

IT CHANGES EVERYTHING

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BIODIVERSITY: TO BE OR TO BE NO LONGER?



Biodiversity: To be or to be no longer?



Can we live in harmony with nature? What does bioinspiration mean? And should we continue building, or do we need to focus on restoring what we already have? **Dorothee Broweys (D. B.)**, biologist and founder of TEK4life, **Bruno David (B. D.)**, naturalist and President of the French national natural history museum (MNHN), and **Philippe Madec (P. M.)**, architect and urbanist, answered these questions in the podcast "Ca change tout", hosted by Thierry Keller, on 19 November 2020. **Here's a quick look at the key moments of their conversation.**



B.D.: Biodiversity is the living fabric that makes up our planet. It takes many forms and illustrates the interdependency of its various components: different species and different ecosystems.



B.D.: If we want to get back to the right balance, we must address the factors that are putting pressure on biodiversity. We need to let nature take its course a bit more, and stop giving in to temptation of managing rural areas.



D.B.: The complicated connections between living things and the balance formed in the 3.8 billion years since life appeared on Earth are our most precious legacy – and one that is not negotiable.



D.B.: How can we make sure our activities are compatible with living things? The key point is placing limits on the business world. It's not just about making sure companies are stable – they must be sustainable and contribute to the delicate balance of living things.



P.M.: Humans come from nature – but there's no doubt that we are the species that has gone furthest in separating itself from nature. The consumerist model of the West has made us forget our connection to living things, giving us even more responsibility.



P.M.: All of the resources we use to build come from nature in one way or another. Let's do what nature does – restore and reuse! It's an immense project that we must carry out in the most efficient way possible.

The podcast "Ca change tout" is available on all platforms and can be downloaded on Apple Podcasts, Spotify, Deezer, Podcast Addict, Google Podcasts and many more, including edf.fr.





“The wall is far off,
but we are moving
towards it faster
than ever.”

Bruno David

President of the French national natural history museum (MNHN),
naturalist

Interview

President of the French national natural history museum (MNHN) and naturalist Bruno David has been observing living ecosystems for many years. He insists that, as protecting biodiversity has become an essential challenge for the future of humankind, taking action has become a matter of urgency: “nothing is irreversible, we must do everything we can to raise awareness”. Bruno David answered our questions.

— The idea of biodiversity is now central to a number of debates, the public are becoming more aware of the issue and...

B. D.: I just want to interrupt you for a moment. Although the word is often used, I’m not sure everyone knows what it really means. We all think we know and understand the idea of biodiversity. But the concept is both simple and complicated.

— How would you define it?

B. D.: Biodiversity is the living fabric that makes up our planet. This idea gets across the interdependency of all living things. We often focus on the number of different species, this idea of wealth; but that’s not enough. Abundance – the number of individuals in each species – is equally important. We also have to consider relative species abundance, to determine the balance between the populations of different species. Wealth, abundance and relative species abundance – explaining these three ideas helps us understand what’s at stake.

— So how do we measure the extent of the issue? And have we gone past the point of no return?

B. D.: The species extinction rate has remained low for the last 200 years, never exceeding 2-3%. However, the number of individuals in each species has fallen drastically. The number of birds, for example, has dropped by 30-40% in three decades. And that momentum only continues to rise. Extinction is rising at unprecedented rates in the history of life on earth, up to 100-1,000 times faster. If abundance falls increasingly quickly, one day animals and plants will quite simply go extinct. To sum up, the wall is still far off, but we are moving towards it faster than ever.

— What is causing this acceleration?

B. D.: There are various reasons. Climate change of course plays a key role, but it’s not the main reason. Let’s be clear – the primary reason is human interference with the planet, how we use it. France loses a natural area the size of a football pitch every three to five minutes. This space is lost as we build housing, roundabouts, private swimming pools and more... I could list a whole multitude of projects that reduce the range of biodiversity.



— But humans have always had an impact on their environment.

B. D.: Yes, like all living things. Beavers build dams and forests grow, but humans’ capacity is unparalleled – particularly since the Industrial Revolution in the 19th century. What’s more, given that we are a large and very numerous species – there are 8 billions of us, which obviously has an impact on biodiversity – and the other important aspect is the fact that we travel a lot. We export our impact.

— Why are we waking up to this so late? Not to set up two issues in a futile way, but the climate has been presented as an urgent issue for years – while the idea of protecting biodiversity is still relatively new.

B. D.: The climate issue is easier to understand. When it gets hotter, drier or more humid, we feel that happening. But the effects of deteriorating biodiversity are less visible and more complex. Living things have been adapting to unexpected events for millions of years. When something happens, we change and adapt. That’s why I think the techy ideas some people are putting forward are totally unrealistic. “We don’t need to change our way of life – we’ll find a technical solution. We’ve always managed it so far!” But thinking we can manage living things like that is endlessly pretentious and arrogant. And it’s doomed to fail.

— What do you think we need to do as a priority?

B. D.: First of all, inform, explain and communicate all of the data to make everyone more aware. Everyone is responsible for defending biodiversity. Second, we can bring about collective change through voting, democracy. Between these two steps we must open up the conversation with companies. In my opinion, we have too long neglected that in biodiversity protection. Companies have the financial means and ability to act quickly. But in every conversation, what’s key is conviction. Blame is unproductive. Rather, we should express what everyone can actually do at their level.

— Are we going in the right direction?

B. D.: There are some promising signs. More and more people want to consume differently, go local and cut down on travel. Nothing is irreversible, especially when it comes to the evolution of living things. But we should be careful not to go past certain limits that will tip us into the unknown. We are currently undoing the living fabric that I mentioned at the start of the interview. Of course, one stitch isn’t a big deal. But after we lose a certain number of them, the threads no longer make up a fabric – they’re a shapeless tangle. We should bear that in mind and act now.

“Everyone is responsible for defending biodiversity.”

Bruno David



Biodiversity ISSUES HOTTING UP



The loss of living things is no longer a question. However, the struggle to protect biodiversity is more difficult to grasp than the climate challenge. To combat climate change, scientists have sounded the alarm of the consequences of a temperature increase of one, two or three degrees. But with biodiversity, the interaction between different species increases the different standpoints – making it almost impossible to establish a common indicator to measure it. Furthermore, the disappearance of wildlife is not very visible. Convincing people of the threat that dissipating flora and fauna poses for the human race has therefore not always been easy.

2010s
The definition of 20 objectives
In 2010, all participants at the Convention on Biological Diversity in Nagoya agreed on 20 specific objectives with the aim of slowing down species loss. Everyone seemed to agree on the urgency. But 10 years later, the picture is grim. Just one of the objectives has been met – that of protecting 20% of the earth's surface.

2020s
2019: a year of great promise
2020 was supposed to be the year of biodiversity. The meeting of the IPBES in Paris in 2019 was an opportunity to clearly identify the challenges and decide on a specific path to follow. Governments were set to step up to the plate and take decisions at COP15 in China. But the Covid-19 outbreak put a stop to those plans. It looks like the issue has been put on hold until 2021.

2000s
Awareness starts to become action
In 2005, the UN published the *Millennium Ecosystem Assessment*. The result of four years of work, this report was carried out by over 1,360 experts from almost 95 countries. It assessed the extent and repercussions of the changes being imposed on ecosystems.

1990s
1992, the first UN convention
Six years later, the first UN Convention on Biological Diversity took place in Rio. The United Nations Framework Convention on Climate Change (UNFCCC) was adopted at the same time. The work of a group of international experts, the IPCC⁽¹⁾, has given climate issues a strong legitimacy. Biodiversity did not have an equivalent group until the IPBES⁽²⁾, formed in 2012.

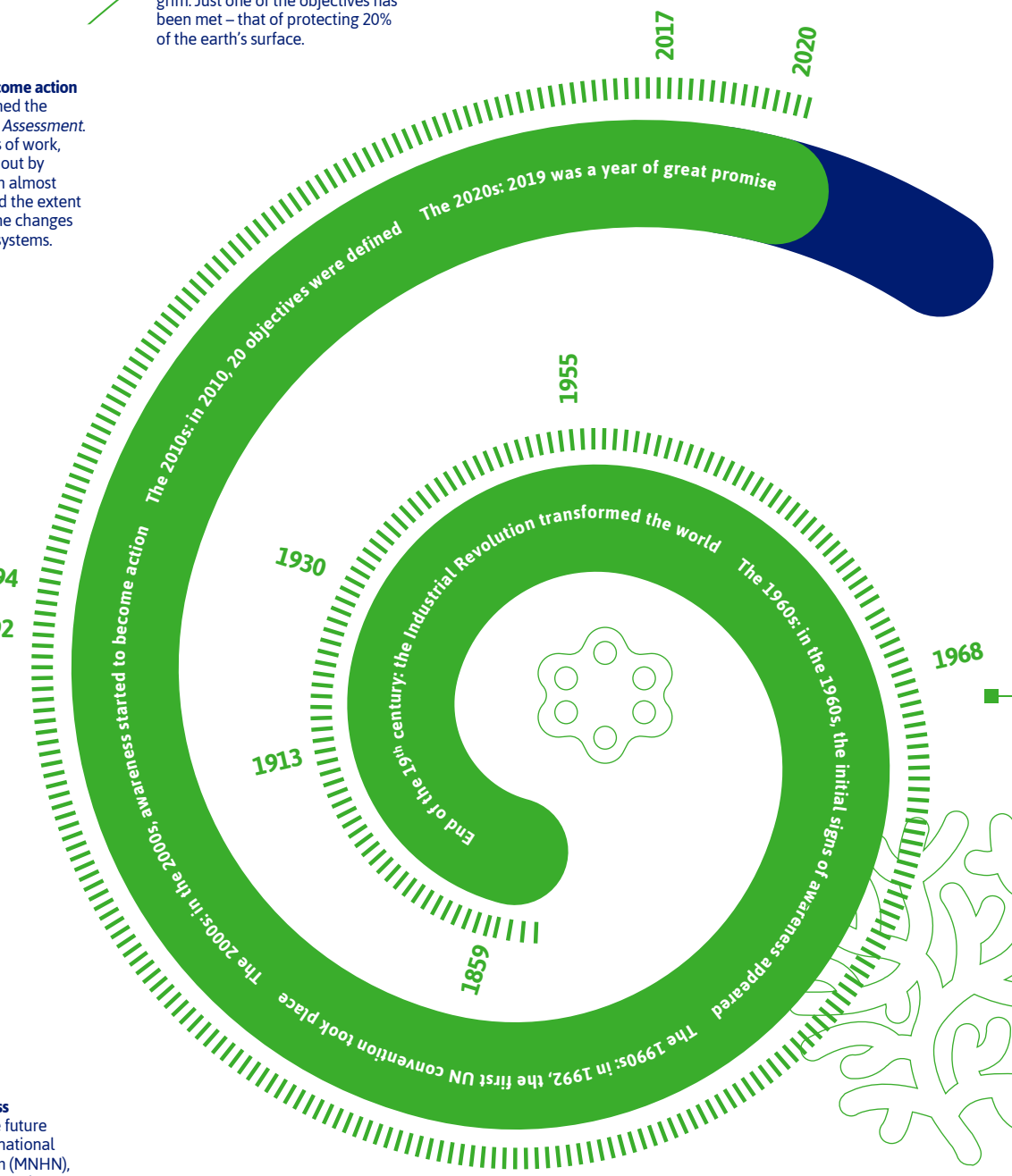
1986

THE BIRTH OF THE WORD BIODIVERSITY
The word *biodiversity* appeared for the first time in 1986 at the National Forum on Biodiversity in Washington.

