cascade like a domino and impact the others.”

Some interconnected feedback loops and the global temperatures at which they are likely to trigger. Image courtesy of Steffen et al. (2018).





Kuznetsk Alatau, South Siberia. Siberia is an Arctic region where permafrost melt and methane release into the atmosphere is rapidly escalating, contributing to climate change. Image courtesy of Dmitry Mottl.



A rapid phase change from rainforest to savannah in the Amazon basin would have serious consequences for the whole planet.

Another example is land-use change due to agriculture, which is the leading cause of deforestation worldwide; it reduces the amount of water released into the air from plant leaves. In the Amazon basin, this transpiration is a major source of rainfall. But signs are strong that rapid Amazon deforestation — combined with global climate change — may be triggering more extreme drought, leading to an abrupt shift from rainforest to degraded savannah, with profound implications for the entire planet. That biome-wide shift would release a vast store of ancient sequestered carbon, exacerbating climate change, leading to more drought and more tree die-off — a vicious, self-multiplying cycle.

Even now the loss of the Amazon rainforest accelerates. Roads penetrating the Brazilian Amazon are used by illegal loggers first, then by cattle ranchers, followed by soy growers in a vicious cycle that is ravaging the tropical nation's greatest, most biodiverse biome — potentially leading to a catastrophic transformation from rainforest to degraded savannah. In light of this, it is no surprise that there is now much concern that, with the recent increase in deforestation rates under Brazil's Jair Bolsonaro government, we may be approaching a tipping point for the Amazon rainforest. Indeed, many view the Amazon rainforest (as well as the Greenland ice sheet and the Siberian permafrost landscape) as the three Earth System tipping points of greatest concern.

Another tipping point example is the devastating wildfires striking Australia and California in the last three years. They arose from multiple factors: intensifying drought due to climate change, accumulated leaf litter and unusual wind patterns. All of these built up slowly and then a small human intervention, such as a spark from a utility company power transformer, as happened in California, was enough to change a forest to a shrubland overnight. Climate change dramatically manifests itself in these bursts of catastrophes. As they become more apparent and frequent, scientists warn that our lack of knowledge about the vast complexity of interactions between Earth System processes — only a fraction of which have been well studied — is what concerns them most.

"It is quite frustrating to have to admit that we do not yet fully understand the fundamental interactions between planetary boundaries," Rockström says. Even if we were able to bring the climate system back into a safe operating space, he adds, "we may by that time have triggered so much forest dieback and so much permafrost thawing and so much ice melt that the planet has already been sent down a trajectory that will end in a steady state not conducive to human civilisation".

How to avoid domino scenarios

Almost everyone who studies tipping point cascades agrees on two key points. The first is that it is crucial not

to become disheartened by the magnitude of the risks; it still is possible to avoid knocking over the dominoes. Second, we should not wait for precise knowledge of exactly where the tipping points lie — which has proved difficult to determine and might not come until it is too late.

You can compare this to smoking. While it definitely causes cancer, it is very difficult for a doctor to nail down how many cigarettes a person needs to smoke to develop cancer. Some people are more susceptible than others, based on a range of factors from genetics to the level of air pollution where they live. But this does not mean it is a good idea to gamble with your lung health by continuing to smoke. A simple rule is not to smoke, because you would be committing to something that is evidently bad for you. The same logic applies to the climate dominoes. If they start falling and knocking each other over, it will be very costly and hard to recover from, therefore we should not disturb those thresholds. So, a precautionary principle seems to be the best way forward for humankind, especially since we are dealing with a system that we know has a lot of feedback loops and interconnections.

"These are huge risks we are playing with, in their potential impacts," says Rockström. "To reduce them, we must wean ourselves off fossil fuels as fast as possible and on to clean energy, and sort out some other sources of greenhouse gases such as diets and land use". And further that "we actually do need the Paris climate accord". This refers to the 2016 agreement that committed most countries to limit warming to 1.5 to 2 C. Rockström argues that 1.5 C is the right target, because it takes into account the existence of the tipping points and gives us the best chance of avoiding them. "For some of these tipping elements," he says, "we're already well into the danger zone anyway."

Food systems key to conserving a habitable Earth

If we are to steer our planet away from a devastating new trajectory, phasing out fossil fuels to reach a net-zero greenhouse gas emissions world economy is a key priority. But even more pressing, experts say, is a change to our food systems.

Food production accounts for nearly 25% of climate-changing greenhouse gas emissions. It is the biggest driver of biodiversity loss, the primary cause of land-use change, one of the largest sources of nitrogen and phosphorus pollution, and it generates huge freshwater demand. Because food production generates high carbon emissions, it adds to ocean acidification too. That covers six of the nine planetary boundaries.

Together, "a food-system transformation and an energy transformation would take us a long way back into the safe space," Rockström said. Indeed, many scientists argue that nothing short of a systemic transformation of



The doughnut, or doughnut economics, is a visual framework for sustainable development, combining the concept of planetary boundaries with the complementary concept of social boundaries. The name derives from the shape of the diagram, i.e. a disc with a hole in the middle. The hole at the centre of the doughnut depicts the proportion of people that lack access to life's essentials (healthcare, education, equity and so on) while the crust represents the ecological ceilings (planetary boundaries) that life depends on and must not be overshoot. The diagram was developed by University of Oxford economist Kate Raworth in her 2012 Oxfam paper "A Safe and Just Space for Humanity" and elaborated upon in her 2017 book "Doughnut Economics: Seven Ways to Think Like a 21st century Economist."



Climate change is the driver behind increasingly frequent and ferocious wildfires, like this one in California in 2021. Image courtesy of Salman R.

food systems is required to feed the world's current and future populations sustainably without driving climate change. Making that sweeping change would not only reduce emissions, but improve health and food security, let alone animal welfare.

Doughnut economics

The planetary boundaries concept for nature has a cousin in economics. This cousin is called doughnut economics. In fact, doughnut economics takes the concept of planetary boundaries as a fundamental principle to form the doughnut graphic of safe operating zones and ceilings within which human civilisation must learn to live in order to survive.

You may not have heard of doughnut economics and you might not be familiar with neoliberalism either, but it is the elephant in the room. Financial meltdown, environmental disaster and even the rise of Donald Trump – neoliberalism has played its part in them all. This hyper-capitalist ideology has failed us and the planet, and has given rise to destructive corporate power. It is the largest Ponzi scheme in human history and has no place in the 21st century. It is connected to the plainly irrational and irresponsible idea that we can have endless growth on a finite planet, that the markets will regulate them-

selves and that the pursuit of profit is more important than anything else. In fact, it needs all these impossible fantasies to keep it alive.

By contrast, the de-growth movement has been calling for an economic and social transformation, rejecting neoliberalist thinking and the primacy of endless growth. Yet mainstream economics is still wedded to neoliberalist philosophy and fails to provide answers to the most pressing issue of our time: How can we avert the destruction of our planet while meeting the social needs of all?

Doughnut economics instead advocates seven ways to not only rethink, but also to redesign economics. At the core of its thinking lies the notion of a circular economy. This notion has become the goal of a social movement and is slowly making its way into active policy-making, including the New Industrial Strategy of the European Union.

Starting with the doughnut

For Raworth, economics lost sight of its social goal while trying to align with abstract laws of motion, with gross domestic product (GDP) touted as the most appropriate proxy for wealth. But even after years of global economic



Wildlife only beyond this point

The law can be used to give nature breathing space. But to date nature protection is by and large a nice sideshow, not a must-have. This must change.

The Maldives, a low-lying island nation, has much to lose. Climate change threatens the very existence of the archipelago nation. No wonder they support the notion of ecocide. Other countries would do well to recognise the existential threat to life as we know it too.

growth, problems of extreme inequality persist and the destruction of the environment has emerged as a toxic by-product of the old economic model. In doughnut economics, GDP is no longer at the centre of economic thinking and planning. Instead, the doughnut's inner ring represents a social foundation consisting of the minimum social standards such as food, health, political voice and gender equality, based on the United Nations 2015 Sustainable Development Goals (SDGs). The outer ring illustrates the ecological ceilings of the nine planetary boundaries. The aim is to bring humanity into what Raworth calls the "doughnut's safe and just space" to prevent social shortfall and ecological overshoot.

False assumptions: the market and human beings

Raworth critiques neoliberalism's narrow focus on markets, which has created and perpetuated a false image of a self-contained market, as well as the superiority of a perceived market efficiency over an equally unfounded assumption of state incompetence. Instead of the outdated idea of the economy as a closed system, Raworth perceives economics as an open, circular flow system and argues that focusing on the market alone leaves several blind spots, such as unpaid household labour and ecological distress.

Raworth introduces the households, the state and the commons (e.g. public land, open-source software) as important forms of provisioning and replaces the image of the economy as a closed, independent system with an understanding of the economy as embedded in the Earth's system, heavily dependent on Earth's resources and their limits.

Neoliberalist theory is also based on the assumption of "rational economic man" as an isolated, self-interested, calculating being that is fixed in taste and values, and dominant over nature. This is clearly an unrealistic view of what human beings are. In Raworth's opinion, this assumption is not only plainly flawed, but also damages society and the living world. She argues that a new portrait of humanity that recognises mutual aid and empathy of people, and acknowledges their interconnection, must be drawn; one that accepts people's constant change of roles and thus, wants and values, and comprehends that humanity is deeply dependent upon the Earth's life support systems.

Raworth also argues that the limited neoliberalist model of a self-balancing market, like the mechanical equilibrium of the market's supply and demand curves, oversimplifies the economy's dynamic and complex nature. The myth of a self-equilibrating market became obvious to Raworth for the first time during the 2008 crash, when mainstream economics failed to anticipate the inherent problems of the financial sector.

By encouraging economists to get savvy with systems, Raworth wants to equip them with tools for grasping eco-

nommic complexities. In reality, the individual components of an economy do indeed interact within a system, connected by feedback loops that either reinforce their effect or bring stability to the system by balancing them. This is yet another parallel of doughnut economics and planetary boundaries. Thinking in systems will, for instance, help better to understand the dynamics that reinforce inequality, such as the 'Success to the Successful' trap.

Distributive and regenerative by design

To tackle the goal of bringing everyone into the doughnut and decreasing ecological overshoot, Raworth promotes an economic design that is distributive and regenerative. Most importantly, she calls for debunking the 20th century message that things have to get worse before they get better and that people have to wait for economic growth to solve the problem of extreme inequalities and ecological degradation.

To her, achieving this goal means going beyond the redistribution of income, but also proactively designing measures for redistributing wealth from various sources such as knowledge, technology, enterprise and ownership of land.

