

# MY PLANET

*by The Navigator Company*

**It's in  
our  
hands**

Halting climate change means changing habits and attitudes, investing in restoration of ecosystems and natural consumer solutions. If we act now, we still have time.



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#### MYPLANET #08

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# Caring and protecting

Global warming is approaching tolerable limits, scientists have warned. We currently have an average of 1.2 degrees Celsius above pre-industrial levels, and the limit of what the planet can bear is 1.5 degrees, as from which irreparable and irreversible damage will be done to ecosystems, calling the survival of mankind into question. The UN has warned: we still have time to win this battle, but we have to act now.

**D**ecade of Action This is what the UN has called the process it has set in motion to last from 2020 to 2030, as the deadline for all members of the United Nations to comply with the 169 targets of the 17 Sustainable Development Goals (SDGs).

More than just a deadline, it's a call to action. The UN Secretary-General, António Guterres, has made repeated underlined the need to implement the SDGs, calling for real action. As well as politicians, social and business leaders have been called on to find solutions, resulting in a series of 100 SDG acceleration actions and in a political declaration calling for total commitment over the next ten years.

In April, at the presentation of the worrying annual report from the World Meteorological Organisation (WMO), showing that greenhouse gases had not slowed down in 2020, despite the economic downturn caused by the pandemic, Guterres went further, calling for 2021 to be the year of definitive action against climate change. Because without immediate steps to change our patterns of consumption and lifestyle, we will have "disastrous effects", such as the worsening of extreme climate phenomena and forced migration.

"The Decade of Action is about our own survival as a species, not just to save the modern world, but to save the Planet Earth. Together, we have to change our patterns of consumption, our lifestyles, all our society", says the UN.

**Light at the end of the tunnel?**

After decades of apathy, Europe appears to caught sight at the end of the tunnel of what it needed to

take an urgent approach to climate change: money. The first assessment of the National Recovery and Resilience Plans (on how the new European funds will be spent) shows that projects relating to the energy transition and fighting climate change will represent well above the target of 37% of total investment, a sum of 250 billion euros that the European Union itself has described as "ambitious".

Looking at the plans from the 13 countries that met the indicative deadline of 20 April (Portugal was the first to submit its plans), "green projects" look like accounting for almost 80% of all the subsidies to be paid out. Working towards climate neutrality emerges as the top concern, with investment in renewable energy and mobility (electrical rail and vehicles, for example), whilst energy efficiency projects (including renovation of buildings) account for applications for around 50 billion euros, in both the private and public sector.

In Portugal, the Climate Transition has created an ambitious sustainability agenda, with substantial incentives in the fields of mobility, decarbonisation, the bioeconomy, energy efficiency and the circular economy. The most significant dimension (61%) of the National Recovery and Resilience Plan is "Resilience", a concept that takes in areas such as the green transition, smart, sustainable and inclusive growth, and the digital transition, the third dimension of the plan.

Whilst funds are at last being invested with a positive impact for the climate, the bad news is that, in the view of many environmentalists, this is too little, too late. And in the case of Portugal, with no projection of their expected impact on the reduction of greenhouse gas emissions (GGE), which are responsible for global warming.

**Portugal was the first country to submit its National Recovery and Resilience Plan, setting out an ambitious sustainability agenda.**



The consumer lifestyle of recent decades has reduced nature's ability to mitigate the pollutant effects of human activities.

**When did climate change start?**

Climate change is a concern almost as old as the industrial revolution, which started in England in the second half of the eighteenth century. Since then, there has been a consistent and gradual increase in the average temperature of the planet, due to the growth of production systems based on the use of pollutant forms of energy that emit greenhouse gases, such as carbon dioxide and methane.

At the same time, the consumer lifestyle of recent decades has led to the devastation of huge sectors of the world's natural capital, reducing nature's own ability to mitigate the pollutant effects of the activities of a growing and increasingly demanding human population.