1960s
Initial signs of awareness
In 1965, Jean Dorst, the future Director of the French national natural history museum (MNHN), published *Before Nature Dies*. The book marked the start of a collective awakening in France. In 1971, Unesco launched an intergovernmental research programme, *Man and the Biosphere*, which reflected on the sustainable management of nature.

Late 19th century
The Industrial Revolution transformed the world
The end of the 19th century was marked by an explosion in human activities. It is also when the first movements to defend the environment emerged, along with the creation of the first protected natural areas. The first International Conference for the Protection of Nature met in Bern in 1913.

(1) Intergovernmental Panel on Climate Change.
(2) The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.



THE RISE OF BIODIVERSITY: KEY STAGES

Since life first appeared on our planet, there have been five major events that eliminated 99% of biodiversity on Earth. Whether the result of a volcanic eruption or the impact of a meteorite, each of these crises disrupted the climate so quickly that species were unable to adapt. According to scientists, a sixth event is now underway, exacerbated by climate change. And it's a vicious circle – the two threats exacerbate each other.



Although trees and plants are not the main producers of oxygen, forest cover contributes to climate regulation.

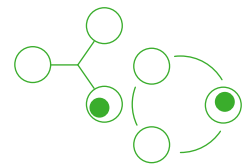
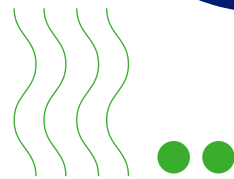
Life on Earth is a balance, and the ocean holds a central place in it. Its role has long been underestimated.

The ocean helps us breathe by producing oxygen. It also prevents global warming by absorbing CO₂ and contributing to cloud formation.

Tropical forests are considered to be... essential places of biodiversity, as they are home to the greatest diversity of fauna and flora.

absorbing CO₂ and contributing to cloud formation.

BIODIVERSITY AND THE CLIMATE – INTERDEPENDENT FOR



3.5 BILLION YEARS

The oceans, a ticking time bomb for the climate

Life on Earth is an equilibrium, and the ocean has a key role. The oxygenation of the planet's atmosphere between 2.2 billion and 2.5 billion years ago is therefore directly linked to a disruption of seabed biodiversity. The ocean helps us breathe by producing oxygen. It also prevents global warming by absorbing CO₂ and contributing to cloud formation. The ocean's importance has long been underestimated, but we now know that its acidification could lead to species disappearance as well as limiting oxygen production.

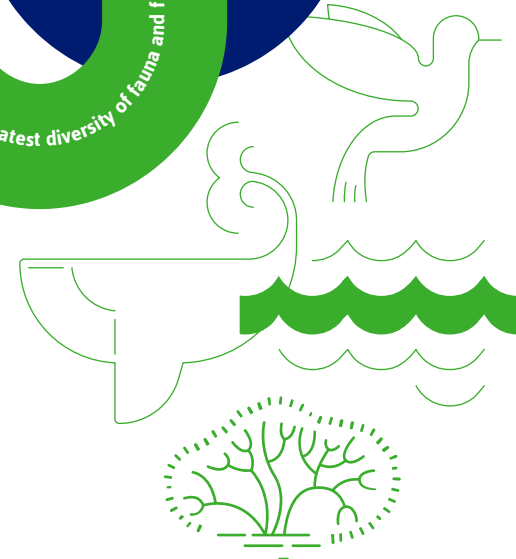


Changing flows and sea currents linked to altered undersea temperatures could disrupt the planet's climatic balance and harm all species on Earth.

Forests, climate regulators and biodiversity hotspots

Although trees and plants are not the main producers of oxygen, forest cover does help regulate the climate. Deforestation ramps up the warming process by generating between 5 billion and 8 billion tonnes of CO₂ every year, which represents between 11% and 17% of global anthropogenic greenhouse gas emissions. According to the latest report by international biodiversity experts from the IPBES,

the world's forest cover is stable, which is good news from a climate point of view – but tropical forests are in sharp decline. These forests are essential for biodiversity as they are home to the widest variety and diversity of flora and fauna.



The melting of the ice caps, a direct threat

This is one of the most visible consequences of climate change. In the short term, it could have direct repercussions on the survival of certain species; polar bears for example may disappear by the end of the century. The melting ice caps also contribute to rising sea waters, a direct threat to coastal species and human activities across the globe.

Climate change uproots some species and wipes others out

Climate change is making certain parts of the globe increasingly hostile places. The species that live there therefore have to flee. Fish in tropical waters migrate towards the poles to get away from rising temperatures. See, for example, the scorpionfish in the Mediterranean. These migrations disrupt the balance of ecosystems. Furthermore, new species compete with native populations and thus exacerbate resource scarcity.

Inaction, A MAJOR RISK

Doing nothing in the face of the dangers facing living things is also a threat to companies. Not only are brands likely to be called out on their behaviour in public campaigns, but they also run the risk of financial loss and fines. But the greatest risk of all remains the threat to society. Without biodiversity, all of our different ways of life could be drastically changed.

Legal RISKS

Biodiversity protection regulations have been strengthened in recent years through the idea of environmental responsibility, accompanied by an obligation to compensate for environmental damage and a reinforcement of the "avoid, reduce, offset" mindset. When companies fail to sufficiently anticipate and apply these obligations, they may be found liable. Although many deem these systems insufficient and think they lack control mechanisms, the risk for companies remains real.

Reputational RISKS

The environment has become a priority for more and more people in France. And it is widely accepted that biodiversity protection objectives cannot always be met without corporate contributions. Ignoring the subject therefore puts companies at risk of losing customers. Those who don't do anything – or, worse, pretend to, but actually damage the environment – run the risk of undergoing public call-out campaigns from environmental associations and acquiring a negative reputation.

Economic RISKS

According to the World Economic Forum, over half of global GDP – almost \$44 billion US – is exposed to moderate or severe risks due to biodiversity loss. It has said, for example, that, by failing to address environmental risks, the world is sleepwalking into catastrophe. Beyond the international economic risks, the danger of revenue loss also applies on the small end of the scale. An increasing number of products are certified environmentally friendly. Companies that fail to take this approach could lose potential market shares or even access to certain markets. Conversely, by acting as trailblazers, companies can ensure they hold a strategic leading position in markets that are likely to change rapidly.

Environmental RISKS

Companies are not cut off from the rest of the world. The risk of species loss across the planet applies to everyone. Disappearing insects could bring about a drastic fall in agricultural production, putting food security in danger. Meanwhile, deforestation and ocean acidification could speed up global warming. That's why more and more companies are choosing to illustrate their commitments to biodiversity and the climate. An example of this is the Act4nature initiative launched in 2018 by a French collective, Entreprises pour l'environnement (EPE), and a number of partners. It aims to engage companies on the issue of their direct and indirect impacts, dependencies and potential for actions to protect nature. Within this movement, international companies – including EDF – have pledged to combat biodiversity loss. They have either renewed their engagements by maintaining their efforts and intensifying their actions, or undertaking new commitments to strengthen their biodiversity strategy.

The environment has become a priority.

The risk of species loss across the planet applies to everyone.

Biodiversity protection objectives cannot always be met without corporate contributions.



The Pine Island Paradox

[EXTRACT]

AUTHOR:
Kathleen Dean Moore

ILLUSTRATOR:
Hubert Poirot-Bourdain

PUBLISHER:
Éditions Gallmeister

The moral equivalent of wildness

I back-paddled in my kayak, listening for small sloshes and hushed voices, the sounds of young people launching boats in the dark. Boat by boat, they disappeared across the lake – two kayaks, a canoe, a raft, a dory. The night was intensely quiet and dark, the way a campsite is quiet and dark after the fire goes cold. But the silhouette of the mountains was appearing against the sky in the east, and light seemed to be gathering in a particular cleft of the mountains. The lake showed a slick of silver.

I began to see the boats on the lake – scattered shadows, simply floating. One after another, the boats turned toward the light, stirring silver rings in dark water, until each boat pointed to the place in the mountains where the moon would emerge. In time, it did; just the top of its arc bulging through a space between black peaks, swelling upward, until the whole creamy white moon popped away from the mountains and floated free. When I looked behind me, the lake was dotted with uplifted, moonlit faces. ...



They were still for a very long time, the young people in the little drifting boats. Then I heard oars splash and the dory moved slowly up the bright pathway toward the moon, until the boat disappeared into the mountains' moon-shadow. Then the boat pivoted, and back they came again into the moonlight. They rested a moment in the glow of the moon, then back they went into moonshadow. Pacing with the slowness of a heavy boat, they rowed back and forth, into the light, into the shadow. At first I couldn't understand what they were doing, but then it dawned on me that each time they went into the darkness, they made the moon drop back behind the mountains. And when they returned to the light, the moon rose: setting and rising, setting and rising, this great enlightenment, over and over again. As the moon sailed higher in the sky and the night grew colder, the boats came in one by one, oars thumping damply, voices whispering goodnight. I counted them as they came. Allen will spend the night in a canoe, floating on that skim of moonlight. Jenna will spread a sleeping bag in the meadow; I saw the beam of her flashlight wander through the pines. When I walked back to my tent, I passed Alicia wrapped in a blanket, ankle deep in shallow water, watching the stars. My god, that must be cold; by morning, there would be frost. It was a long time before the dory came to shore. I lay in my tent and listened to voices murmur on the lake. "So what *is* nature?" one voice asked, making me smile. "And *where* is it?" another one answered.

“So what *is* nature?”

In the morning, we all sat in sunlight that made us squint, reading Henry David Thoreau. This was PHL 438, Philosophy of Nature. Every year in late September, I take a group of university students to the mountains for this class. The students come from all parts of "campus – marine biology, political science, geography, forestry, a few from philosophy. We camp on a little lake in a subalpine-fir and white-pine forest, just under the broken talus slopes of Jigsaw Mountain. In the meadow where we'd convened, frost glittered on each seed head and blade of grass, and steam rose in scarves from the lake. A person "needs wildness the way a garden needs its load of muck," Thoreau wrote, and none of us disagreed, there in the meadow with light in our hair and dragonflies clattering past and a great cloud of mayflies rising into sunlight for one ecstatic day of flight. We tried to imagine what the metaphor might mean exactly. What is muck? What is muck to a garden? How and when is it best applied? If plants need muck in heaps at their roots, where they live and grow, what is the significance of this horticultural fact for young people who for five days had been gorging on wildness, swallowing it in great gulps, as if they were starved.

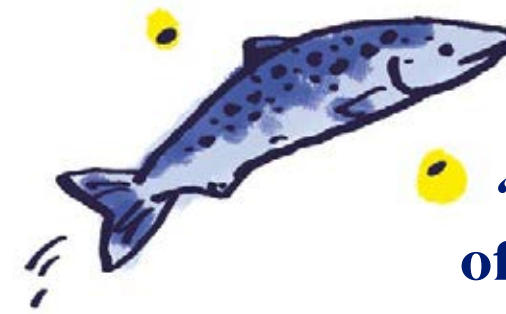


Gallmeister

The Éditions Gallmeister publishing house has been sharing American literature of all kinds with French readers since 2005. Indeed, the expansive landscapes of the US are not just impressive visually – they also directly shape the personalities of its people. Kathleen Dean Moore, philosopher and naturalist, knows how to observe the slightest change to the natural world and capture it in her writing. In a continuation of *Holdfast: At Home in the Natural World* (published in French as *Petit traité de philosophie naturelle* by Gallmeister, "Totem" collection in 2020), *The Pine Island Paradox* (French translation, *Le Paradoxe de Pine Island*, out in autumn 2021) gently invites the reader to observe the natural phenomena all around us. www.gallmeister.fr

Thoreau went on. "In wildness is the preservation of the world." But the students noticed he didn't waste much time talking about wildness itself. He talked instead about what the muck of wildness nourishes in *people* – energy, strength, courage, independence, a new alertness, a way of seeing that penetrates ordinary expectations, joyous gratitude that goes beyond mere gratefulness to a state of grace. If the world is to be preserved, he implied, it will be because of the transformation wildness makes in people, their strength and joy and moral resolve. The students thought they knew pretty much what Thoreau meant, because each of them had been transformed that week into the sort of person who canoes on a wilderness lake in the dark, in the silence, in the presence of the moon, in the grace and protection of their friends. They knew that swelling up inside. They knew that gratitude. They knew that connection to the lifting, moonlit night, the joy that can't be distinguished from love.