As a substitute for the degenerative linear industrial economy of neoliberalism (take, make, use, dispose, pollute), Raworth supports the design of a circular economy: industrial products are recycled, reused, repurposed and repaired, and biological nutrients are utilised in multiple ways, for example circular fashion, repair cafes or recycling schemes.

What about growth?

Neoliberalism has created economies that need to grow, whether or not they make us thrive. What we need instead are economies that make us thrive, whether or not they grow. To be able to thrive without GDP growth, Raworth believes it is necessary to redesign the social, financial and political lock-ins to growth, for example, by promoting well-being without the dominance of the culture of consumerism in public/private life.

An end to consumerism, inequality and the relentless pursuit of profit and growth? Recognising the contribution that households, the state and the commons make to a just and equal society? That would be something to strive for, would it not? So what are we waiting for?

Ecocide and the law

So, respecting planetary boundaries is important. Shifting away from a cancerous economy that destroys our planet is too. What about the power of the law to aid and speed up this process in the face of stiff resistance to change – despite all the evidence – from



There is no endless growth in nature. Besides, infinite growth on a finite planet is an obvious impossibility. The question is whether we dare to question the economic growth paradigm before it is too late?
Picture courtesy of Georg Berg.

corporations, politicians and the rich elites? If there is not enough political will to rein in humanity's excesses to avert climate, environmental and economic disaster, perhaps we must turn to the law?

Environmental law has developed in response to emerging awareness of, and concerns over issues impacting the entire world. Early examples of legal enactments designed to preserve the environment, for its own sake or for human enjoyment, are found throughout history. During the "Great Stink" of 1858, for example, the dumping of sewage into the River Thames in London made it smell so ghastly in the summer heat that parliament had to be evacuated; a resultant Government Bill mandated the construction of new sewerage outlets away from London. Later, when environmental law in its true sense first emerged in the 1960s, it was primarily concerned with procedural compliance; a lot of the laws were focussed around the permission needed to build a motorway, factories or housing blocks or waste discharge thresholds, i.e. it was mostly preventive. But as the scale of the environmental and climate crisis became clear, environmental law went further.

Since 1972, developments in environmental law have included the adoption of a constitutional right to a healthy environment by 88 countries, with another 65 countries having enshrined environmental protection in their constitutions. In addition, over 350 environmental courts and tribunals have been established in over 50 countries and more than 60 countries have at least some legal provisions for citizens' rights to environmental information.

Today environmental law regularly operates in areas complicated by high levels of scientific uncertainty. This aspect of environmental law, also known as the 'precautionary principle', requires that if there is a strong suspicion that a certain activity may have environmentally harmful consequences, it is better to control that activity now rather than to wait for incontrovertible scientific evidence. This principle, which has its parallel in how we should approach planetary boundary tipping points, is the basis behind many recent laws, such as the Endangered Species Act in the US. It was also used in Australia's argument to push Japan into taking action on overfishing, especially of bluefin tuna (more very recent examples from 2021 are in the infobox on the right).

However, a recent UN Environment report found that despite a 38-fold increase in environmental laws put in place since 1972, failure to fully implement and enforce these laws is one of the greatest challenges to mitigating climate change, reducing pollution and preventing widespread species and habitat loss. "We have the machinery in the form of laws, regulations and agencies to govern our environment sustainably," says Joyce Msuya, Acting Executive Director of UN Environment, "but political will is now critical to making sure our laws work for the planet and its people".

Very recent, encouraging examples of environmental law wins from 2021 include:

- Washington climate activists celebrating a victory over a massive fracked gas refinery
- The Mexican Supreme Court ruling in favour of a Mayan community and suspending a 49,000 hog farm
- A Dutch court ordering Shell to bring its emissions in line with the Paris climate targets arguing that Shell had violated human rights by fuelling the climate crisis
- Germany being reprimanded by the European Court of Justice over its failure to tackle air pollution in its biggest cities
- The Irish government being taken to court over the inadequacy of their climate policy, with the judges ruling it lacked the specificity to comply with the law and telling the government to act now to protect citizens from climate change
- The Belgian government being found guilty of negligence in its policies to tackle the climate crisis with the court finding that by refraining from taking all necessary measures to prevent the effects of climate change detrimental to the lives of the complainants, the Belgian government had breached the European Convention on Human Rights
- The European Parliament approving a landmark law to make the European Union's greenhouse gas emissions targets legally binding, paving the way for a policy overhaul to cut planet-warming pollution faster
- The UK Court of Appeal blocking plans to build a third runway at Heathrow Airport, saying that allowing the expansion would violate the country's obligations to the Paris climate agreement

The report also devotes significant attention to one particularly worrying trend: the growing resistance to environmental laws, which has been most evident in the harassment, arbitrary arrests, threats and killing of environmental defenders. In the last five years, 908 people in 35 countries — including forest rangers, government inspectors, and local activists — were killed. Still, despite this harrowing loss, the momentum towards using the law to protect the planet is growing: Legal experts from across the globe have recently drawn up a historic definition of ecocide, intended to be adopted by the International Criminal Court (ICC) to prosecute the most egregious offences against the environment. The draft law defines ecocide as “unlawful or wanton acts committed with knowledge that there is a substantial likelihood of severe and widespread or long-term damage to the environment being caused by those acts”.

If adopted by the ICC’s members, it would become just the fifth offence the court prosecutes — alongside war crimes, crimes against humanity, genocide and the crime of aggression — and the first new international crime since the 1940s when Nazi leaders were prosecuted at the Nuremberg trials.

Prof Philippe Sands QC of University College London, who co-chaired the panel that spent much of 2021 refining the definition, said: “The four other crimes all focus exclusively on the wellbeing of human beings. This one of course does that too, but it introduces a new non-anthropocentric approach, namely putting the environment at the heart of international law, and in doing so it is original and innovative. For Sands the single most important thing about this initiative is that it is part of that broader process of changing public consciousness, recognising that we are in a relationship with our environment, we are dependent for our wellbeing on the wellbeing of the environment and that we have to use various instruments: political, diplomatic, but also legal to achieve the protection of the environment.

An ecocide law has been mooted for decades, with the late Swedish Prime Minister, Olof Palme, pushing the concept at the 1972 UN Environmental Conference in Stockholm. More recently, ecocide was considered for inclusion in the 1998 Rome Statute establishing the ICC before being dropped. The Scottish barrister Polly Higgins led a decade-long campaign for ecocide to be recognised as a crime against humanity before her death in 2019. The members of the panel, which also included experts from Samoa, Ecuador and the US, are hopeful that now is the right time for agreement.

The other co-chair, Dior Fall Sow, a UN jurist and former prosecutor from Senegal, said: “The environment is threatened worldwide by the very serious and persistent damage caused to it, which endangers the lives of the people who live in it. This definition helps to emphasise that the security of our planet must be guaranteed on an international scale. In the current context,

where serious damage to the environment is increasingly important and affects a large number of states, their support could be gained for this new definition of the crime of ecocide. One can think, among others, of island developing states that are subject to ecological ecocides committed by corporations.”

Indeed, several small island nations, including Vanuatu in the Pacific and the Maldives in the Indian Ocean, have called for “serious consideration” of a crime of ecocide at the ICC’s annual Assembly of States Parties for years. It will be interesting to see whether it finally gains the ICC’s support at the beginning of this crucial decade.

Outlook

Experts are calling for a transformative, holistic approach to avoid reaching tipping points and see the entire Earth System as a shared global commons, with humans as stewards. The intertwined nature of this framework calls for the development of a novel governance approach at global, regional and local scales. This new deal must integrate environmental limits, a sensible economy free from the myth of eternal growth and the power of the law, all working towards a new sustainable future for humanity and the planet. The 2021 IPCC report devised by thousands of scientists and policymakers as well as many other voices are clear in that we must get away from our outdated, arrogant, exploitative and destructive relationship with the planet.

That is a daunting global goal. But there is one planetary boundary — the first we ever realised we were in danger of crossing — that offers hope: the depletion of the ozone layer. In 1987, the world’s nations recognised the urgency and validity of the science and embraced the politically binding requirements of the Montreal Protocol. We stepped back from the brink, the ozone hole has shrunk and could be healed by 2050.

The next ten years will determine whether or not we are able to turn away from our march towards disaster and build a sustainable civilisation that can stay within planetary boundaries, or whether we cannot help ourselves as a destructive species that ultimately brings about its own demise. Time is fast running out. If nations can come together to fix the doomed trajectory we are on at the moment — based on broken and destructive value and economic systems — then there is a chance we can reverse current trends and steer Earth’s path back towards a stable state. Momentum is building and the ozone layer experience shows us that concerted global action works. With doughnut economics and environmental law we also have powerful tools. However, the chance that we can get our act together as a global civilisation is growing dimmer. The window is rapidly closing and we only have a decade left at most. Respecting the planet so that it does not reject humankind as a failed experiment is an effort we absolutely have to make. ■

REVIEW 2021

Thank you so much!
Three successful fundraisers that helped our partners around the world and ensured our own survival to this point.

The coronavirus epidemic was declared a pandemic in March 2020. From then on, no more expeditions ran. Almost immediately – in April 2020 – we started to run a fundraiser that was all about getting our local conservation partners through the crisis. This ran until the end of 2020 and raised €50,000 thanks to the generosity of many donors (see their honour roll below). Examples of what this money achieved include

- our Azores whale & dolphin scientist Lisa Steiner being able to be out on and off the water from April to the end of the season in November
- community expeditions to keep the science and conservation efforts going in Costa Rica (sea turtles), the Tien Shan (snow leopard) and Germany (wolf)
- instigating a new coral reef conservation project in the Maldives, using coral nurseries to grow baby corals.

A full overview is on our blog <https://blog.biosphere-expeditions.org/> and in the 2021 Magazine.

In February 2021 we announced that there would be no expeditions in that year either. This meant that there was to be next to no income for us for close to two years. With this, our survival

was at stake, so we started our own survival appeal, which ran until October 2021. Once again, many generous donors (many of them repeat donors from the coronavirus fundraiser - see the honour roll below) stepped up and we were able to raise €30,000 to ensure our survival through the crisis.

Our third and final fundraiser connected to the coronavirus pandemic was all about vaccinating our local partners in those countries where vaccines are an expensive luxury. Through new and repeat donors (see honour roll) we were able to raise over €5,000 to achieve this.

HONOUR ROLL

"It is thanks to the people below that we have been able to help our partners and ourselves to weather the storm thus far. All of us at Biosphere Expeditions cannot thank these generous donors enough. It is our pleasure to honour them publicly via this honour roll."