After countless warnings from scientists, systematically ignored by decision-makers, it was only in 1988 that the Inter-governmental Panel on Climate Change (IPCC) was set up. And only in 2005, following on from the Kyoto Protocol, signed in 1997 by 192 States, that the international community started to take effective measures to curb global warming, by then an established scientific fact. Europe set up its Emissions Trading Scheme (EETS), designed to discourage greenhouse gas emissions, requiring emitters to pay more than they would pay to convert their facilities to less pollutant energy systems.

**Targets missed and renewed**

When they met again, this time in Paris, in 2015, to set stricter targets for admissible levels of greenhouse gas emissions, several commitments in this area had not been honoured. In 2012, only the European Union had met the targets agreed in Kyoto. And shortly after the signing of the Paris Agreement, which was voluntary and not binding, Donald Trump's decision to take the US out of the agreement dealt a severe blow to the fight against global warming.

The size of the US economy makes the country a key player in these efforts. In 2019, whilst each European

**Recycling is not enough**

Recycling is an important way of preserving the environment, but taken alone it ends up encouraging the perpetuation of the consumer society. That's why reducing and reusing (the other two "Rs" in sustainability) are more effective strategies for cutting emissions.

The example of the US points to the need for big improvements in the efficiency of recycling. According to the Environmental Protection Agency (EPA), only 25% of glass is recovered, and for plastic the figure is under 10%. Of the 300 million tons of domestic waste produced in the US in 2018, only 69 million was recycled. The only successful recycling rates in the United States are for paper and cardboard, at over 68% (72% in Europe, according to the Confederation of European Paper Industries, CEPI).

Recycling has also been prejudiced by inappropriate individual behaviour, albeit with good intentions. People put non-recyclable waste in recycling bins, in the hope that it will be recycled. This is the phenomenon known nowadays as wish-cycling. The contamination ends up consigning the whole batch to landfills, which emit methane, a greenhouse gas with a significant influence on climate change and a heating potential sixty times greater than CO<sub>2</sub>, although it remains in the atmosphere for longer. ♦

emitted 6.7 tons of CO<sub>2</sub>, the figure for each American was 16 tons. Per capita emissions were what led China (7.1 tons) and India (1.9 tons) to claim the right to allow their emissions to grow in the next decade, making an international understanding even more difficult.

On 21 April this year, the European Union set a new target for cutting net reductions (i.e. the balance between emissions and retention) of greenhouse gases by at least 55% by 2030, in comparison with 1990 levels, maintaining the target of carbon neutrality by 2050. The European Parliament's recommendation pointed to a minimum of 60%.

Now under the presidency of Joe Biden, the US has revived its environmental concerns and is seeking to cut emissions by 50% by 2030, but taking 2005 as its baseline, making it objectively less ambitious than Europe, whose own targets are regarded as unambitious by the majority of environmentalists.

**Portuguese people willing to step up efforts**

In line with the majority of people in Europe, the Portuguese want their country to do more to cut emissions. A YouGov survey of 12 countries for the European Federation for Transport and Environment (T&E), of which the Portuguese environmental NGO Zero is a member, showed that almost three out of every four people in Portugal would be happy to pay a little more for fuel or heating energy, if this helped in the collective drive to cut emissions.

There are actually exceptional examples of a commitment to mitigating the effects of climate change in Portugal. The Navigator Company, for instance, was the first Portuguese company, and one of the first in the world, to adopt a commitment to make all its industrial complexes neutral in carbon emissions by 2035. The announcement, made in 2019, cuts 15 years off the target set by the European Union and by Portugal for carbon neutrality, requiring investment of more than 150 million euros in renewable energy, new technologies and also in planting forests. This has already started to bear fruit: the recent start-up of a new biomass boiler at the Figueira da Foz mill will alone permit Navigator to make a 32% cut in CO<sub>2</sub> emissions by the end of this year. In line with the United Nations SDGs, The Navigator Company has developed its own "Responsible Management Agenda 2030", which it has adopted as the management blueprint for the Decade of Action.