So here is what really scared me: The next day, the students would come down from the mountain to the first day of classes on a state university campus going through rush. The cars they'd left in empty parking lots would be shoulder to shoulder with pickups and bikes, and the cafeteria cashiers would be harried and cross. Voice mails would spill out invitations, and parties would thump long into the night. Between beers, the students would worry about how to find space in the classes they need, and how to open a checking account with no money. And when they called home to say they were safely out of the woods – yes, it was awesome, yes, yes – what would they be able to tell their parents, as the cell phone kicked in and out and somebody's car alarm beeped and the line for registration pushed out the door? Can we bring the values of wild places with us as we drive down the mountain? How can we hold on to them in our neighborhoods? This was not an idle question. What if it's true that we need wildness the way a garden needs muck, that the "preservation of the world" depends on wildness? What if it's also true that most people don't live in the wild anymore, that we can't? What, then, will nourish and preserve us?



“The preservation of the world depends on wildness.”





“Learning to monitor the changing seasons and the movements of the clouds is a big thing.”

Catherine Larrère

Philosopher, specialist
in environmental ethics

Interview

Catherine Larrère is a philosopher who specialises in environmental ethics. Her work highlights the moral connection between human beings and nature. How have people become aware of their responsibility? Why have we cut ourselves off from nature? What path could we take to restore harmony? We found out in an interview that quickly combined philosophy with practicality.

— In our relationship with nature, humans act like teenagers – trying to assert total independence while knowing it's impossible and complaining about any sanctions applied. What should we think about our relationship with the environment?

Catherine Larrère: We've never had a neutral relationship with nature. Even in the 18th century, when Emmanuel Kant presented nature as an array of resources to provide for the human race, or in modern physics when Galileo and Newton highlighted how it worked and simply presented it as a succession of phenomena, our relationship with nature has always been an emotional one. These thinkers often expressed themselves passionately, proving the sensitive nature of this topic – impossible to pin down to a simple theory. In 1973, an Australian philosopher, Richard Routley, came up with a very relevant story – that of the last man on earth. Before dying, he destroys his natural surroundings. "After all, there's no one else left. What's the problem?" But we know it's a problem, even if we're talking about the last human being in existence. We have a moral responsibility to the environment, not just to other people.

— But where does the original divide stem from? How did we get so detached from the environment at some point?

C.L.: There are several theories. In 1967, science historian Lynn White Jr published an article titled "The historical roots of our ecologic crisis". Noting the reality of the environmental crisis, the article asserts that it has its roots in the Old Testament; God created man in his own image and gave him the Earth, which gave humans a sense of superiority. This interpretation of the Bible is contested but has nevertheless left an impression. Another explanation dates back to the Middle Ages, when technological advances made significant progress in the Western world, particularly in Europe. This took the form of technical changes, such as replacing the ard with plough to cultivate the land, and the ability to create and harness energy, such as watermills and windmills. Europe no longer relied on human strength alone. Technical progress is based on harnessing natural elements.

— As early as the 19th century, people in English-speaking countries were concerned about the destruction of nature. This concern led to the creation of large natural parks such as Yellowstone and Yosemite. Our collective awakening is therefore not a recent phenomenon. So why did it take so long to carry out any action?

C.L.: Before taking action, we need to gather knowledge, the right kind of knowledge in particular; however, the knowledge we currently have is too broad and too focused on the numbers. It's tricky to measure the extent of a problem when you can't even understand the figures. It's comparable to the subject of the national debt – when you're talking about millions of billions of euros, the issue becomes too abstract. When it comes to biodiversity, global figures sound the alarm, but in order to act, we need more precise local data. Above all, we must not allow ourselves to get bogged down in overly rigid or simplistic arguments.



— Which simplistic arguments are you referring to?

C.L.: Too much emphasis is placed on climate change alone; it is central, but it must not be separated from the other components of the environmental situation. For example, electrofishing may seem justified in terms of CO₂ emissions; however, it leads to mass and reckless destruction of fish, which is disastrous for biodiversity. Another argument we should get away from is the idea of a separation between nature and society, dividing biodiversity and urban areas. Cities don't just cancel out nature – it's always there. Tree roots sometimes crack the pavement, weeds grow wherever they can and animals are taking back city centres during lockdown. The different faces of urban parks can teach us a lot about our relationship with biodiversity in cities.

— What have you learned?

C.L.: That nature in cities should be "real" – unplanned rather than artificial creations with incongruous exotic plants. Landscape gardener and designer of Parc André-Citroën, in Paris, Gilles Clément, explains that this park has never been vandalised, while gardens created from scratch are on a regular basis – something to think about. We must urgently find a place and purpose for nature in cities. Residents can even contribute by using compost bins and sharing gardens. The environment can create a sense of community.

— Where should we start to rebuild that connection with the environment? What do you think our first steps should be?

C.L.: Direct destruction – overexploitation of soils, deforestation, etc. – and intensive agriculture are dangerous for biodiversity. We need to be able to stop or limit certain practices and organic farming should be subsidised. The growth of the human habitat also leads to massive destruction, particularly suburban housing, which breaks up nature. But people are moving there in droves as the cost of living in city centres continues to rise. We need to start by looking at this issue. Lastly, we've been ignoring something more personal. Nature is a source of wellbeing, as shown by ecopsychology. We have to be aware and give the environment the attention it deserves. Learning to monitor the changing seasons and the movements of the clouds is a big thing – especially for young people, who are increasingly brought up in urban areas.

“We have a moral responsibility to nature.”

Catherine Larrère

Avoid, reduce, offset

The “avoid, reduce, offset” mantra has been widely adopted by public institutions and companies alike. It is especially used to describe the process of trying to halt the destruction of the environment as part of major infrastructure projects.

1976: the “avoid, reduce, offset” rule was included in French law.

2016: the French law on biodiversity was created.

2009 and 2010: the Grenelle environment laws were created.

“We need to switch up the scale.”

Sylvie Gillet
Biodiversity and Health & Environment
Division Manager at EPE

That rule became law for the first time in 1976, with a clearly defined objective: making sure that any project with a harmful impact on the environment can only be carried out under the observance of strict rules. The first of these rules pertains to finding out whether that impact can be avoided. If this is impossible or can only be done partially, it must be reduced. As a last resort, if avoiding or reducing the impact is impossible, the repercussions generated by the operation must be offset.

The “avoid, reduce, offset” is inspired by the approach practised in the United States. At the beginning “no one really knew what to do”, according to Guillaume Sainteny, who headed in the Ministry for the Ecological and Inclusive Transition France’s environmental authority in charge of controlling how this threefold approach plays out in reality.

Progress has come gradually, although not particularly when it comes to avoiding environmental damage, as carrying out a project without harming ecosystems is usually deemed too restrictive by project managers. That has barely changed today, even if the halting of the airport in Notre-Dame des Landes seems the perfect example. But reducing the environmental impact has been helped by evolving techniques and even people’s mentalities. The offsetting aspect has, however, long been a dead letter.

EDF STEPS UP ITS COMMITMENTS IN 2020

With production facilities, sites reconverted for different uses, land reserves and more, EDF manages 46,000 hectares of land and reservoirs located in or near natural areas. Its commitment to protecting ecosystems has intensified, diversified and taken on a specific structure over the years in collaboration with associations and scientific partners. Biodiversity has been one of the Group’s 6 corporate social responsibility goals since 2016. EDF’s actions to promote biodiversity gained additional strength in 2020. The Group pledged to carry out 30 additional measures over the next two years as part of 2 major national initiatives: *Entreprises engagées pour la nature – Act4nature France* and *Act4nature International*. A major focus in this new range of actions is improving scientific knowledge, particularly regarding the impact of offshore wind and artificial light, and the effect of the water temperature at nuclear sites on aquatic organisms. Another focus is the pressures as defined by the IPBES – the biodiversity equivalent of the IPCC – with, for example, EDF drawing up directives for wind and photovoltaic energy, as well as conventions requiring that third parties apply environmental practices on the land under their concession.

A new framework for fresh momentum

Two European directives, the Grenelle environment laws of 2009 and 2010 and, finally, the 2016 French law on biodiversity were needed to give new momentum to the threefold “avoid, reduce, offset” approach.

That being said, the system in place is by no means perfect. Thresholds (regarding land or costs) therefore influence whether or not there will be an impact assessment. Some 68,000 hectares of natural or farming land is lost to urbanisation in France every year. The French Ministry for the Ecological and Inclusive Transition has pointed out that nationally this is the main cause of deteriorating natural habitats and particularly biodiversity loss. This application of thresholds also encourages certain project managers to divide up their projects so that certain aspects slip under the radar. A sort of grey area applies to projects discussed on a case by case basis – and that’s where nature loses out. And then there are project owners who just think about how to get out of this regulation.

“We really have to underline the fact that it’s a legal obligation,” says Sylvie Gillet, Biodiversity and Health & Environment Division Manager at EPE. Some companies have incorporated that for a long time. “That’s the case for energy providers and the managers of major projects, who find themselves at the forefront due to the impact of their activities.” France’s electricity transmission system operator RTE has therefore condemned the use of plant protection products or rotary cutting under high-voltage lines, to cite one example.

Is this good behaviour a case of not being able to see the forest for the trees? “We are still seeing biodiversity loss,” says Sylvie Gillet. “We need to switch up the scale.”

OFFSETTING, EASIER SAID THAN DONE

Offsetting occupies its own special place within the “avoid, reduce, offset” approach. Present in French legislation since 1976 but with the caveat “if possible”, offsetting was only really put in place after its adoption in the law of 2016 to reclaim biodiversity, nature and landscapes. But offsetting has received its fair share of criticism.

When applied in development projects, the practice can eliminate net biodiversity loss and even sometimes produce gains. Project owners have three options: either they restore biodiversity on a plot of land themselves, engage a third party to do so, or buy units in offsetting programmes. To do so, they must purchase a number of offsetting units equivalent to what is being destroyed from an establishment with its own land, where it is carrying out restoration work.

CDC Biodiversité (a wholly owned subsidiary of French financial institution Caisse des dépôts) operates energy offsetting programmes and was the first organisation in France to sell these units. In 2008, CDC Biodiversité bought 357 hectares of industrial orchards that were withering away on the Crau plain, in the south of France, and restored the habitat to its original state – a semi-arid steppe. Other organisations have since followed their example.

In addition, barrister Clémence du Rostu has pointed out in a note that “offsetting measures should include a performance requirement and be effective throughout any environmental violations”. The A65 motorway, connecting Pau and Langon, in southwest France, since 2010, is an ideal example. CDC Biodiversité fulfilled the offsetting responsibilities of concession holders by safeguarding and restoring 1,372 hectares of natural habitats for the 55-year concession.

Offsetting, the right to destruction?