Dr. Matthias Hammer,
Executive Director




The following contributed to our fundraiser for local partners (€ 50,000 raised)

H Agner (Germany) • S Amos (UK) • N Barber (UK) • C Beisel (Germany) • H Below (Germany) • M Benner (Germany) • J Benz (Germany) • S Birkholz (Germany) • K Blecker (Germany) • J Blomgren (USA) • S Bolinger (Switzerland) • S Bordier (UK) • D Bownan (Australia) • K Bunting (UK) • R Charters (UK) • A Collins (UK) • H Coogan (UK) • J Craven (UK) • S Dittmann (Germany) • A Down (France) • S Dräger (Germany) • U Dräger (Germany) • J Dutz (Germany) • V Ellenrieder (Germany) • J England (UK) • J Evans (China) • U F (Germany) • I Fritz (Germany) • A Geimer (Germany) • M Gilbert (USA) • A Giles (Germany) • T Gillon (UK) • J Gödecke (Germany) • N Goodall (UK) • P Goodman (UK) • J Graser (Germany) • A Guth (Germany) • K Haan (USA) • I Hellwig (Germany) • M Herold (Germany) • J Hill (USA) • G Hodgson (UK) • D Hofmeister (Germany) • G Hogben (UK) • S Hughes (USA) • G Humphreys (UK) • C Hurfar (Germany) • B Hussey (UK) • J Ignorek • T John (Germany) • A Kassekert (Germany) • L Kennedy (USA) • K Klatt (Germany) • G Koßmann (Germany) • S Lahtinen (Finland) • T Lanigan (Ireland) • D Lansch (Germany) • C Lee (South Africa) • P Löbel (Germany) • J Long (USA) • A Mätzig (Germany) • M Mannaert (Germany) • R Meloni (Switzerland) • K Melrose (UK) • T Merrie (UK) • A Morris (UK) • A Munkel (Germany) • U Pamler (Germany) • C Pfeffer (Luxembourg) • H Pekkarinen Rieppo (Sweden) • P Pilbeam (UK) • P Poley (Germany) • J Polson (UK) • A Prella (Germany) • P Ransome (UK) • J Rawnsley (UK) • B Rees (UK) • N Rice (UK) • G Risbirdger (UK) • M Roberts (UK) • F Rohart (Germany) • A Rohlf (Germany) • S Rowling (UK) • J Rüdener (Germany) • M Sax (Germany) • C Schneid (China) • S Schöttle (Germany) • J Schweitzer (USA) • P Serail (Netherlands) • N Seshadri (Japan) • M Shepstone (USA) • K Silverthorne (UK) • M Simpson (UK) • J Skinner (UK) • P Smith (Belgium) • O Soubreyand (France) • M ten Veldhuis (Netherlands) • N Thobois (France) • P Thoem (Canada) • V Thürey (Germany) • J Tondy (USA) • G Treherne THE (Netherlands) • L Trudel (USA) • R Tunstall (UK) • R Vlask (Netherlands) • E Westbrook (USA) • T Whaley (Germany) • S White (China) • L Wiedemann (Germany) • A Wienhöfer (Germany) • M Zuckert (Germany) • and anonymous donors

The following contributed to our Biosphere Expeditions survival appeal (€ 30,000 raised)

H Agner (Germany) • L Bailey (Canada) • C Beisel (Germany) • H Below (Germany) • A Berendts (Netherlands) • S Berger (Austria) • S Birkholz (Germany) • J Biekehör (Germany) • R Boughton (Hong Kong) • D Bownan (Australia) • K Bradley UAE • R Bunce (UK) • K Bunting (UK) • U Burkhardt (Germany) • C Cockburn (UK) • J Collins (UK) • A Coogan (UK) • S Daugherty (USA) • A Dean (UK) • A Deegan (USA) • J Dhawal (UK) • U Dräger (Germany) • E Durell (Germany) • V Ellenrieder (Germany) • K Engelhardt (Germany) • J Evans (China) • M Fink-Schneider (Germany) • A Geimer (Germany) • V George (Germany) • M Gilbert (USA) • N Goodall (UK) • B Gowdy (USA) • D Gunz (Switzerland) • D Hahn (Germany) • B Henning (Germany) • M Herold (Germany) • E Hess (USA) • M Hilkemeier (Germany) • J Hill (USA) • D Hofmeister (Germany) • B Hussey (UK) • P Joiner (USA) • U Klingner (Germany) • K Klatt (Germany) • G Koßmann (Germany) • A Krimmel (Germany) • U Kürsten (Germany) • D Lansch (Germany) • L Lynch (USA) • S Macharg (UK) • S Mehnert (Germany) • R Meloni (Switzerland) • M Mucke (Germany) • K Penkuhn (Germany) • P Pilbeam (UK) • S Pinson (Australia) • A Prella (Germany) • C Ramirez (USA) • P Ransome (UK) • B Rees (UK) • M Roberts (UK) • S Salih (France) • H Scharpff (Germany) • R Schauls (Luxembourg) • J Schweitzer (USA) • C Scroope (Australia) • K Silverthorne (UK) • B Singer (Canada) • R Skybey (Australia) • H Stecher (Austria) • S Strohschein (Germany) • B Styner (Canada) • S Sultanova (USA) • M ten Veldhuis (Netherlands) • S Thiede (Germany) • P T (Canada) • A Tilekeev (USA) • G Treherne (Netherlands) • A van Eck (Netherlands) • R Vlask (Netherlands) • T Volk (Germany) • C Wates (UK) • Ormskirk Clocktower Rotary (UK) • and anonymous donors

The following contributed to our vaccination fundraiser (over € 5,000 raised)

R Boughton (Hong Kong) • P Burke (UK) • Crowther/Cozens clan (UK) • S Daugherty (USA) • K Doute (Germany) • U Draeger (Germany) • V Ellenrieder (Germany) • M Fink-Schneider (Germany) • N Goodall (UK) • M Herold (Germany) • G Herold (Germany) • M Hilkemeier (Germany) • G Hodgson (UK) • B Hussey (UK) • I Johnson (Canada) • U Klingner (Germany) • G Koßmann (Germany) • J Patten (Austria) • C Pfeffer (Luxembourg) • A Prella (Germany) • M Roberts (UK) • M Shepstone (USA) • L Trudel (USA) • G Voss (Netherlands) • P Wirtz (Germany) • P Witherspoon (USA)



RESTARTING IN 2022?

Here we go again, perhaps.

We were poised to re-start expeditions in 2022, but as we go to print in early December 2021, a new and perhaps very virulent new strain of the virus is emerging from southern Africa. The UK and other countries have shut down entries from that region and an increasing number of countries in Europe are going back into lockdowns as the known Delta variant wreaks havoc, mainly amongst the unvaccinated, and the effects of the new Omicron variant are as yet unknown.

We are expecting Omicron to spread rapidly around Africa and the rest of the world. What measures countries will take to contain the spread is unknown and at the moment unknowable. How long this new variant will prolong the pandemic is also unknown, let alone highly frustrating and worrying.

We have just (in late November) placed our first two expeditions of 2022 (Arabia and Kenya) on a warning. This means that we now believe that there is a higher than 50% chance that we will have to defer these expeditions again. The outlook for Kenya is particularly bleak, because Kenya is in Africa, our expedition scientist comes from South Africa and is there at the moment.

Like everyone else on the planet, we can but wait, plan, react and adapt. So here is our plan:

- 1 We will keep monitoring the situation and re-open expeditions as soon as it is reasonable to do so.
- 2 We will start another survival fundraiser if this new wave of the pandemic threatens our survival.
- 3 Once we restart expeditions, we will take all reasonable precautions necessary to protect our citizen scientists, staff, helpers and the wildlife we are honour-bound to protect.

This means that

A Only fully vaccinated people (with certifications proving their vaccination status) will be allowed on the expeditions. All available vaccines will be accepted. The last vaccination must not be older than six months.

B Those that are not fully vaccinated may be allowed to take part if (i) there is a certified medical reason why they cannot be vaccinated – in that case they must provide a negative rapid / lateral flow / antigen Covid test immediately prior to the expedition commencing and will need to be re-tested at regular intervals during the expedition, or (ii) if their country of origin has not offered vaccinations to them – for local staff we will try to compensate for this via private vaccinations where they are available; where this is not possible, the testing scheme as above will apply.

C We will also require a rapid / lateral flow / antigen Covid test from each expedition member immediately prior to the expedition commencing and may repeat this test at regular intervals, as needed.

D Expedition leaders will also be fully vaccinated. As far as possible, we require all others (scientists, rangers, cooks, all other support staff who will come in contact with our citizen scientists) to be fully vaccinated too. For countries where this is an issue, we will have testing regimes and/or a vaccination programme for our local partners, where necessary, via private healthcare.

E Although there will be common threads (vaccinations, tests, hygiene procedures) on all expeditions, the exact procedures will vary from country to country. We will publish what the exact procedures are about six to seven weeks before the expedition starts, alongside your reminder to start preparing and settle your balance.

At the time of writing, only three people have complained about this and have been removed from the expeditions until such time that they see sense or that anti-vaxxers no longer present a danger to others.

Stay healthy, stay safe, keep up your spirits and wish us good fortune to get through this, as we do all readers.

All of us at Biosphere Expeditions

After almost two years of a forced pandemic hiatus,
we are re-starting expeditions in 2022.
We of course realise that forward planning is still very difficult.
This is why we are handling signups and deferment very flexibly
so that no one misses or loses out.
Full details about this are on www.biosphere-expeditions.org



EXPEDITIONS A-Z

ARABIA



ARABIA - United Arab Emirates

in cooperation with



Ways of the desert: Conserving Arabian oryx, Gordon's wildcat, sand fox & other species in the iconic sandy desert landscape of Arabia

This Arabian oryx and desert species conservation volunteer expedition to Dubai (UAE) will take you to the fascinating and iconic sandy desert landscape of the Arabian Peninsula. Working alongside scientists from the Dubai Desert Conservation Reserve, you will be part of a small international team, monitoring Arabian oryx, Gordon's wildcat, red and sand fox, Arabian and sand gazelles, as well as other flagship species of the desert. From a comfortable oasis field camp, you will venture out in the expedition 4WDs and on foot to study antelope behaviour and social structures, camera- and live-trap Gordon's wildcat, red and sand fox, and monitor them by radio and GPS telemetry. All this to ensure the survival of these important flagship desert species in their beleaguered world.