Nevertheless, some have criticised abuses of the offsetting mechanism, arguing that it is used to dodge obligations to avoid and reduce environmental damage. Philippe Thiévent, the Director of CDC Biodiversité, explains: “You hear this argument a lot, but I don’t know of many companies that are rushing to implement offsetting measures.” He also dismissed the idea that it gives companies the “right to destruction”, provided that avoid and reduce measures are correctly applied. “It’s better to take action for good rather than doing nothing. Anything people do will never be as good as what nature can do – but that’s not a reason to do nothing.”

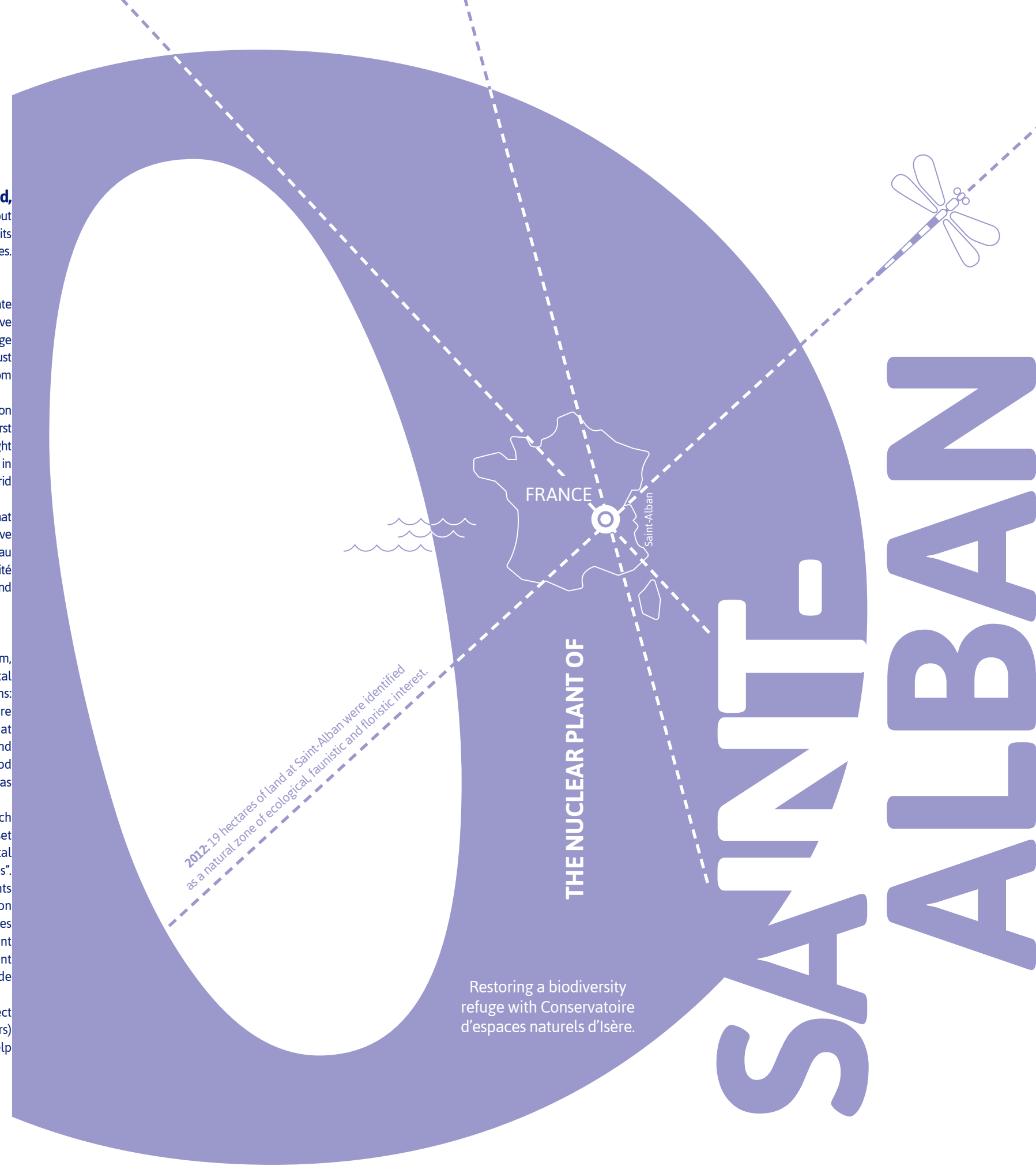
Furthermore, according to a 2019 study carried out by the French national natural history museum (MNHN), of 25 projects (577 hectares) set aside to offset areas where natural land is being urbanised, “environmental offsetting was either not stringent enough or unsuitable in 80% of cases”. “The law is currently not sufficiently controlled or correctly applied,” points out Philippe Thiévent, who is calling for a rapid implementation of action 90 from the French government’s plan for biodiversity. Action 90 envisages the provision of management tools that would enable the relevant authorities to follow and check offsetting measures. Philippe Thiévent explains: “It’s not about punishment – there needs to be an educational side to the monitoring, so that we make collective progress.”

Furthermore, if carried out well, offsetting is expensive. “If project managers incorporate the accurate cost of long-term (30-60 years) offsetting into their plans, it would have a direct positive effect and help reduce the environmental impact,” says Philippe Thiévent.

€650 MILLION TO €1,400 MILLION

The range of funding that the French Ministry of the Ecological and Inclusive Transition has deemed necessary to offset transport infrastructure between 2017 and 2037.

“Environmental offsetting was either not stringent enough or unsuitable in 80% of cases.”



2012: 19 hectares of land at Saint-Alban were identified as a natural zone of ecological, faunistic and floristic interest.



THE NUCLEAR PLANT OF SAINT-ALBAN

Restoring a biodiversity refuge with Conservatoire d’espaces naturels d’Isère.

SAINT-ALBAN



On the banks of the Rhône, 50 km south of the city of Lyon, the EDF Saint-Alban plant generates the equivalent of 30% of electricity consumed in the Auvergne-Rhône-Alpes region. Across the 180 hectares of land, almost 20 hectares of wetland are home to ecosystems where biodiversity thrives with, for example, beavers, amphibians and dragonflies. The area's environmental and hydrological features are being restored thanks to a long-term partnership with an environmental association, Conservatoire d'espaces naturels d'Isère (CEN). "The Malessard stream is home to

the area's last southern damselflies, a protected dragonfly species", says Yves Prat-Mairet, Associate Curator. "The hydraulic work completed in late 2019 fulfilled all of the conditions needed for their population to reach 1980s levels again." To maximise nature's chances, CEN d'Isère launched a five-year on-site management plan this year and is carrying out annual surveys. It intends for example to create new ponds to support the existing reed bed. Moreover, there are plans to mow twice a year to combat the growth of goldenrods, an exotic invasive plant that is currently an obstacle to the return of native insect and bird species. Yves Prat-Mairet explains: "The aim here is to reconcile human activity with biodiversity by using similar techniques to those used by projects restoring habitats in natural areas."



THE MAJOR STEPS TO RESTORE MALESSARD'S WETLAND ECOSYSTEMS

2012

19 hectares of land at Saint-Alban were identified as a natural zone of ecological, faunistic and floristic interest, by the Isère department as part of EDF engineering's proactive Land and Biodiversity programme.

2018

A complete environmental and hydrological survey was carried out to launch the partnership agreement with CEN d'Isère.

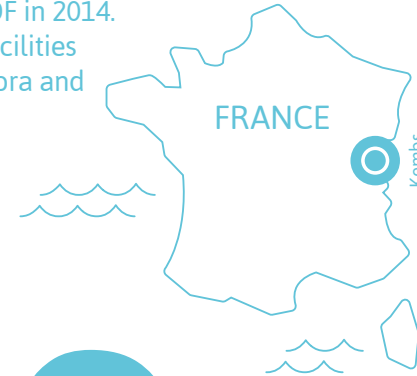
2019

The first work to restore hydraulic operation of the Malessard stream took place.

April 2020

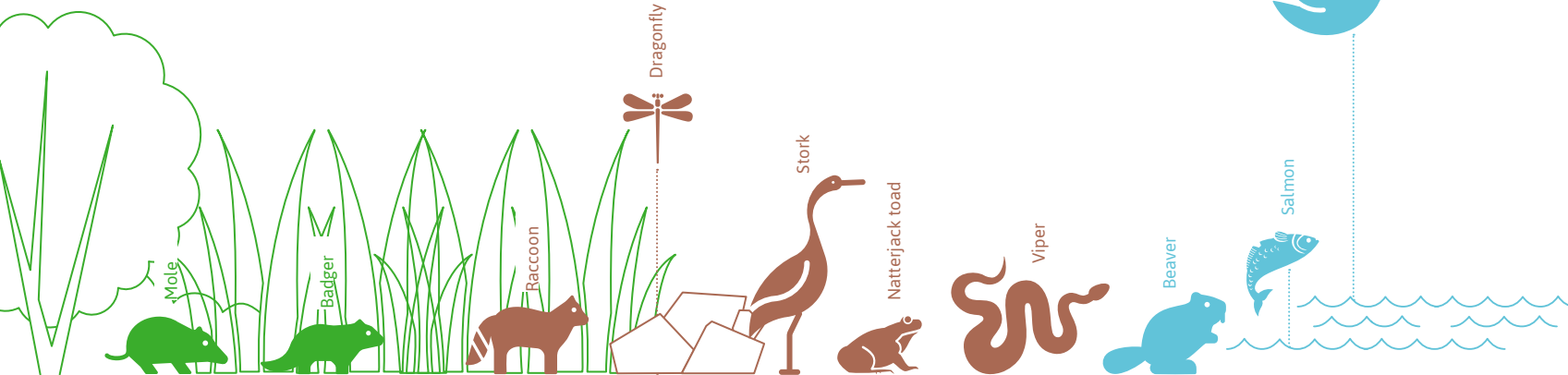
The CEN d'Isère launched a 5-year management plan in collaboration with EDF.

Welcome to Île du Rhin. This small island in Alsace was once taken over by the monoculture production of corn – but today, birds, amphibians and fish flourish here. Wildlife came back to the island thanks to a large-scale renaturing project launched by EDF in 2014. This project symbolises EDF’s willpower to integrate its facilities harmoniously in their local ecosystems and protect the flora and fauna that live there – a unique initiative in Europe.



The KEMBS

dam, bringing back nature to the banks of the Rhine



“I love seeing storks, geese and all kinds of dragonflies gather here every day. It’s become a real biodiversity hot-spot!” Peering through a telescope from the window of an observatory, Philippe Knibiely has watched fauna returning to the Île du Rhin, a small island wedged between the Grand Canal of Alsace and the Old Rhine. The director of the Petite Camargue Alsacienne – the association that manages the nature reserve of the same name, which includes Île du Rhin – has paid tribute to the ambitious renaturing project completed by EDF in 2014. The project was carried out with a host of organisations: design offices, local elected officials, environmental associations, scientific institutions and more.