Expedition contribution	Duration	Dates	Meeting point
€ 1640	8 days	8 - 15 Jan 2022	Dubai

More info www.biosphere-expeditions.org/arabia



ARMENIA



ARMENIA

in cooperation with



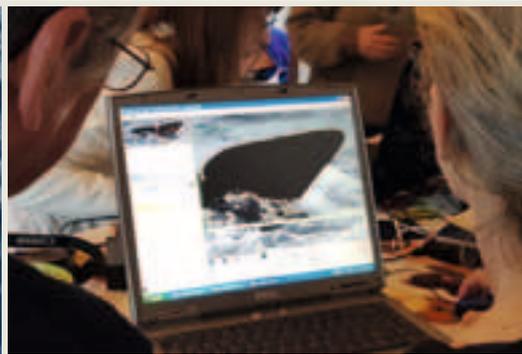
Surveying biodiversity: Leopard, lynx, bear, wolf and other species of the Khustup mountains in the Zangezur biosphere complex

This Caucasian expedition to Armenia will take you to the remote, spectacular and beautiful Khustup Mountains in the Zangezur Biodiversity Complex. There you will record leopards, lynx, bears, wolves, ibex, birds and other indicators of biodiversity in an effort to assist local NGOs and authorities in their work of wilderness and wildlife protection. You will be working as part of a small international team from a tent base camp at 1,980 m (where altitude sickness is not an issue). You will be covering ground in the expedition vehicles and on foot, looking for tracks, kills, scats and the animals themselves, and setting camera traps. A true expedition-style base camp, off-road driving and the breathtaking high mountains make this a challenging, but very rewarding expedition.

Expedition contribution	Duration	Dates	Meeting point
€2380	13 days	26 Jun - 8 Jul 2022	Yerevan
€2380	13 days	10 - 22 Jul 2022	Yerevan

More info www.biosphere-expeditions.org/armenia

AZORES



AZORES - Portugal

Fascinating creatures of the deep: Studying whales, dolphins and turtles around the Azores archipelago in the Atlantic Ocean

This whale, dolphin and turtle conservation expedition will take you to the remote and spectacular Azores Archipelago in the middle of the Atlantic Ocean to study whales, dolphins and loggerhead turtles. You will photograph sperm, blue, fin, Sei, humpback and minke whales, as well as bottlenose and Risso's dolphins you come across and record them for local and international monitoring databases. You will also listen to whale and dolphin vocalisations. If sea conditions allow, you may also capture loggerhead turtles in the open ocean using nets and then measure, tag and release them as part of an international tagging programme. All this in an effort to elucidate the animals' life histories and migration patterns across the oceans and assist with the formulation of effective conservation and management strategies. You will spend the day on a modern catamaran research vessel out at sea and your evenings and nights at an historic and comfortable guesthouse in the town of Horta on Faial Island.

Expedition contribution	Duration	Dates	Meeting point
€1840	10 days	10 - 19 Mar 2022	Horta, Faial Island
€1840	10 days	21 - 30 Mar 2022	Horta, Faial Island
€1840	10 days	1 - 10 Apr 2022	Horta, Faial Island
€1840	10 days	12 - 21 Apr 2022	Horta, Faial Island

More info www.biosphere-expeditions.org/azores



GERMANY

Love / hate relationships: Monitoring the return of the wolf to the German state of Lower Saxony

This wolf conservation volunteer expedition to Germany (Europe) will take you to the beautiful lowlands of Lower Saxony, a federal state in northern Germany, to help monitor and protect the returning wolf population. Working in small teams mainly around the famously picturesque Lüneburger Heide (Lüneburg Heath), you will record signs of wolf presence such as tracks and kills, as well as survey prey species such as deer and wild boar. You will also camera-trap the animals and collect samples to study wolf diet and for genetic analysis. The expedition base is a historic and remote manor house hotel with all modern amenities, right on the edge of the Lüneburg Heath.

Expedition contribution	Duration	Dates	Meeting point
€1930	7 days	25 Jun - 1 Jul 2022	Bremen
€1930	7 days	2 - 8 Jul 2022	Bremen

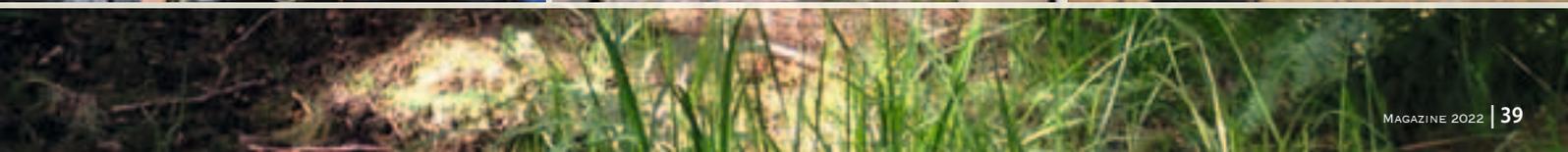
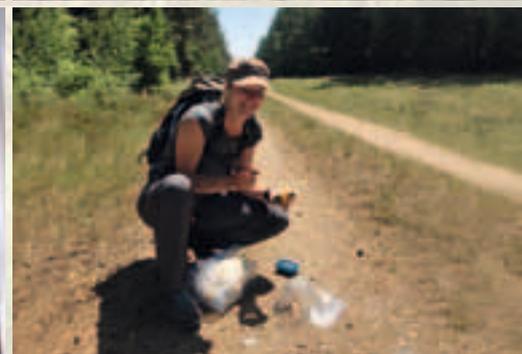
More info www.biosphere-expeditions.org/germany



GERMANY

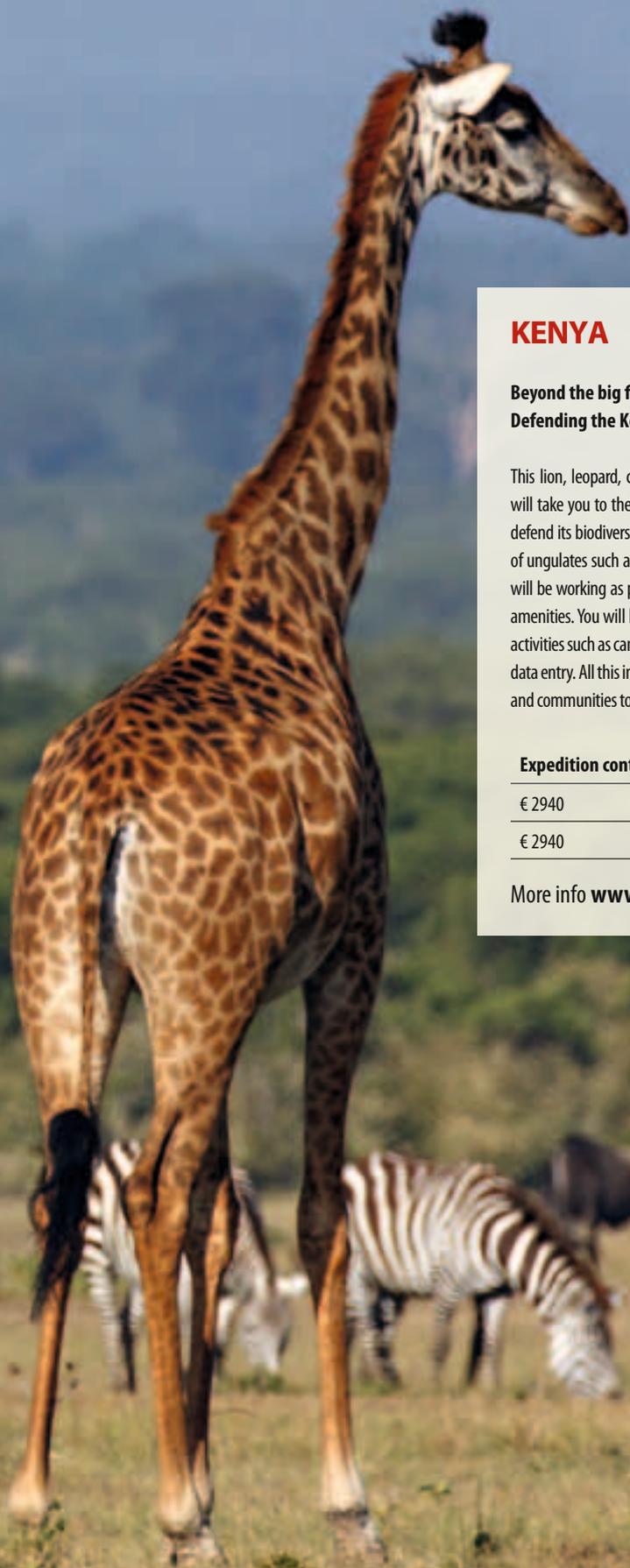


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KENYA





KENYA

in cooperation with



Beyond the big five:

Defending the Kenyan Maasai Mara from biodiversity loss

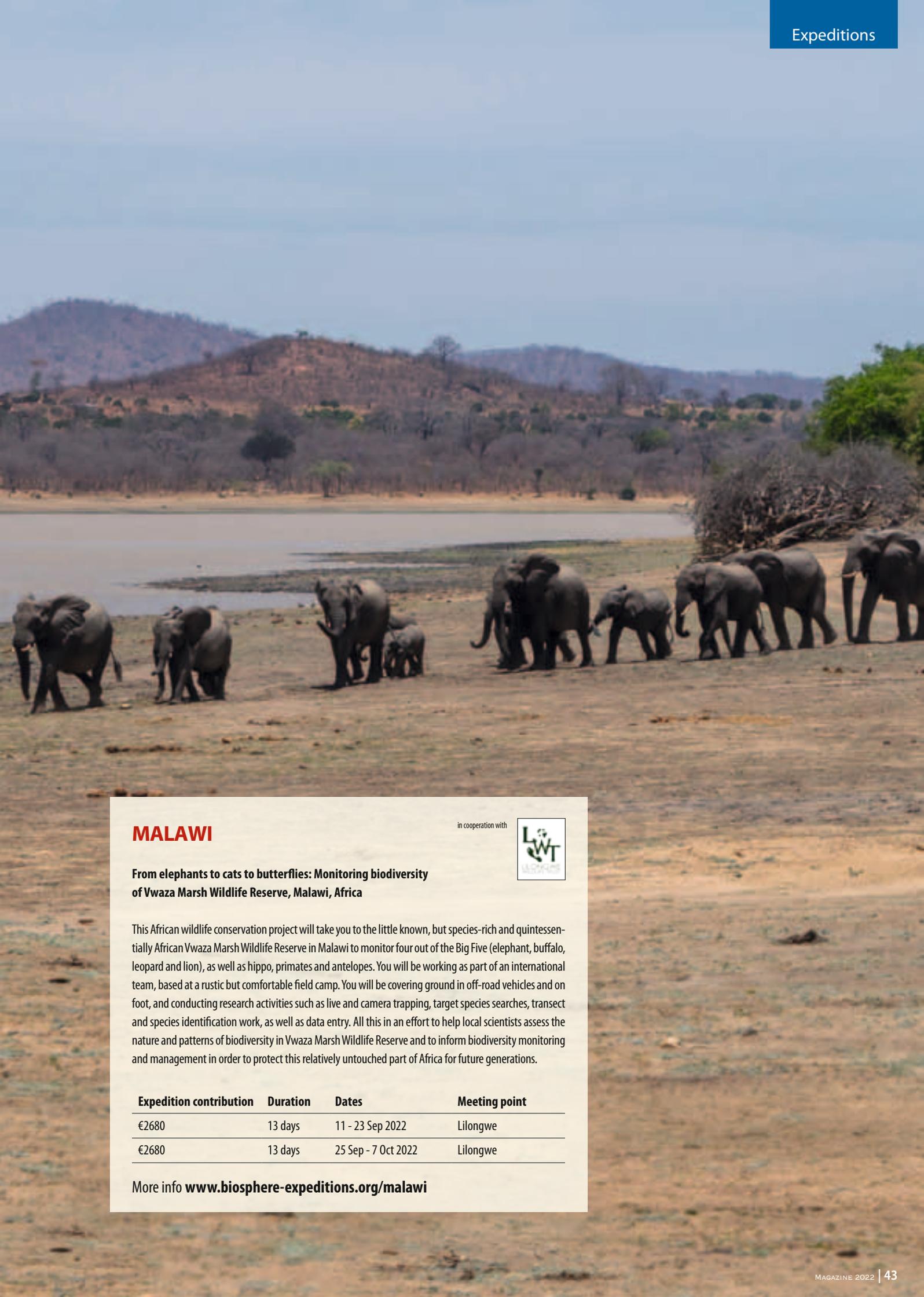
This lion, leopard, cheetah, elephant and African biodiversity conservation volunteer expedition to Kenya will take you to the world-famous Maasai Mara, one of the natural wonders of the world, to monitor and defend its biodiversity. Species to be monitored include leopard, lion, cheetah, elephant, buffalo and a host of ungulates such as giraffe, zebra, eland, impala, wildebeest, as well as other flagship African species. You will be working as part of an international team, based at a very comfortable field station with all modern amenities. You will be covering ground in off-road vehicles and on foot, and conducting wildlife monitoring activities such as camera trapping, target species searches, transect and species identification work, as well as data entry. All this in an effort to ascertain population diversity and abundance, and to work with local people and communities to find successful strategies for coexistence with wildlife in this iconic African landscape.

Expedition contribution	Duration	Dates	Meeting point
€ 2940	13 days	13 - 25 Feb 2022	Nairobi
€ 2940	13 days	27 Feb - 11 Mar 2022	Nairobi

More info www.biosphere-expeditions.org/kenya

MALAWI





MALAWI

in cooperation with



From elephants to cats to butterflies: Monitoring biodiversity of Vwaza Marsh Wildlife Reserve, Malawi, Africa

This African wildlife conservation project will take you to the little known, but species-rich and quintessentially African Vwaza Marsh Wildlife Reserve in Malawi to monitor four out of the Big Five (elephant, buffalo, leopard and lion), as well as hippo, primates and antelopes. You will be working as part of an international team, based at a rustic but comfortable field camp. You will be covering ground in off-road vehicles and on foot, and conducting research activities such as live and camera trapping, target species searches, transect and species identification work, as well as data entry. All this in an effort to help local scientists assess the nature and patterns of biodiversity in Vwaza Marsh Wildlife Reserve and to inform biodiversity monitoring and management in order to protect this relatively untouched part of Africa for future generations.

Expedition contribution	Duration	Dates	Meeting point
€2680	13 days	11 - 23 Sep 2022	Lilongwe
€2680	13 days	25 Sep - 7 Oct 2022	Lilongwe

More info www.biosphere-expeditions.org/malawi

in cooperation with



MALDIVES

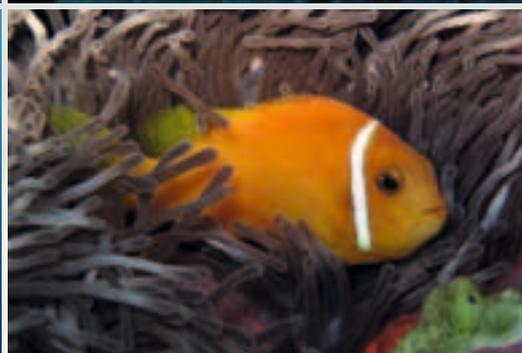
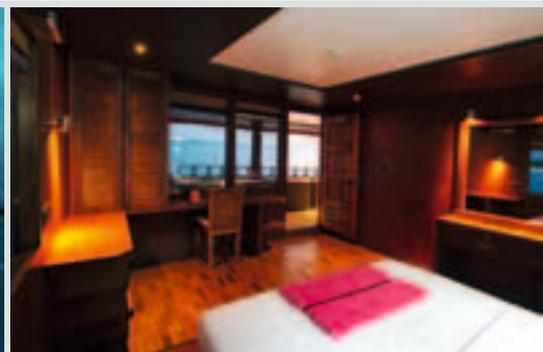
Little and large: Surveying and safeguarding coral reefs & whale sharks in the Maldives

This SCUBA diving expedition will take you to the beautiful 26 coral atolls that make up the Republic of Maldives. Based on a very luxurious and modern liveboard yacht, you will help marine biologists study and protect the Maldives' coral reefs and resident whale shark population. All this because the Maldives government identified a need for further research and monitoring work as far back as 1997. Biosphere Expeditions is addressing this need with your help and will train you as a Reef Check EcoDiver. With this qualification you will then gather important reef and whale shark data and you will also be eligible to apply for PADI or NAUI Reef Check Speciality Course certification after the expedition.

Expedition contribution	Duration	Dates	Meeting point
€2480	7 days	3 - 9 Sep 2022	Malé

More info www.biosphere-expeditions.org/maldives

MALDIVES





SOUTH AFRICA

SOUTH AFRICA

in cooperation with



Carnivores of the Cape Floral Kingdom: Surveying Cape leopards and biodiversity in the fynbos mountains of South Africa

This expedition will take you to South Africa's beautiful Cape Floral Kingdom (fynbos), a UNESCO World Heritage Site and the world's only biome contained within one country, to conduct a survey of leopard and fynbos biodiversity and to experience African fauna (such as buffalo, giraffe, eland, kudu, zebra, etc.). Based in a remote mountainous part of the Western Cape on a comfortable former farmstead with all modern amenities, you will first learn some bush skills and then conduct surveys on foot, mountain bike or car. You will also set camera traps, conduct game counts and you may assist with cat capturing and collaring, and other studies that may be ongoing at the research site at the time, such as bird, tortoise or flower monitoring. All this in an effort to mitigate human-wildlife conflict and create a sustainable future for all.

Expedition contribution	Duration	Dates	Meeting point
€1990	13 days	4 - 16 Dec 2022	George

More info www.biosphere-expeditions.org/southafrica

SWEDEN

in cooperation with



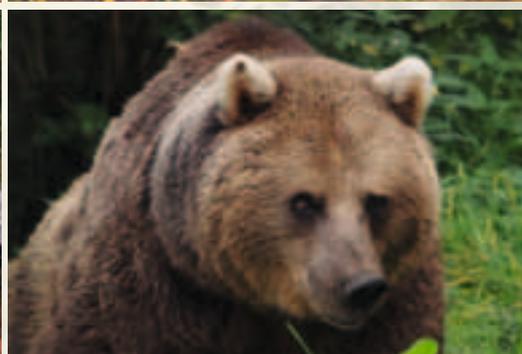
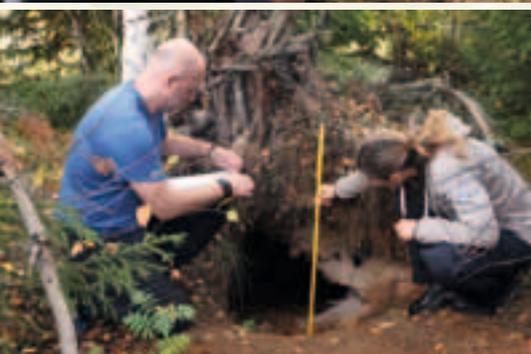
SWEDEN

Beautiful Brown bears: Studying bears in the quintessentially Scandinavian woodlands of Dalarna Province

This Swedish bear citizen science expedition will take you to the picturesque and quintessentially Scandinavian countryside of Dalarna province in Sweden to help study and protect the local brown bear population. Working in small teams, in flat or gently rolling hill terrain of heath, forests and wetlands, you will find and document bear winter dens and summer day beds when the bears are away (you will be able to tell this from their GPS position or collar signals). Detailed knowledge about dens and denning behaviour is important, because it helps to avoid human-bear conflict and provides important population, reproductive and other ecological information that is critical for successful bear conservation.

Expedition contribution	Duration	Dates	Meeting point
€1970	8 days	28 May - 4 Jun 2022	Mora

More info www.biosphere-expeditions.org/sweden





in cooperation with



THAILAND

Elephant encounters: Studying Asian elephants in the hills of northern Thailand to increase their welfare and conservation

This expedition will take you to the tropical highlands and Himalayan foothills in the shadow of Thailand's tallest peak (Doi Inthanon at 2,565 m). There you will conduct close-encounter behavioural and other studies on Asian elephants to make an important contribution to elephant conservation in Thailand. Our study elephant herd lives in the forested area surrounding a remote hill tribe village, where the expedition is based in the community. The expedition will also work on general biodiversity monitoring, as well as education, capacity-building and incentive creation for local people, which are all vital if elephants are to have a future in Thailand living side-by-side with humans.

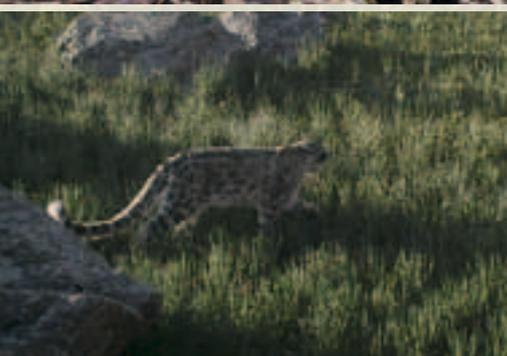
Expedition contribution	Duration	Dates	Meeting point
€1890	9 days	7 - 15 Nov 2022	Chiang Mai

More info www.biosphere-expeditions.org/thailand

THAILAND



TIEN SHAN





TIEN SHAN - Kyrgyzstan

in cooperation with



Mountain ghosts: Protecting snow leopards and other animals of the Tien Shan mountains of Kyrgyzstan

This snow leopard conservation project will take you to the remote, spectacular and beautiful Tien Shan mountains of Kyrgyzstan to survey snow leopards, as well as their prey animals such as the argali mountain sheep, the Central Asian ibex, marmots and others. You will be working as part of a small international team from a mobile tented base camp set at various locations and altitudes of around 2000 m (where altitude sickness is not an issue). You will be covering ground in the expedition vehicles and on foot, looking for tracks, kills, scats and the animals themselves, and setting camera traps. True expedition-style base camp conditions, testing but satisfying mountain surveying, off-road driving and the breathtaking high mountains make this a challenging, but very rewarding expedition.