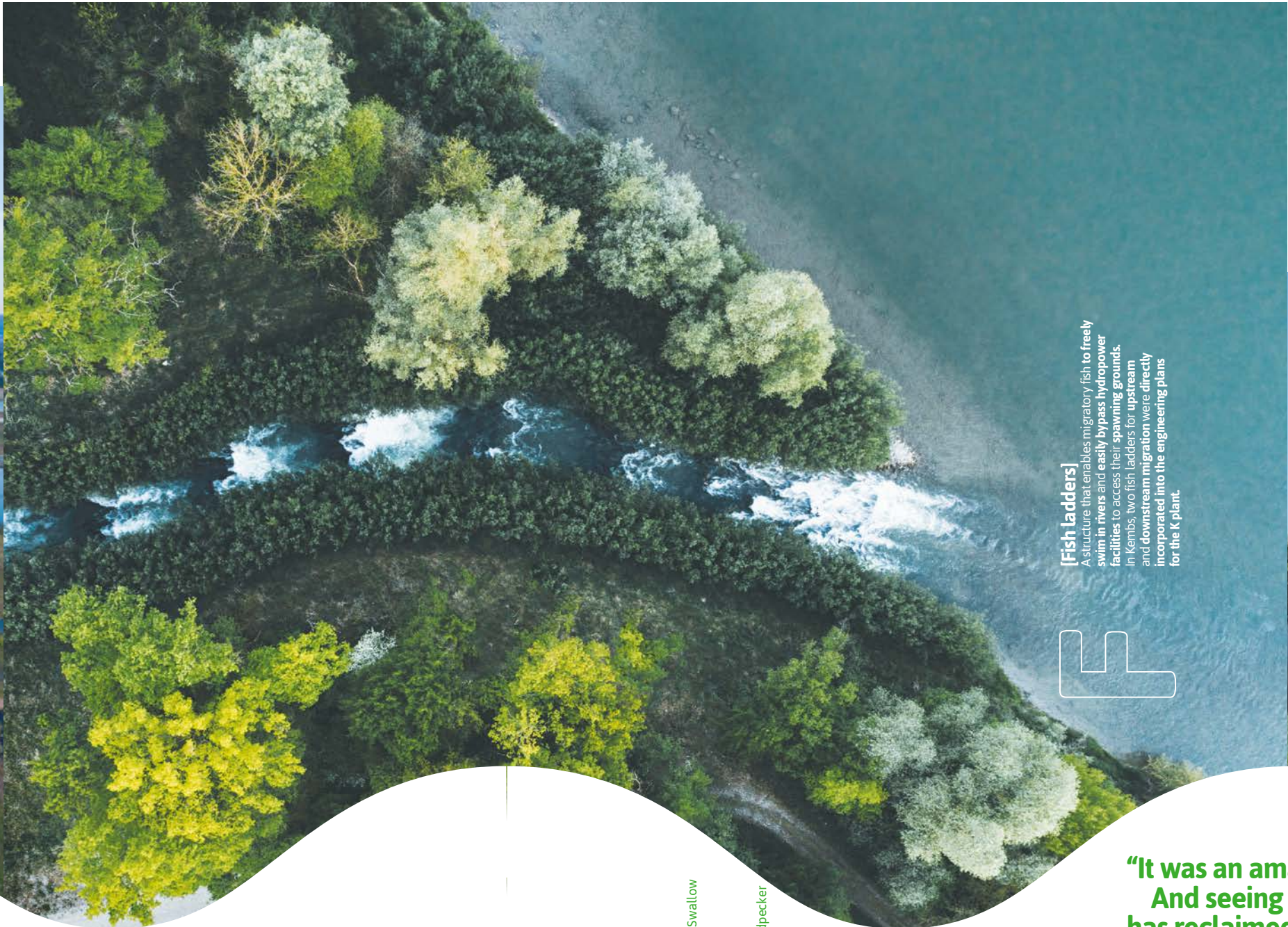
It all began in the early 2000s, when EDF was preparing to renew its concession of the Kembs dam. At the time, the structure diverged much of the Rhine’s water to the Grand Canal d’Alsace to power the plant located upstream. Wildlife in the old waterway long suffered due to the reduced water flow. In the shadow of the powerful structure, Alain Garnier, head

of environmental projects at EDF Hydro Est, remembers the process. His team presented their plans to the French government, proposing to increase the environmental flow of the Old Rhine fivefold to bring it up to between 50 m³ and 150 m³ per second. Even better, the flow would now vary by season in harmony with the river’s natural output, recreating habitats that foster wildlife development.

But it would be impossible for EDF to fine-tune this flow with the immense sluice gates of the old dam. New turbines needed to be built – and that’s how the K plant project was born. “This plant is really an innovation – it’s a structure that generates electricity AND regulates the environment,” says Alain Garnier. But that’s not all EDF is doing for the Old Rhine. The company works to bring gravel back to the riverbed, which is key for some species to reproduce. Now the project is complete, species have returned and move freely; Alain Garnier points to a fish ladder, a series of pools that enable migratory fish to go up and down the river as they please. A similar facility already exist for beavers.



[Environmental flow]
The minimum quantity and timing of water required in a waterway for a sufficient flow to maintain the life, movement and reproduction of aquatic species.



[Fish ladders]
A structure that enables migratory fish to freely swim in rivers and easily bypass hydropower facilities to access their spawning grounds. In Kembs, two fish ladders for upstream and downstream migration were directly incorporated into the engineering plans for the K plant.



[Renaturing]
An operation returning a habitat that has been changed and denatured by humans to a condition close to that of its original natural state.



Meanwhile, around the plant, forests and prairies are thriving. And yet, six years ago, corn grew as far as the eye could see, spanning 100 hectares. Renaturing Île du Rhin is EDF's latest project, but by no means its least ambitious. To offset the construction of this small plant, the company decided to create a new waterway, the Petit Rhin, around the island dried by the installation of the previous river. To do so, EDF called on Biotec, a Swiss design firm headed by Bernard Lachat. They worked with a geomorphologist to find the old channels of the Rhine on the island. They suggested that EDF develop the project by rebuilding "a mosaic of different habitats with side branches with very little flow. These types of areas highly encourage dragonflies, amphibians, reptiles and more to flourish." The area is part of the nearby Petite Camargue Alsacienne. When the water went in, in September 2014, fish, birds and ducks that previously solely lived on the historical reserve

started to venture onto the island. Various amphibians are also making an appearance – including natterjack, common midwife and yellow-bellied toads. EDF spent €60 million on the entire project and will continue to contribute an average of €300,000 to ensure the site's continued monitoring. Tourists and residents clearly appreciate it – in 2019, 30,000 people visited the site trails. Local people are also fans. Jean-François Moreau is the head chef at a restaurant located upstream near the locks – and a wildlife photographer in his time off. He witnessed the site's transformation first-hand. "It was an amazing project. And seeing how nature has reclaimed these places is just magical." Every morning before heading to the kitchen, he tours the island: "Storks fly down, there's common sandpipers, green sandpipers, treecreepers, great spotted woodpeckers, etc. Once you've seen all of that, your day's already off to a great start!"

"It was an amazing project. And seeing how nature has reclaimed these places is just magical."

Jean-François Moreau, chef and wildlife photographer

CA CHANGE TOUT

Discover the sound documentary in the podcast "Ca change tout", on all listening and downloading platforms: Apple Podcasts, Spotify, Deezer, Podcast Addict, Google Podcasts... and on edf.fr.

“AROUND
40% OF
THE WORLD
ECONOMY
IS BASED ON
SERVICES
SUPPLIED
BY NATURE.”

Interview:
**ANTOINE
CADI**

Head of Research and Innovation
at CDC Biodiversité



— **How is biodiversity funded?**

Antoine Cadi: Funding has changed a lot. Apart from a few major donors, for a long time it was purely funded by public money. In the 1990s company contributions began to develop, but they only accounted for 7% of total sponsorships. What's more, these very companies that made financial contributions either did not change or only marginally altered how they worked. It wasn't until after the millennium that companies began addressing the idea of taking a more responsible and cohesive approach to their relationship with the environment.

— **And now we have environmental economists...**

A.C.: Yes – and they estimate that anywhere between \$150 billion and \$350 billion will be needed every year to save biodiversity. In addition, they think that three quarters of these sums should come from the private sector. It's urgent that we save not one or several specific species but rather biodiversity as a whole, as well as the ecosystem services that it provides. Around 40% of the world economy is based on services supplied by nature – water purification, pollination and soil fertility, to name a few. Our society and economy have become accustomed to their availability. But this abundance of “free” resources will disappear with biodiversity loss. Companies can no longer ignore these issues.

— **Does that mean we should put a price on nature?**

A.C.: It's a pivotal moment. We shouldn't be looking to monetise everything, but it is important to think about the replacement cost for those same services over the long term. And we have to remember that over a quarter of biodiversity has already been lost.

— **Do biodiversity assessment indicators exist?**

A.C.: We first looked at what was happening with regards to the climate, which is referred to using a unit that everyone now agrees on – tonnes of CO₂ equivalent. Coming up with the same thing for biodiversity was very challenging. How can you bring together 2 million species within one metric unit? CDC Biodiversité decided to use existing solid scientific research in order to create a tool for companies and investors to measure their biodiversity footprint – i.e. the level of pressure they put on nature – much as they do for the climate with the carbon footprint. We called it the “Global Biodiversity Score (GBS)”.

HOW CAN YOU BRING TOGETHER
2M
SPECIES
WITHIN ONE METRIC UNIT?



“WITH THE GLOBAL BIODIVERSITY SCORE, COMPANIES NOW HAVE A TOOL TO MEASURE THEIR IMPACT.”

— **How does the tool calculate impacts?**

A.C.: Impacts are expressed in MSA.km², where MSA is the Mean Species Abundance, which characterises the integrity of ecosystems. MSA values range from 0% to 100%, with 100% representing an undisturbed and intact ecosystem. The idea is to then connect this calculation to the pressure resulting from their economic activities, such as soil degradation and pollution. We created the B4B+ club to encourage discussions, carry out pilot projects, and involve scientists and NGO partners. We launched version 1.0 on 12 May 2020 (<https://www.cdc-biodiversite.fr/gbs/>). The task now is to extract specific data, like for a carbon assessment. At the same time, the companies will also be asked to reflect and draw up a strategy to reduce their impact.

— **Is this indicator going to encourage the emergence of financial tools?**

A.C.: In terms of funding biodiversity, we're still light years away from a solution like the carbon market. Green bonds, for example, are overwhelmingly climate-related. Biodiversity is still losing out. By rolling out these projects, other organisations are getting involved. For example, Axa AM, BNP Paribas AM, Mirova and Sycomore AM have launched a joint initiative to develop a tool to measure impacts on biodiversity.

— **Are we not simply commodifying nature?**

A.C.: That's a risk we must take into account and prevent by providing tools such as GBS that enable us to take action to reduce impacts on biodiversity. However, we must not rule out developing "bargaining" which would involve drawing up contracts between stakeholders to establish a sustainable and collaborative method of governance to take action to protect nature.

— **What's the keyword to saving biodiversity?**

A.C.: Humility... And willpower!



**Interview:
SYLVAIN
VANSTON**

Head of Climate
at Axa Group

Axa has been working to integrate biodiversity risks into its investment and insurance activities since 2018. Why?

When biodiversity suffers, so do entire swathes of the economy across the world: agriculture, textiles, chemicals, pharmaceuticals, etc., potentially bringing down other sectors in their wake. It's not only a risk for our long-term investments, but also our activity as an insurer. The collapse of biodiversity poses risks as severe as those presented by climate change. But for biodiversity in particular, the changes come faster, are more intense, and are often already irreversible. For society as a whole, protecting biodiversity is a real emergency. For investors, we think it's the next frontier of sustainable finance. The good news, if there is any, is that climate change is one of the main sources of pressure on biodiversity; as such, we have all already started taking action. But biodiversity requires targeted actions to address all of the other factors such as local pollution, deforestation, oceans and land usage.

What are your current specific means of action?