Expedition contribution	Duration	Dates	Meeting point
€2540	13 days	11 - 23 Jul 2022	Bishkek
€2540	13 days	25 Jul - 6 Aug 2022	Bishkek
€2540	13 days	8 - 20 Aug 2022	Bishkek

More info www.biosphere-expeditions.org/tianshan

CAMPAIGNS

Next to expeditions, our campaigns are the other big part of what we do for the planet

In the first 20 years of our existence we were focused on citizen science and wildlife conservation. We will continue with this focus, but this, we feel, is no longer enough. The undeniable crisis our planet is in on so many fronts – from environmental destruction to pandemics, all through greed and overconsumption - demands more action and activism. It demands a radical rethink of how we run our lives, societies and the way we treat our planet. Because sitting on our hands is simply not an option any more. We have a moral duty to act if we want to be able to look our grandchildren in the eyes.

Below are the details of three of our four main campaigns (the other one, our pandemic appeal, is covered on page 29):

- **Top Ten Tips on decency in wildlife volunteering** and how to beat the charlatans (also see www.biosphere-expeditions.org/10tips)

- **Twenty Tips on how to be (radically) green** (also see www.biosphere-expeditions.org/20tips)

- **Do more for the planet, yourself and Biosphere Expeditions** (also see www.biosphere-expeditions.org/domore)

TOP TEN TIPS

on decency in wildlife volunteering and how to beat the charlatans



TOP TEN TIPS
Choosing a wildlife volunteering experience
This is what you should look out for

1. Reputation, reputation, reputation: has the organisation won awards or accolades, who are they associated with, what is their philosophy, do they write & publish their results and what's their safety record.

2. Qualified staff: work should be led by qualified & proven experts, group leaders should be well qualified and all staff should be well briefed on risks and safety issues.

3. Where does your money go: good organisations will always publish clear information that shows how your money is spent.

4. Proper follow-through: a good organisation will, through updates and reports, keep you informed about how the project progresses even after you've left.

5. What will you get out of it: be clear about what you want to get out of the experience - training, self-development, an adventure - then check whether the organisation is clear in communicating what's on offer for you.

6. Community involvement and benefit: understand a project's relationship to the local community and make sure that the organisation is properly embedded with local efforts and people – does the community benefit, have they given consent for work to be carried out, how have they been involved. Is there training for locals, scholarships, capacity-building, education, etc.

7. Your fellow participants: understand the profile of the people that will share your trip by checking the organisation's website and social media sites.

8. In the field: check that the organisation is clear & transparent about what will be happening day to day, the accommodation, food and other logistics, and also what is expected of you.

9. Captive animals: if the experience involves captive animals, be very clear on the purpose of the captive facility, where the animals come from and whether it is part of a reputable programme.

10. Handling animals: steer clear of organisations that encourage handling of captive wild animals for anything other than essential veterinary or neo-natal surrogate care. If wild animals are handled, it should only be for essential research & conservation work and following strict animal welfare guidelines.



More details at www.biosphere-expeditions.org/toptentips

Volunteering has come in for a rough ride in the past, and often rightly so. These days it is hard to find a worthwhile volunteering experience that achieves tangible benefits. The market is full of profit-driven, unscrupulous operators, which do little for local wildlife at best and are harmful to it, and local communities, at worst. The worst examples include bogus animal sanctuaries and fake orphanages.

Fortunately it's not that hard to look behind the glitzy fronts. The best way to avoid the charlatans is to ask the right questions. For example: is the operator a non-profit organisation or a profit-driven business? What is the rationale for involving volunteers (what will they do exactly, where and when)? What will be the outcome and how will local people and/or wildlife benefit? Does the organisation have any achievements it can list, any awards or other accolades? Is it transparent in its finances and structure? A handful of pointed questions such as these will, in most cases, separate the good from the bad from the downright ugly.

Our Top Ten Tips will help you to ask the right questions. They are for those looking for a citizen science vacation, wildlife conservation holiday or gap year experience that is beneficial not only to themselves, but also for the wildlife and communities that they will encounter.

20 TIPS on how to be (radically) green

Here are our Twenty Tips - from the light green of what we should all do as a bare minimum, to the dark green rejection of neoliberalism and the fallacy of endless growth, to joining the revolution that is gathering pace.

See www.biosphere-expeditions.org/20tips for more details and clickable links with background information and examples.

★ CATEGORY 1 - LIGHT GREEN

This is what we should all know and do, because it's easy, does not cost much (or actually saves money) and is better for the planet. There really is no excuse for not doing this and be at least light green.

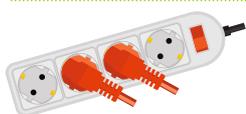


Food - **NO WASTE**,
less/no meat and regional/seasonal

1

Western societies and their food suppliers in particular waste an astonishing amount of perfectly good food (up to a third!). Try to minimise food waste at home and do not fall prey to “best before” rip-offs, which are aggressively promoted by the food industry to increase sales and profits. Also, reduce your meat intake drastically or go vegetarian for a few days a week (or completely). There's a host of reasons why – health, climate change, carbon footprint, world hunger, compassion for animals, etc. Or go entirely plant-based (vegan) – with a few precautions, this can be even healthier, more compassionate for animals and better for the planet. Finally, eating regional and seasonal food is healthy, kind to your budget and kinder to the planet through reducing supply chains and carbon footprint. It's a no-brainer.

What Biosphere Expeditions does: All our expeditions are vegetarian, as are events and other things we organise as an NGO. We buy almost exclusively regional and seasonal food on our expeditions in order to support local economies and reduce our impact. We do the same at our events.



SAVE energy

2

There are many ways to do this; most of them are easy and much of this is about creating new habits that are kinder to the planet (and your budget).

What Biosphere Expeditions does: On our expeditions and administrative locations, we have strict energy saving policies and regimes.



SAVE water

3

Just like saving energy, this is about changing habits and there are hundreds of tips [available online](#).

What Biosphere Expeditions does: Just like with energy, our expeditions and administrative locations have water saving policies and regimes.



USE eco-friendly cleaning products in your house

4

Many cleaning products contain chemicals that are extremely harmful to the environment and its inhabitants, including humans. [Eco-friendly cleaning products](#) are an easy alternative and solution.

What Biosphere Expeditions does: We work hard to purchase eco-friendly cleaning products wherever they are available and encourage our partners (e.g. expedition accommodation and assembly points) to do the same.



USE eco-friendly hygiene products

5

The [Campaign for Safe Cosmetics](#) has created Skin Deep, a searchable online database of cosmetics and personal care products where you can check your sunscreen, shampoo, deodorant, shaving cream and more for toxic ingredients.

What Biosphere Expeditions does: We encourage expedition participants (and staff) to bring only eco-friendly/biodegradable personal hygiene products on expedition.



Say **NO**
to bottled water

6

The Independent (a UK broadsheet newspaper) has called bottled water one of the “[biggest scams of the century](#)”. Just don't do it in regions where tap water is a perfectly safe alternative. Buy a non-plastic refillable container instead.

What Biosphere Expeditions does: Bottled water is a big no-no on expedition. Where local water is not safe to drink, we use large, re-usable containers instead wherever possible.



DON'T use
disposable tea/coffee cups

7

The billions of disposable coffee cups thrown away each year are a [waste of resources and harm forests](#) in particular. Say no to the throwaway culture and switch to [reusable coffee cups](#) instead.

What Biosphere Expeditions does: We simply don't use throwaway cups.

20 TIPS

★ **CATEGORY 1 - LIGHT GREEN**



REDUCE the amount you print

8

The environmental impact of paper is significant. At the same time it's easy to reduce paper use.

What Biosphere Expeditions does: We have gone largely paper-free in our administration; on expedition we do use more paper (datasheets, field guides, safety information, etc.), but we minimise this and recycle wherever possible.



RECYCLE more - check the domestic recycling system that you can use and use it well

9

Your local area administration will have details on its recycling scheme. Use it and make doubly sure you don't just throw away toxic household waste such as batteries, paints, oils, etc., but dispose of them properly.

What Biosphere Expeditions does: Our administration locations are on full recycling schemes; on expedition we use whatever recycling scheme is available locally and take home with us the most toxic waste (batteries etc.) to be disposed of properly there.



CREATE biodiverse gardens

10

Biodiversity is under threat like never before, populations of insects, birds and other species are collapsing at unprecedented rates, a recent UN report talks of unprecedented decline with species extinctions increasing. There is no doubt that our planet is now in the midst of its sixth mass extinction of plants and animals - the sixth wave of extinction in the past half-billion years. It may all sound like doom and gloom, and it is serious, but there are things you can do in your backyard to stem the tide and create a garden for native biodiversity. Leave lawns uncut and allow native plants to populate areas of your garden - weeds are only a matter of definition! Give them and other native plants a home and allow your garden to go wild. Nature conservation really does begin in your backyard!

What Biosphere Expeditions does: We tackle the problem from the other end, by not having centralised office space, which needs buildings that destroy green spaces. Instead we work with existing business centres around the world and run a highly decentralised operation with people working from home (or in the field) for the overwhelming majority of their time. We encourage staff and partners to create as many green spaces as possible and educate them about biodiversity gardening.

★★ **CATEGORY 2 - GREEN**

This category is a darker shade of green. It requires more of an effort, but not much more. It is really what we should all do. It is where changing unsustainable habits of a lifetime starts and where we can turn the tide, because many small actions can add up to a movement. Take these as your first steps towards what comes next: being dark green (see points 18-20). Because really, that's where we all need to be if our planet is to make it through its current crisis.

VISIT protected natural areas and join organisations that look after them

11



The more that protected areas are used, the bigger the incentive for governments and individuals to work to keep them intact. And joining organisations that care for wilderness will give them money, motivation and a voice to talk to government - a membership organisation of one million (the Royal Society for the Protection of Birds in the UK is one example) will be listened to by politicians who want to stay in power. The more people we have supporting nature conservation organisations, the better.

What Biosphere Expeditions does: We work with nature conservation organisations around the world and we help to create protected areas and empower local people and organisations to care for them.

VOLUNTEER to support local people and organisations that look after the environment

12



Whether it is a local litter pick or helping the local school with a bit of wildlife gardening, your help will be much appreciated. And if you can't do the more physical tasks, try offering to help with tasks that you have skills in, such as talking to people at local shows or writing articles or distributing leaflets.

What Biosphere Expeditions does: We are one of those organisations, but there are many, many more organisations out there that need, deserve and will appreciate your support too.

SUPPORT conservation as an armchair citizen scientist

13



Help out with conservation work without leaving your own home. The [Zooniverse website](#) is a great place to start. Zooniverse is the world's largest and most popular platform for citizen science, people-powered research. The research is made possible by volunteers — by now over a million people

around the world who come together to assist professional researchers with [great success](#). Their goal is to enable research that would not be possible, or practical, otherwise, and they have many different types of research that you can help with. Many projects have produced unique [scientific results](#), ranging from individual discoveries to classifications that rely on input from thousands of volunteers. Click on the 'Nature' projects to get a sample of the wildlife research that you can get involved with.

What Biosphere Expedition does: Citizen science is also what we all about, but ours is on the more active, hands-on side of the spectrum (although we have some [home-based projects](#) too). The whole spectrum is important and armchair citizen science, [when done well](#), is just as valid as expeditions in remote and challenging locations.

SUPPORT wildlife surveys via citizen science apps

14

There is a host of citizen science apps to make records of things that you see in nature when you are out and about. A lot of conservation organisations now produce their own apps to help monitor a variety of species. The apps usually walk you through the survey process and how to identify different types of animals, so you can learn as you go. Some good examples from the UK are [Mammal Tracker](#) and [Bee Count](#), but there are many available. And of course apps extend well beyond nature monitoring. For example, [citizen activism through air quality monitoring apps](#) has helped tackle air pollution across Europe. So there is much for you to get involved in!

What Biosphere Expeditions does: See point 13 above.

Be more ACTIVE in local nature conservation

15



Volunteer at your local nature park or reserve and help support organisations that look after our wild places. Many organisations will train volunteers to undertake physical work such as scrub removal or tree planting, as well as organising surveys of different species, so go along to your local nature organisations and see

if you can take part in some invasive plant removal or a butterfly survey, or help count frogs, birds or a myriad of other species.

What Biosphere Expeditions does: Just that, only in more remote and challenging places abroad.

MAKE your holiday count

16



Combining conservation with your holiday is a growing trend. Combining some time away from work or domestic chores with a great outdoors experience is good for our mental health as well as the environment. NGOs such as [Blue Ventures](#), [Operation Wallacea](#) and Biosphere Expeditions organise trips to many places around the world in support of scientists working in remote and challenging places so that you can work alongside them and help them out in the field. Remember not to fly, if at all possible, or, if you have to, make your flight really count!

What Biosphere Expeditions does: Combining citizen science, wildlife conservation and a different kind of holiday is the bread and butter of what we do. There are also many other organisations offering these kinds of experiences. But be aware that there are lots of charlatans amongst them, so check out our [Top Ten Tips](#) on how to choose an experience that's great for you and for the planet.

LEARN more about the crisis our planet is in so that you can instigate change and become an advocate for nature

17



Just search the internet for "[sixth extinction](#)" or "[climate change](#)" or "[planetary crisis](#)". Much is being written about this at the moment – and for good reason. It's good that the world is waking up to what is happening and you can be amongst those spreading the word, often in informal ways. So arm yourself with facts about the current state of nature and the most effective ways that people can help.

What Biosphere Expeditions does: We are part of this process and on our 20th anniversary have added activism, such as this campaign, to what we do for nature. In our first 20 years we were focused on citizen science and wildlife conservation. This is no longer enough, because the [undeniable crisis our planet is in](#) demands more action and activism. It demands a radical rethink of how we run our lives, societies and the way we treat our planet.

★★★ **CATEGORY 3 - DARK GREEN**

The sixth extinction, climate breakdown, coronavirus pandemic and general crisis our planet is going through are serious, threatening nature and our lives as we know them today. So we must be serious too and this category demands commitment. And indeed, we need nothing short of a revolution if we are to come out of this intact as the human stewards of our planet. It may seem like a long shot now, but remember that things always seem unchangeable right up to the moment when a revolution starts and society flips from one state to the next. With this dark green category, you are putting yourself on the right side of history and you will have an answer when the next generation asks you what you did to prevent our planet from sliding into disaster.

ASSESS your carbon footprint and act

18



Human demands on the earth are now well beyond unsustainable. It is estimated that by 2030 (and this is not far away) the world will need 30 percent more water, 40 percent more energy and 50 percent more food if it continues

on its current trajectory. This is disastrous and things will need to change, especially in our western world of high impact and consumerism. Focusing on your personal carbon footprint is a good place to start. Use one of the many calculators (e.g. [WWF](#), [Carbon Footprint](#), [C2ES](#), [Earth Day](#)) and, most importantly, act on their recommendations on how to reduce your footprint. Walk and cycle more, use public transport, become vegetarian or vegan, only use aeroplanes when you have to (and when you do, make your flights count), take offset action, etc. Be mindful of your actions and research what you personally can do to reduce your footprint.

What Biosphere Expeditions does: We have strict procedures to minimise our carbon footprint and offset what is left with [Climate Care](#). We encourage our staff, expeditioners and partners to do the same. We make them aware of the concept of carbon footprint too and take action ourselves. Our [expeditions have all been vegetarian](#) for a while anyway.

REJECT the destructive and disastrous ideologies of neoliberalism and continuous growth

19



You might not even know what [neoliberalism](#) is, but it is the elephant in the room. Financial meltdown, environmental disaster and even the rise of Donald Trump and his and Boris Johnson's disastrous handling of the coronavirus pandemic – [neoliberalism has played its part in them all](#). This ideology has failed us and the planet and has given rise to [destructive corporate power](#). It is the [largest Ponzi scheme in Earth's history and no longer fit for purpose](#). It is connected to the irrational and irresponsible idea that we can have endless growth on a finite planet – in fact it needs this impossible fantasy to keep it alive. Reject it! Reject it in favour of doughnut economics, whereby social and ecological factors are equally respected. At the moment, one (social progress such as better health, jobs, and education) is built on the sacrifice of the other (ecological systems). With [doughnut economics](#) the two can thrive together. Elect politicians who support doughnut economics, buy from firms who build the concept into their business strategies and support campaigns that promote human welfare within planetary limits. Arm yourself with facts and be an activist in educating people about destructive neoliberalism and its healthier alternatives.

What Biosphere Expeditions does: We reject neoliberalism in our [economic policy](#) and act accordingly. We reject continuous growth and in the end we want to make ourselves redundant by empowering local people and communities. We educate those around us through campaigns like this.

JOIN THE REVOLUTION!

20

It has been argued that [only rebellion will prevent ecological collapse](#), and we tend to agree. So get politically active! Tell your politicians and leaders what you think and ask them to do more of the things you care about. Join revolutionary organisations based on peaceful resistance and civil disobedience (such as [Eradicating Ecocide](#), [Client Earth](#) and [Fridays for Future](#)), because [facts about our ecological crisis are incontrovertible](#) and sitting on our hands is simply no longer good enough. We need [3.5% of the population to reshape society](#) and we have a [duty to act to save our planet from sliding into destruction, if we want to be able to look our grandchildren in the eye!](#) Be on the right side of this revolution and join us now!

What Biosphere Expeditions does: We have joined the revolution and we are taking action, because our planet needs all the help it can get. Join us now!



DO MORE

Whether you are back from an expedition and want to do more, or interested in lending a hand, there is more you can do for the planet, for yourself and for Biosphere Expeditions. Here's how.

The full text with explanations, background, references and links is also on www.biosphere-expeditions.org/domore

BE (radically) GREEN



1 The undeniable crisis our planet is in demands more action and activism. It demands a radical rethink of how we run our lives, societies and the way we treat our planet.

Our 20 tips on how to be (radically) green go from the light green of what we should all do as a bare minimum, to the dark green rejection of neoliberalism and the fallacy of endless growth, to joining the revolution that is gathering pace as we speak. Turn to page 55 or to www.biosphere-expeditions.org/20tips to see our tips in detail.



SPREAD THE WORD

www.biosphere-expeditions.org/domore#words

2 Help us to help wildlife and people across the world by spreading the word. Word of mouth is by far the best way to get people excited. Talk to your family, friends, and colleagues about your experience and encourage them to join in too.

Social media

Share your experience, comments, pictures and videos on your social media and ours. This really does help to spread the word about us and our conservation work.

Testimonials

Independent reviews are very important for us, not just for those thinking about joining an expedition, but also for our staff, scientists and partners who draw great motivation and encouragement from them. So we would be very grateful if you could write a review on our [Facebook review page](#) and/or on [GreatNonProfits](#).

Hold events & talks

Host an event for us in your neck of the woods, or give a presentation. Examples include holding a drinks reception in a local pub, a dinner party at your home, a talk/presentation at your local wildlife or conservation society, a get-together at your professional organisation or club, or anything else you can think of. We can send

you support materials such as presentations, as well as postcards and brochures that you can hand out at your event. In addition, a staff member of Biosphere Expeditions may be able to attend with enough prior notice.

Work with your local media

Local newspapers and radio stations are always looking for new stories, and they are very likely to want to hear about your experiences. Biosphere Expeditions has an extensive storage of high resolution photos and broadcast quality HD films, so please [contact us](#) if you need pictures or film clips to illustrate your story or if you would like help with your press release or media work.

Blogs

Are you a blogger? If so, why not create a blog about Biosphere Expeditions and/or your expedition experience and link it through to us. This will also help to get the word out there. If you do create a blog, make sure you let us know about it, so we can link back to you.

Picture & video sharing sites

Videos and pictures work really well in getting people's attention. If you are putting your expedition pictures or videos on a sharing site such as Instagram or YouTube, then please also make sure you link through to us or tag your pictures to Biosphere Expeditions as this will also help to spread the word.

Video diaries

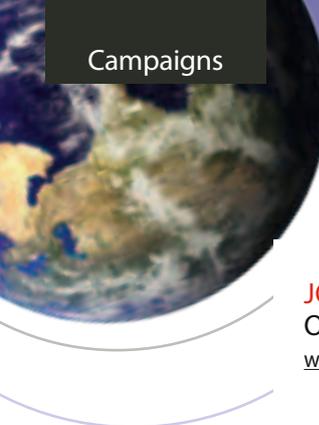
We would like to build up a library of expedition team members' personal video diaries. There are no limits to your creativity other than we ask that your final cut is no longer than 6 minutes.

CONTRIBUTE YOUR TIME & SKILLS

www.biosphere-expeditions.org/domore#skills



3 We always need people with skills who can help us out. Examples are skills in the outdoors, accounting, graphic design, IT, social media, research, etc.