Our financial tools are fragmented in their field of action and limited in scale. That will remain the case as long as biodiversity lacks a significant and universal indicator like the carbon footprint to measure the biodiversity impact of companies and, by extension, our assets. Axa currently finances biodiversity protection through investment funds with "an impact", which support companies taking actions or whose activities create a positive, measurable impact, often known as "nature-based solutions". But change will come from our capacity – within a few years, we hope – to measure the impact of our investment choices and insurance practices on biodiversity.

What will this tool for measuring biodiversity impact actually change for Axa?

As an investor, Axa will be able to set targets to reduce the biodiversity risk of its portfolio and launch suitable measures. For example, by choosing to disengage from certain companies whose production methods are unsustainable for biodiversity and who fail to respond to shareholder intervention. As an insurer Axa could one day decide, according to this indicator, to no longer cover certain activities undertaken by a company in a certain region or country, while increasing support for companies that update their business model. This targeted adjustment of our insurance activities is the right response to the very localised nature of biodiversity risks – compared with the climate risk, which is global. Current scientific knowledge shows that risks mostly come from certain sectors in certain regions that are major reservoirs of biodiversity. In relation to the climate risk, alongside our green investment strategy, Axa has already rolled out a policy to phase out coal and oil

sands from our business activities, which is something our customers have been receptive to. But this approach will obviously only have an impact if the majority of insurers develop similar policies, as is currently the case for coal, potentially through coalitions.

Is the financial sector as a whole becoming more aware?

It's a growing concern and I'm cautiously optimistic about the ability of investors, banks and insurers to work together to naturally extend existing climate-related actions to encompass biodiversity. We are now waiting for a decisive boost from the COP15 biodiversity conference in 2021, where governments should agree on a target and a long-term roadmap that companies and investors can use to build their action plans.

“FOR SOCIETY AS A WHOLE, PROTECTING BIODIVERSITY IS A REAL EMERGENCY.”

LANDMARK ORGANISATIONS

2020 was supposed to be the year of biodiversity – a title that will now no doubt go to 2021, with two major events set to take place: the 15th Convention on Biological Diversity and the IUCN Congress. One objective is to demonstrate that protecting ecosystems must be a priority for governments as well as companies, as in the combat against climate change.



1948

IUCN
Created in Fontainebleau in 1948 and since based in Switzerland, the **International Union for Conservation of Nature (IUCN)** will come back to France for the first time in 2021, holding a congress in Marseille. This worldwide network is made up of government representatives and associations and draws on the advice of 15,000 experts across the globe. In 2018, its revenue totalled 127.2 million Swiss francs (around €118 million). Recognised for its Red List of Threatened Species, first drawn up in 1964, the IUCN has pointed out that, according to the World Economic Forum, over half of world GDP is exposed to moderate or severe risks due to biodiversity loss.

1972

UNEP
The United Nations Environment Programme (UNEP) is the world's leading environmental authority. It was founded in 1972, after the Club of Rome published a report on the limits to growth. Located near Nairobi, in Kenya, it was the first UN entity to be based in a developing country. But its status as a programme rather than an agency, like the WHO and WTO, limits its powers significantly and means it is solely financed by countries' voluntary contributions.



1973

CITES
It has been estimated that the trafficking of global flora and fauna is the world's fourth most common type of trafficking in the world after drugs, counterfeit goods and people. It therefore clearly warranted the creation of the **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**. It was signed in Washington in 1973, setting a legal framework to avoid the overexploitation of wild animals and plants for trade. The Conferences of the Parties (COP) take place every two to three years to ensure its application.



1992

CBD
The Convention on Biological Diversity (CBD) was created at the Earth Summit in 1992. The international treaty was ratified by 168 countries or "parties". The CBD secretariat is based in Montreal. It has three main objectives: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising out of the utilisation of genetic resources. Its meetings, COPs are held every two years. They aim to advance the implementation of the convention and the application of its decisions in the different countries. In 2010, COP10 set 20 objectives to meet by 2020. For the time being, just one – the creation of protected marine areas – has been met. COP15 is scheduled to take place in Kunming, China, in October 2021 and will set new targets. Some hope that these new objectives will be more realistic and therefore more achievable, in a context that is more sensitive to these issues.

2008

FRB
The French Foundation for Biodiversity Research (FRB) focuses on understanding, appreciating and increasing awareness of biodiversity research. To do so it not only supports research teams but also leads the IPBES French National Committee. Along with the French national natural history museum (MNHN), it provides scientific advice as part of the CBD. Lastly, it also provides scientific tools for ecosystem management.



2019

IPBES
In 2019, the **Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)** issued a shocking report. It stated that, if nothing is done, 1 million of the 8 million species in existence are at risk of extinction in the near future. Created in 2012 following the model set by the Intergovernmental Panel on Climate Change (IPCC), the IPBES acts as an interface between international scientific expertise and governments. It focuses on the conservation and sustainable usage of biodiversity. Operating under the authority of the UN, the IPBES secretariat is based in Bonn, Germany.

2020

OFB
The French agency for biodiversity (OFB), created in January 2020, works to protect living things in France. It came about as the merger of the Agence française pour la biodiversité and the Office national de la chasse et de la faune sauvage. With 2,800 staff, the OFB is also responsible for environmental and wildlife health policing and reports to the French Ministry of the Ecological and Inclusive Transition. In 2020 it had a budget of €433 million.



What will tomorrow look like?



A column by GILLES BŒUF

Professor emeritus at Sorbonne University, consultant professor at AgroParisTech, President of the European Centre of Excellence in Biomimicry in Senlis (CEEBIOS), former President of the French national natural history museum (MNHN) and visiting professor at Collège de France

AT THE END OF SUMMER 2019, SOMEWHERE in the province of Hubei, in China, a new epidemic was emerging that would become a pandemic at the start of 2020. What should we make of the Covid-19 outbreak, and how should we react to make sure that this catastrophe – and is it really one, compared to other past events? – never happens again? Why did it produce these reactions? What is the connection between this pandemic and human activity, like the acceleration of climate change or biodiversity loss?

For the climate, there isn't a direct link – rather, we need to look at the unspeakable conditions of overcrowded live animal markets in China, as well as the horrifying number – over 100,000! – of flights that take place every day, making a 3.5% contribution to ramping up climate change and global heating. That's the kind of behaviour we have to completely overhaul. The enemy isn't the virus – it's ourselves! One of the main questions today is that, here in France and most other European countries, we have accepted major restrictions to our activities and movements – so are we ready to make the same "sacrifices" to limit the extent of climate change? Is this the end of the privileges afforded to the aviation sector, as recently suggested by Raymond Woessner? The liberal approach to pricing and actual costs, taking external factors into account, is raising crucial questions. The decline in biodiversity and living things is again mentioned specifically in the latest WWF publication, *Living Planet Report 2020*, which was released after the IPBES report of 7 May 2019 following a Unesco meeting in Paris at the end of April/beginning of May 2019. Nature is deteriorating globally more quickly than at any other time in human history, and the species extinction rate is ramping up – which is already producing severe repercussions for people all over the world. The health of the ecosystems that we and all other species rely on is worsening faster than ever. We are eroding the very foundation of our economy, livelihood, food security, health and quality of life throughout the world.

Just one species is responsible for the Covid-19 pandemic – ours. As with the climate and biodiversity crises, the recent pandemic is the direct consequence of human activity – particularly our global financial and economic systems, which are based on a limited paradigm that prizes economic growth above all else. We therefore currently have a short window within which to tackle the challenges of the current crisis to avoid planting the seeds of future crises. Will we learn from it? When will we eliminate these live animal markets held in unspeakable conditions across Asia, halt the unbridled extraction of trees and animals in ecosystems – including tropical forests – all over the world, end the constantly derided and systematically infringed-upon sustainability thresholds for life at land and sea, cease waste and constant water pollution, stop the "environmental roulette" of transporting everything everywhere and triggering spikes of invasive species and the unrestrained dissemination of all types of pathogens, viruses and bacteria or other micro-organisms that cause these pandemics and create so much suffering? The virus has multiplied our weaknesses.

In conclusion, there has been life on Earth for almost 4 billion years, developed from the first cells that formed in the primitive ocean. The Earth has undergone the worst crises imaginable and always survived; to do so, it has had to constantly adapt to external shifting conditions. But in order to adapt, we must change – which is something we still aren't doing. When will we stop this disastrous short-sightedness? Too much consumerism and excess; we must never forget that, at our core, we are just water, salt and cells. Let's be inspired by living things, which use energy sparingly, never poison themselves (they may produce dangerous substances, but they know how to dispose of them and their waste is always reused somehow) and constantly innovate, producing benefits for us all. We need biodiversity to survive. Maybe a little virus consisting of just 15 genes could give us the collective jolt that we so need.



“We need
to move away from
short-termism.”



Robert Costanza

Economist, professor of Ecological Economics
at the Crawford School of Public Policy (Australia)

Interview



Robert Costanza, professor of Ecological Economics and Vice Chancellor's Chair in Public Policy at the Crawford School of Public Policy at the Australian National University, was one of the first academics to estimate the value of the world's ecosystem services and natural capital and what they contribute to the economy. As one of the founding fathers of ecological economics, Costanza analyses the way in which biodiversity can help society to progress and why humankind struggles to integrate such considerations into its behaviour and puts forward some ideas to change this.

— Until recently, economics and ecology were considered to be totally separate, but now it seems impossible to ignore the inherent connection between them. How do you explain this shift?

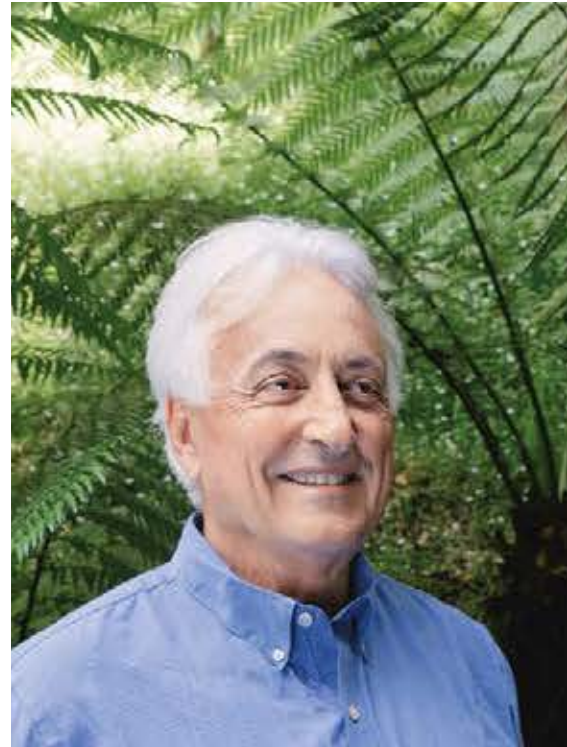
R. C.: To start with, it's just simple logic. The economic activity of humankind takes place within a finite and limited space – the natural world. So, it's absurd to separate them. Over time, an important concept has emerged among ecological economists, that of "nature's services", a term first coined in 1977 by Walter Westman. It was a decisive moment, as we began to consider the value of the environment's contribution to the economy. In 1997, we took this concept further in an article entitled "The value of the world's ecosystem services and natural capital"⁽¹⁾.

— What do you mean by ecosystem "services"?

R. C.: Ecosystem services refer to the ecological characteristics and functions that directly or indirectly contribute to human welfare. We derive a wide variety of advantages from the natural world; it supplies us with water, food and raw materials, regulates our climate, offers natural irrigation and forms soils, is a source of biodiversity and provides a space for more cultural, outdoor activities.

— So, properly balanced natural ecosystems are essential to human welfare, yet still we manage to destroy biodiversity. We like to believe that humans are guided by interest, but in this case, we're acting against our own best interest. Why?

R. C.: Let's go back in time a bit. After 1945, society faced an urgent need to rebuild and stimulate growth. It was important for nations to boost their gross domestic product (GDP), which in the past tended to reflect a certain level of happiness and confidence in the future. Today, these two factors are no longer so closely correlated, primarily because of the staggering rise in inequality. Increases in wealth now only benefit a tiny proportion of the population. Yet, we have continued to use the same indicator; GDP is still thought to be a kind of barometer. We need to take into account new parameters that do not fall within the scope of the economic market to achieve collective wellbeing – which is, after all, the whole idea behind economics. We have developed other metrics, such as the genuine progress indicator, or the Index of Sustainable Economic Welfare. The environment and biodiversity have a decisive role to play in this quest. In 2011, we estimated the value of global ecosystem services at \$125 trillion per year. Our research estimated that the destruction of ecosystem services between 1997 and 2011 represented a loss of between \$4.3 trillion and \$20.2 trillion per year. What we extract from nature cannot be easily replenished and even if we have the will or ability to rebuild it, such efforts require considerable investment. In any case, ecosystem damage is first and foremost a risk to humankind, as demonstrated by the climate breakdown and the huge surge in pollution, which also unavoidably leads to financial losses.



— But what is stopping humankind from seeing nature and biodiversity as an asset that we cannot live without if we are to survive and thrive?

R. C.: Firstly, there's a lack of environmental understanding. When we lost our connection with the ecosystem, we lost our ability to understand it. Too many people just have no idea how the environment works, what it provides and the extraordinary complexity of it all. It is essential we restore a culture that revolves around the living world. We mustn't underestimate the strength of the current system; it gives us answers that are both satisfying and effective, but only in the short term. We're all tackling a kind of addiction to the immediate satisfaction of our needs, and therapy is a difficult and costly process.

— What are the priorities to put nature back at the heart of our socio-economic model?

R. C.: We need to be able to work together to come up with an answer to an essential question: what are our goals for the medium to long term? I doubt people would respond by saying: "we should further destroy the ecosystem to grow GDP, which no longer has any kind of tangible impact on our day-to-day lives". I believe we need to develop more direct democracy to get away from the short-termism I mentioned before.

Business has an integral role to play, driving innovation and circulating information. Companies can improve their manufacturing processes, redefine their objectives and highlight the real issues at stake, for example by incorporating the cost of any negative environmental or social externalities on to the price of their end goods or services. Action like that would rapidly raise awareness in society.

— Are there any initiatives that have caught your eye in recent years?

R. C.: Yes, lots! The most important thing is to build bridges and pool our strengths. Groups such as the Wellbeing Economy Alliance and the Wellbeing Economy Governments, which bring together Scotland, Iceland, New Zealand and Wales, are very interesting. These countries have developed a shared vision, one which promotes the idea that progress in the 21st century must pursue the environmental wellbeing of citizens above all else. They work together on joint projects and solutions. Decisions of this scale can have a very powerful impact.

— What is the difference between the wellbeing economy and the green growth we so often hear about?

R. C.: Even if it's green, growth is still just a state of mind, but it seems to have become both a means and an end. As I said earlier, we need to pursue other goals as the context in which we're living and the challenges we're facing are different now. Nature offers an interesting insight on the matter, as no living organism keeps growing forever. They evolve, change and adapt, but don't grow continuously. We need to think about that and adapt how we behave accordingly.

“Ecosystem damage leads to financial loss.”

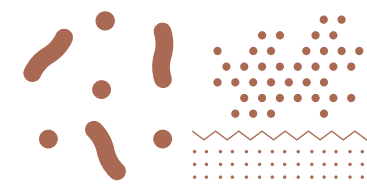
Robert Costanza

⁽¹⁾ Robert Costanza, "The value of the world's ecosystem services and natural capital", Nature, 1997.

Life on earth – a universally beneficial yet oh so fragile balance!

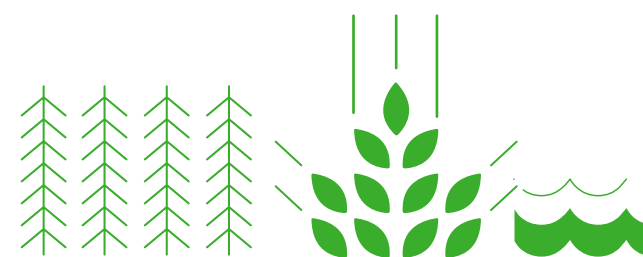


Within an ecosystem, different species provide each other with essential services. In this extremely fragile balance of living things, humankind has so far come out on top – because nature doesn't charge humankind anything in exchange for its services, which certain NGOs estimate to be worth around \$500 billion per year. These services, which can be split into four categories, enable our species to survive. What are they?



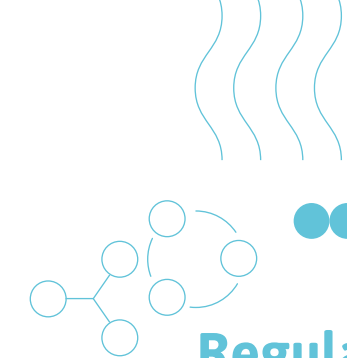
Supporting SERVICES A balance built on fragile foundations

All living things provide services to others, but this virtuous balance is built on a fragile foundation. For example, soils are the fundamental element in land ecosystems, supplying plants with the water and nutrients they need to grow. They also provide a habitat to a considerable number of micro-organisms, which have various functions in operating ecosystem services. In the same way, the production of oxygen – essential to almost all life forms – is connected to the good health of oceans and forests. Supporting services represent the primary category of ecosystem services because, without them, the other three categories simply wouldn't exist.



Provisioning SERVICES Nature feeds us for free

Ecosystems provide us with a great many goods upon which we rely, such as food, water, wood and fuel. Our ability to extract such raw materials depends on the good health of these services. For example, agriculture needs insects to pollinate fields – a study conducted by the French National Research Institute for Agriculture, Food and the Environment (Institut national de recherche pour l'agriculture, l'alimentation et l'environnement – INRAE) and the French National Centre for Scientific Research (Centre national de la recherche scientifique – CNRS) estimated the value of work carried out by pollinators at €153 billion; from forests, we source timber and fibres; the incredibly diverse plant world provides the pharmaceutical industry with the resources it requires to produce medicines; and springs provide us with access to fresh water.



Regulating SERVICES Nature purifies our atmosphere

Forests and oceans produce the oxygen we need to breathe and, by directly consuming CO₂, they also help to minimise the amount of greenhouse gas released into the atmosphere; green spaces effectively help mitigate the urban heat island, thereby enabling people to better tolerate the increasingly frequent heat waves we now experience; the diversity of species and individuals limits the rapid proliferation of pathogens and diseases.

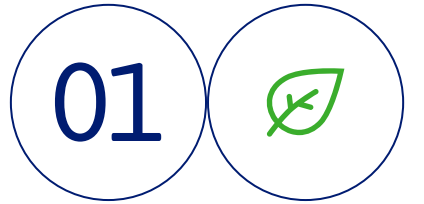


Cultural SERVICES Nature as a source of inspiration

Researchers and engineers draw inspiration directly from nature to improve a whole host of materials and technology. For example, learnings taken from studying the behaviour of ants looking for a route from their colony to a source of food enabled us to develop orientation systems, such as GPS; by modelling Burdock plants and their tiny hooks, engineers developed Velcro; and it was the deadly club of the mantis shrimp, capable of smashing a crab's shell, that inspired the torpedo. Nature extends its reach much further into society – for instance, the African savannah is a major tourist attraction that helps inject considerable sums of money into local economies, and forests offer a stunning backdrop for relaxing walks that are essential to a good quality of life.



TAKING ACTION IN A PARTNERSHIP PACT



WIND AND PHOTOVOLTAIC ENERGY
As part of the Act4nature International initiative, EDF and the IUCN – as well as EDP and Shell – are working in a partnership to draw up guidelines to identify and prioritise the measures available to minimise the impact of wind and photovoltaic projects on biodiversity. They aim to publish the guidelines in 2021.

Building action

EDF has committed to going beyond the “avoid, reduce, offset” regulatory requirement. With this in mind, the Group decided to set more than 20 new commitments to tackle in France and abroad between now and 2022. To power its strategic discussions, EDF draws on work by the French committee of the IUCN, the French national natural history museum (MNHN), the French League for the Protection of Birds (Ligue pour la protection des oiseaux – LPO) and the Federation of conservatories of natural areas (Fédération des conservatoires d’espaces naturels – FCEN).

In order to provide help where needed, this all-encompassing framework needs to be directly managed according to the biodiversity issues of each site. EDF is therefore developing tools to aid decision-making with the MNHN and the LPO, using their methodologies to draw up environmental inventories of the Group’s land assets.

Meanwhile, EDF’s R&D department is working with over 50 partners to develop the effectiveness of its actions to protect biodiversity and anticipate future regulations. For example, the company founded a shared research team with the French National Research Institute for Agriculture, Food and Environment (INRAE) in 2009 – renewed for five years in 2019 – which works to develop environmental approaches to aquatic and, now, land environments. It boasts 10 theses and post-doctorates undertaken, 30 publications written, and 8 theses defended to date.

ENVIRONMENTAL DNA
In collaboration with INRAE and Spygen, EDF’s R&D department is developing more effective and less intrusive environmental inventory techniques. For example, a simple water sample, taken upstream and downstream from hydropower dams and nuclear power plants, is used to analyse traces of DNA and identify nearly all species of fish present. This makes it easier to carry out inventories and reduces any related costs. The current goal is to transpose this methodology to plant biodiversity; for instance, the DNA of honey could be used to make an inventory of the flowers from which bees gather pollen.

17 new voluntary actions

are being carried out in France between now and 2022 as part of the Entreprises Engagées pour la Nature – act4nature France initiative and will be assessed by the French Biodiversity Agency (OFB).

€21 m invested

in R&D work in order to determine the ecosystems surrounding EDF’s generating facilities and develop innovative solutions to avoid, reduce and offset structures’ impact on biodiversity between 2018 and 2021.

Scientists cross-reference the data and issue recommendations; naturalists make observations and raise the alarm; and companies decide to take action and provide resources. But in the face of the immensely complex issue of protecting living things, no one can do it alone – especially when action must be taken on a local basis, accounting for the particularities of each ecosystem and its species. That’s why EDF group has created a network of biodiversity partners to work together, with three main focuses. Each partner harnesses their specific area of expertise to help the Group remain vigilant regarding emerging challenges. Their advice and constructive criticism challenge the company and drive it towards progress.



Helping formulate Group actions to promote biodiversity



Making use of skills to carry them out



Training employees and raising public awareness

A FRAMEWORK FOR ACTION The 5 major factors of biodiversity decline identified by IPBES:

- changes in land and sea use;
- overexploitation of resources;
- climate change;
- pollution;
- invasive exotic species.

◆ Taking action in a partnership pact

CORRECTIVE ACTION
EDF has installed 218 fish passes in France to help species bypass its hydropower facilities. EDF's R&D department and partners conducted research on the Golfech dam, in the Tarn et Garonne department, and, using an acoustic camera, identified exotic predators (i.e., *Silurus*) positioning themselves at the entrance to the fish passes in order to annihilate the native population of Atlantic salmon. The layout of the fish passes was adjusted accordingly.

PROTECTING SPECIES
Over the past twenty-five years, the Pyrenean desman population has declined by 60% in the river systems once home to this little-known semi-aquatic mammal. In addition to taking measures to reduce the impact of its hydraulic activity, EDF is helping improve understanding of its way of life, for instance by providing observational data and supporting these. The Group is taking similar action to protect the Zingel asper, a critically endangered fish endemic to the Rhône basin.