JOIN THE FRIENDS OF BIOSPHERE EXPEDITIONS

www.biosphere-expeditions.org/friends

4 The Friends of Biosphere Expeditions are people who feel passionate about providing continuous support to our critical wildlife conservation and research projects across the globe. By joining the Friends you can play a vital part in making a real difference to the survival of our planet's endangered species.

If you can't take part in a full-blown expedition yet, or if you have already been with us and would like to stay involved, or if you would simply like to be part of what we are doing, then become a Friend of Biosphere Expeditions today!

Help us to support critical wildlife conservation and research projects across the globe from a monthly membership fee starting at €10 | £10 | US\$12 | AU\$15. Depending on your country of residence, your membership fee may be tax-deductible (for example membership fees to our US 501(c)(3) charity, or our German e.V. charity, where we can issue tax-deductible receipts).

To join the Friends, just send us an e-mail. We will then sort out the rest together.

Membership benefits

Friends membership benefits include expedition and events discounts, the Biosphere Expeditions Magazine, first notification and preference for last-minute expedition places, news and updates on how your membership fee is making a difference to our conservation work in the field and much more.

Where does my membership fee go?

Wondering where your money will go? We guarantee that 100% will go into supporting conservation. We can do this because we are a small, flexible organisation with no steel and glass headquarters to maintain or bureaucratic dinosaurs to feed. Whenever we make a significant expenditure on one of our conservation projects from the Friends' funds, we will let you know in a clear and transparent way. For example, we may spend some of the fund to enable scientists from different projects to present the findings of their Biosphere-supported projects at international conservation conferences, or we may spend some of the fund on printing education materials for local people, or on training up a local conservationist under the guidance of our project scientists, or creating placements on our expeditions for local students and people.

Friends' activities 2020

We were poised for more placements and activities when the pandemic hit. With no expeditions running from March 2020 onwards, no placements or other activities took place. Instead we battened down the hatches, financially and otherwise, and are riding out the storm. To help our conservation partners around the world, we started three successive fundraisers (see pages 24-25) and focused our energies on those. Friends' funding and activities will resume when expeditions do in 2022.



DONATE

www.biosphere-expeditions.org/domore#donate

5 Our work on the ground of course continues after you have left. If you would like to donate to a particular expedition or Biosphere Expeditions as a whole, then please get in touch. We can then discuss how and what tax benefits you may receive.

Depending on your country of residence, your membership fee or donation may be tax-deductible (for example membership fees or donations to our US 501(c)(3) charity, or our German e.V. charity, where we can issue tax-deductible receipts or German "Spendenbescheinigungen"). We also have a page on **employer match-giving and personal taxation**, which you may want to check.

In-kind donations

You may have laptops, GPSs, video cameras, binoculars or other items to give away, which we or our partners can use. If so, please let us know and we will either use them ourselves on our wildlife conservation projects or pass them on to our local partners.



JOIN AN ETHICAL CITIZEN SCIENCE PROJECT



RAISE FUNDS

www.biosphere-expeditions.org/match-giving#fundraising

Involve your company

6 Does your company publish a company magazine? If so, the editor would probably be very interested to hear from you as they are always keen to cover interesting features relating to their members of staff.

Many employers, particularly in the USA and Canada, but also elsewhere, will match-fund charitable contributions made by their employees, retirees and employees' spouses. In Biosphere Expeditions' case this means that your employer may match-fund your expedition contribution payments and other donations you make to Biosphere Expeditions. Some employers also provide matching funds to support employee volunteer hours.

Some companies also have grants for non-profit organisations such as Biosphere Expeditions, so why not talk to relevant people in your company? You may have a Corporate Responsibility Manager, or an Environmental Manager or a Communications or Sustainability Manager who may be able to help you.

Direct fundraising

Support critical wildlife conservation and vital research by raising funds for Biosphere Expeditions. There are many ways to do this. Why not organise an event, or take part in a sporting endeavour? It's fun, a great way to meet people and to do something different to challenge yourself. By raising funds you can make a long-lasting contribution to our wildlife conservation work worldwide.

Locally

7 Volunteer at your local nature park or reserve and help support organisations that look after our wild places. Many organisations will train volunteers to undertake physical work such as scrub removal or tree planting, as well as organising surveys of different species, so go along to your local nature organisations and see if you can take part in some invasive plant removal or a butterfly survey, or help count frogs, birds or a myriad of other species.

Abroad

Combining conservation with your holiday is a growing trend. Combining some time away from work or domestic chores with a great outdoors experience is good for our mental health as well as the environment. NGOs such as [Blue Ventures](#), [Operation Wallacea](#) and Biosphere



Expeditions organise trips to many places around the world in support of working in remote and challenging places so that you can work alongside them and help them out in the field. Remember not to fly, if at all possible, or, if you have to, make your flight really count!

USE OUR AFFILIATES NETWORK

www.biosphere-expeditions.org/affiliates



8 You can also support Biosphere Expeditions through the affiliates network. Whatever the affiliate and our arrangement with them, commissions and perks gained from you using their services will always be ploughed back into our research and conservation work and to benefit our local partners wherever possible. ■

PREVIEW: ANNIVERSARY BOOK



For our 25th anniversary in 2024, we will publish a picture-heavy coffee table book with anecdotes spanning the history of Biosphere Expeditions from its beginnings until 2024, with pictures to illustrate the anecdotes. The book will be written by our executive director Dr. Matthias Hammer and published in early 2024. Title and length are to be announced, but it will be around 160 pages and cost no more than €30 (hardcover, picturebook, approx. 30 cm square format). We will publish a few sample draft chapters here before publication. You can also pre-order copies by e-mailing info@biosphere-expeditions.org.

CHAPTER 1: BEGINNINGS

From some woods in Bavaria to a bathroom in Cambridge, this is where the Biosphere Expeditions journey starts

making strange noises deep underground, grunting and whining far away, near the centre of the world. Muddy fox tracks and hidden squirrel feeding tables. The fragility of it all. The silence during hours of waiting that is not really silence, but bliss in what the child thinks must be the wildest and most exciting place on earth. Gone are the dreams of wanting to become a fireman, a jet fighter pilot or whatever young boys dream of growing up to be.

The word "expedition" takes hold in the child's head without him knowing what it means. There it mixes with images of steaming green jungles, egged on by wide-mouthed viewings of Kipling's classic of the same name, brought to flickering screens through Disney's dream world. Later more serious contenders join. There's Sielmann, a German Attenborough long before the child knows who that is, and his "Expeditions to the animal kingdom" in books and on TV. There's Horst Maas and his book "Waterways to freedom (with survival guide)" with tales of long canoe journeys through the unknown. There is Alexander von Humboldt, the 18th century explorer and polymath with his expedition journals full of adventure and remarkable discoveries. And there's Paul Theroux's "The Mosquito Coast" with Harrison Ford as the hero trying to conquer the jungle and failing.

But far-flung travel was not on the cards. It did not have to be. The woods and Alps were on the doorstep and there was also exploration of the virtual, analogue kind: books, maps, TV and the endless expanses of a child's imagination. In that expanse, the idea took hold, alongside the word. A path was charted, a dream created: a biology professor researching some beetles somewhere in the jungle.

Water is splashing and it's hard to hear her, talking and standing at the sink in the small bathroom in Cambridge, throwing ideas around. "Why don't you get people to contribute to expeditions you then take them on – just as you did on those student expeditions we organised"?

The world stops. Water splashes in slow motion. And there it is: the idea, the eureka moment, the moment you see a clear path ahead, bright and white against the tiles of that small bathroom. There it was. In that moment, the vision of what it is today. A short sentence, an idea, a beginning and so much more.



Wind back to some woods in Bavaria a generation or so earlier. A steaming lake in the morning mist, no more than a puddle, but a sea of wonder to a small child with his father, stalking out a badger sett. Seeds were laid there and then. A fascination with nature, a sense of wonder about the natural world in its infinite forms. The trees that tower above like silent guardians of secret places, their branches enveloping and protecting, but also threatening. The green mosses at their feet and ivy creeping up their trunks, dripping with water in droplets that turn the world upside down. Badgers



The rest followed, almost. Biology at school and then university, only interrupted by a spell of national service and then some more. Formative years of hardship and danger and children playing war. It almost swallowed the child, had the dreaming spires not beckoned strongly from abroad.



There, in a most British ivory tower, expeditions finally start to mean something. Where else but in Britain would students be encouraged (and funded) to do research and explore far away, adding a little bit of knowledge to the archives of the Royal Geographical Society (RGS) and some dusty university library.

“And if you don't write up your results, you might as well lie on a beach. Then it's not an expedition, but an excuse for a holiday”, said Shane Winsor, godmother of all things expedition at the RGS. Lesson learnt. Forever.



Ghillean Prance, that giant of botany at Kew takes the dwarf under his wing, who organises expeditions chasing medicinal plants in the Amazon delta one year and in Madagascar the next.

The path is lit brightly ahead now – the high beams switched on by the first two expeditions: an undergraduate degree, then a PhD, then jungle professor. And then....crisis. The naïve child learns that academia is not just researching beetles in the Amazon. It's teaching also, admin, lots of admin, publish or perish, elbows, egos and a world of extreme specialisation. The dream starts to fade, a house of cards collapsing. Has the dog barked up the wrong tree for the last 25 years?

Not so, she says in that bathroom in Cambridge. And the rest is history.

Left page
 The woods in Bavaria where the seeds for Biosphere Expeditions were laid in the 1970s
 © Werner Hammer †.
 Eureka moment student digs in Cambridge. | Topsy-turvy world in a droplet.
 Influential books that charted a path towards Biosphere Expeditions.

This page
 Paratrooper children taking themselves very seriously on exercise in Germany, 1988.
 The author is in the middle © Alexander Mätzig.
 Studying medicinal plants in the Amazon. The author is on the left. © Russell Cobban



Biosphere Expeditions is an international non-profit conservation organisation registered in Australia, England, France, Germany, Ireland and the USA.

Officially accredited member of



- UN Environment Programme
- International Union for the Conservation of Nature
- European Citizen Science Association

CONTACT US

www.biosphere-expeditions.org

www.biosphere-expeditions.org/offices

Australia ☎ 1800-708261

✉ australia@biosphere-expeditions.org

France ☎ 01-53170820

✉ france@biosphere-expeditions.org

Germany ☎ 0931-66398320

✉ deutschland@biosphere-expeditions.org

Ireland ☎ 01-9695263

✉ ireland@biosphere-expeditions.org

North America ☎ 310-9097449

✉ northamerica@biosphere-expeditions.org

UK ☎ 01603-251760

✉ uk@biosphere-expeditions.org