LIGHT POLLUTION
By 2022, EDF will have implemented a methodology to measure the impact of artificial light on fauna, measuring its effectiveness on at least two sites between now and 2022. For the past twelve years on Reunion Island, the "Nights without lights" in April and May have been helping to prevent young Barau's petrels from becoming stranded during flight by taking initiatives to combat excessive or poorly positioned lighting. Organised by the Reunion Island national park and the Society of Ornithological Studies, this programme was renamed the "Days of the night" in 2020 and expanded to protect other species that are threatened or disorientated by light (such as insects, fish and turtles) throughout the year.

FOCUS 2

02

Working together

Local teams led by EDF's partners spearhead multi-year action plans and manage their performance by carrying out regular inventories on the Group's sites while they carry out environmentally-friendly land management, restore biodiversity refuges and protect natural corridors and wetland ecosystems.

Contributing to scientific species knowledge is also key to the initiatives carried out with the FCEN and the academic world.

The environmental impact of EDF's activities is strictly regulated, but the Group continues to refine its understanding of how they interact with biodiversity. Take, for example, nuclear sites, where surface water is subject to a hydroecological monitoring programme approved by the French Nuclear Safety Authority (Autorité de sûreté nucléaire – ASN), supported by the French research institute for exploitation of the sea (Institut français de recherche pour l'exploitation de la mer – IFREMER) for coastal sites.

THERMO-HYDROBIOLOGY RESEARCH PROGRAMME
EDF is collaborating with INRAE to study the influence of water temperature on aquatic organisms near nuclear power plants. Their work will help improve understanding of the impact of climate change on these environments.



1



2

INVASIVE PLANTS
In Isère, the French national alpine botanical conservatory renatured the banks of the new Romanche-Gavet hydroelectric facility with local plants with a greater resistance to invasive species. /2_3

HABITATS
For the past 10 years in Martigues (in the Bouches-du-Rhône department), the CEN PACA has been carrying out environmentally friendly management of a 10-hectare habitat with very rich Mediterranean biodiversity on EDF's

behalf. This initiative increases awareness of a highly threatened species – *Cressa cretica*, a small plant in the morning glory family – and helps the plant develop. /1_4_5_6



3



4



5



6

FOCUS 3

03

Training and raising awareness

In a bid to transform professional practices in its business lines and take biodiversity into account, EDF is teaming up with external experts to create tools for its employees. The Group is going to educate and train 1,000 additional employees between now and 2022 through in-person educational modules, e-learning, *fresque de la biodiversité* workshops, etc.

Schools, local residents and visitors can visit the public information centres at EDF sites in mainland France and French overseas territories all year round. Developed with local stakeholders, the space dedicated to biodiversity presents actions undertaken on the ground and raises visitor awareness of biodiversity issues.

BIRD REPRODUCTION
The LPO has designed a three-day training session for the EDF teams that oversee on-site impact assessments. With sessions taking place annually, the latest aimed to pass on the necessary knowledge and skills to protect birds during the mating season.

A NATURE FESTIVAL
Since 2008, over 60,000 visitors have taken part in the activities organised by EDF sites and their partners for the "Fête de la nature", which includes nature walks to discover flora and fauna, conferences, exhibitions and creative workshops. In October 2020, the Saint-Alban nuclear power plant and the île du Beurre nature observation centre taught children how to build a birdhouse.

EDF'S MAIN IMPACTS ON BIODIVERSITY:

- water and aquatic biodiversity, through its hydropower plants
- loss/fragmentation of natural land habitats, through the effects of its facilities
- birds and bats, through its distribution networks, wind farms and public lighting

What roadmap do governments have? What role do companies play? With targets for the next 10 years due to be set at the UN Biodiversity Conference (COP15) in Kunming, China, in October 2021, **Yann Wehring**, France's Ambassador for the Environment in international talks, and **Carine de Boissezon**, EDF's Chief Sustainability Officer, share their points of view.



Less talk,
more
action!



— **Non-governmental actors have high expectations for the COP15 in terms of targets for a global response, indicators and so forth. Reasonably speaking, what can we expect?**

Yann Wehring: A comprehensive framework to enable everyone – governments, authorities and private stakeholders – to develop a roadmap and an action plan for after 2020. France is pushing for this framework to include ambitious targets, such as increasing the percentage of the Earth's surface covered by designated protected areas on land and at sea to 30%. Additionally, a commitment to halve our use of pesticides and plastics – the most harmful sources of pollution – by 2030, as scientists are urging us to do so. In addition to setting targets, their funding will be at the heart of the talks. The Convention's Strategic Plan for Biodiversity 2011-2020, created in 2010, failed due to insufficient funds.



Choosing an indicator to measure biodiversity is a complex issue that could entail a combination of indicators; however, this must not impede progress or be used as a pretext for inaction. The future of biodiversity hinges on what is happening on the ground right now. Unlike climate change efforts, biodiversity initiatives can produce results very fast provided the situation has not yet reached a critical threshold.

Aside from COP15, which does not aim to provide alternatives, I would feel hopeful if governments, local authorities and private stakeholders adopted pragmatic, tangible approaches.

Carine de Boissezon: Exactly – immediate action is a priority. EDF renaturing land in France and abroad shows that the functionality of ecosystems can be restored in the space of a few years. This often has significant socio-economic consequences for local communities. But other than drawing up environmental monitoring inventories for our sites, how can we measure the creation of value for our activities and the common good? How do we report on the role of biodiversity in tackling climate change? For example, to generate low-carbon electricity in its nuclear and hydroelectric power plants, EDF needs water – a resource that, as we know, is closely linked to the abundance of biodiversity. The Group is developing its own measuring tools, but EDF, like all companies, needs indicators that are internationally recognised. We need them to manage our initiatives – and citizens and financiers will judge how effective they are based on these indicators. I therefore expect COP15 to acknowledge that biodiversity forms part of an overarching objective – the health of humans, the climate and nature.

— **On that note, how can we make sure that biodiversity and the climate are no longer treated separately?**

C. de B.: Some of the actions to achieve carbon neutrality recommended in the IPCC reports have not been well-received by its biodiversity counterpart, IPBES – take bioenergy, for instance. EDF has made significant progress in reconciling these two issues, giving them equal importance among the Group's corporate responsibility commitments since 2016. Since 2020, our programme of voluntary actions to promote biodiversity is centred on the five direct drivers of change in nature identified by the IPBES, including global warming.

Y. W.: We still have a long way to go before we can fully align these challenges, but France is convinced that there is a need to do so. I can think of at least three reasons. First of all, the energy transition must be in harmony with biodiversity conservation and EDF plays a leading role in this respect. Wind turbines in particular are met with opposition on the ground and we must provide solutions. Secondly, you have "nature-based solutions"; for instance, restoring a mangrove creates an excellent carbon sink. We now know that biodiversity conservation can contribute to up to 30% of climate change mitigation solutions. This brings us to the third reason to align these challenges: funding. We need people to wholeheartedly commit to funding projects that benefit both the climate and biodiversity.



“Renewable energy development must be in harmony with biodiversity conservation. Setting the two against each other would be terrible for the planet.”

Yann Wehring



— We therefore need to step up our efforts on all fronts. What can France expect of companies, particularly EDF?

Y. W.: Companies must support national momentum as they are both the root of and solution to the problem. Internationally, the Paris Agreement on climate change has shown us that, in order to make progress, we need the involvement of both the government and non-governmental actors – including companies, who have the agility needed to implement this collective commitment. France is therefore in favour of forming more minor international coalitions to bring together the most motivated stakeholders, a few governments, companies and NGOs. France holds a One Planet Summit to create momentum for biodiversity conservation, thereby making a significant contribution to the sequence of international events culminating in the COP15 of the United Nations Convention on Biological Diversity.

Furthermore, France needs “champions” to support its stances internationally. EDF’s expertise in reconciling the challenges of aquatic biodiversity and hydroelectricity generation makes advocating to national governments easier. We expect trailblazing solutions to be put in place for the construction of large dams and, on a more general note, the development of renewables. EDF will have the government’s full regulatory and political support. Setting renewable energy development against biodiversity conservation would be terrible for the planet.

C. de B.: Just like it does for the climate, EDF group will make an unwavering contribution to the biodiversity targets set by the government. As part of two national initiatives we are involved in, Act4nature France and Act4nature International, the Group is already testing environmentally-friendly dam management in Laos to get the nearby Nakai-Nam Theun national park onto the International Union for Conservation of Nature (IUCN) Green List of Protected and Conserved Areas. We are also developing guidelines for this global organisation on incorporating biodiversity conservation into wind and photovoltaic energy projects. It is no mean feat. Its extensive land assets coupled with its leading position in the renewable energy market give EDF a significant capacity to act. Our mission to protect biodiversity requires localised solutions adapted to the specific features of each ecosystem, but it is also very rewarding as it produces tangible results that benefit everyone.

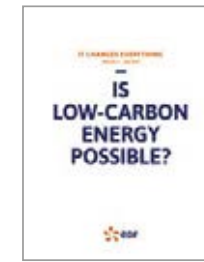
“I expect the COP15 to acknowledge that biodiversity forms part of an overarching objective – the health of humans, the climate and nature.”

Carine de Boissezon



IT CHANGES EVERYTHING

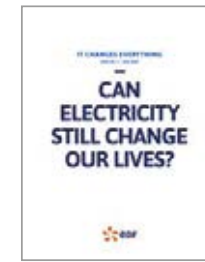
A magazine that addresses the major issues of the energy transition.



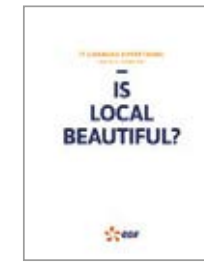
Issue no. 1 – July 2019



Issue no. 2 – October 2019



Issue no. 3 – July 2020



Issue no. 4 – October 2020



Issue no. 5 – January 2021



Radio shows exploring and challenging the shift currently taking place amid biodiversity concerns, with three guests: Dorothee Browaeys, biologist and founder of TEK4life, Bruno David, naturalist specialised in palaeontology, evolution and biodiversity and President of the French national natural history museum (MNHN), and Philippe Madec, architect, urban planner, essay writer and ecoresponsible pioneer.

Interviews with well-known figures and experts that “change everything”.

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Biodiversity is under pressure – what are the risks?

Naturalist and President of the French national natural history museum (MNHN) Bruno David insists that as protecting biodiversity has become an essential challenge for the future of humankind, taking action has become a matter of urgency: "Nothing is irreversible, we must do everything we can to raise awareness." Doing nothing in the face of the dangers facing living things is a threat to society as well as companies, which face economic, legal and environmental risks.

P. 04

Biodiversity and humankind: avoid, reduce, offset.

Philosopher and environmental ethics specialist Catherine Larrère confirms this: "We have a moral responsibility to nature." The urgent need to establish a more harmonious relationship with our environment has ramped up the development of innovative actions and funding mechanisms for biodiversity. Examples in France include Saint-Alban and Kembs, where EDF is taking action to reduce its impact by mobilising an entire ecosystem of stakeholders.

P. 18

Biodiversity restoration, a win-win.

Through his research on the services nature provides to the human economy, economist Robert Costanza maintains that "Ecosystem damage leads to financial loss". To restore the balance, we must establish a new framework for conducting industrial activities in a more responsible way that shows our commitment to biodiversity. EDF is therefore working with a network of partners that play an active role in biodiversity conservation in order to keep its finger on the pulse of emerging challenges.

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