**Everyone matters**

The UN Secretary-General, António Guterres, has led a campaign for a 45% cut in global emissions by 2030, in relation to 2010, which will require countries around the world to pull together, as they meet again in Glasgow, for November's 26th Climate Change Conference of Parties (COP26).

Guterres has said we are "on the verge of the abyss" and that 2021 is the "year of action", underlining the need to act already "decreed" by the UN itself, which has designated this as the Decade of Action.

**The future of bioproducts**



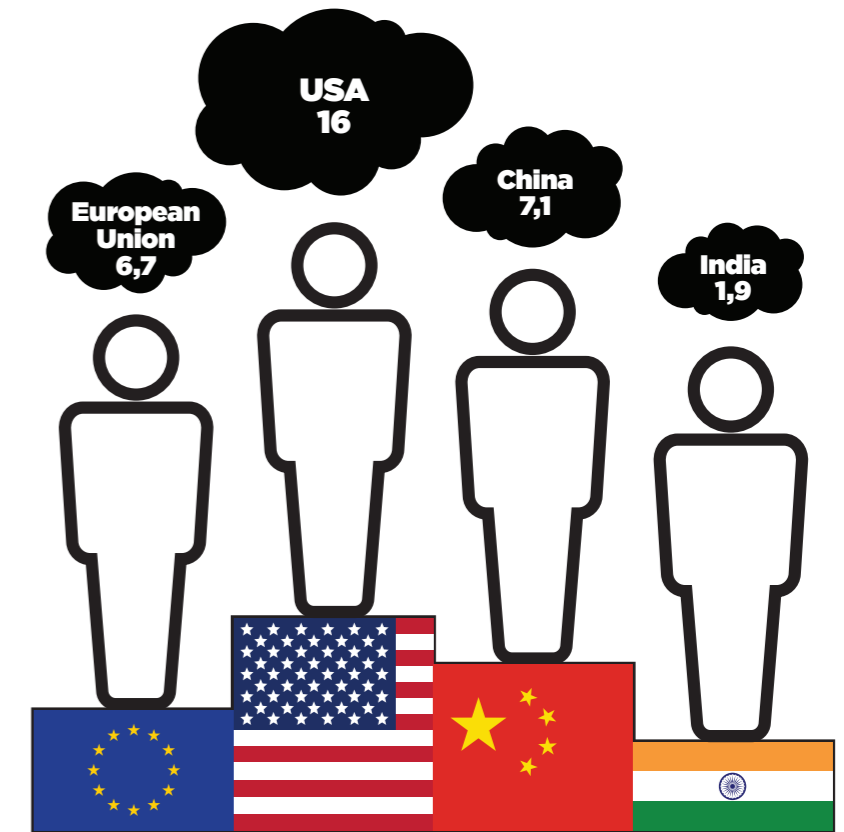
The biochemicals and biofuels being researched at RAIZ are a sustainable alternative to fossil fuels.

In the field of bioproducts, RAIZ - the forestry and paper research institute majority owned by The Navigator Company - centred its efforts in 2020 on biochemicals and biofuels, a sustainable alternative to fossil fuels, which can make a huge contribution to reducing greenhouse gas emissions. The Inpactus research programme, in partnership with the Universities of Aveiro and Coimbra and other organisations, includes work on preliminary engineering of a process for producing bioethanol from biomass and conceptual design of another process for producing bioethanol from primary sludges, which are a form of cellulose waste generated at the waste water treatment units of pulp and paper mills. The results so far are technically and economically promising, and are aligned with the EU directive (with targets already set up to 2030) requiring a rising level of mandatory incorporation of biofuels obtained from cellulose materials/waste into fuel for vehicles. ♦

**Almost three in four people in Portugal would be happy to pay more for fuel or energy, if this helps efforts to cut emissions.**

**Per capita CO<sub>2</sub> emissions (tons/year)**

Whilst in absolute terms China is regarded as the largest emitter of greenhouse gases (27% of total global emissions, according to the latest report from the Rhodium Group, which ranks the US in second place, at 11%, and India third, at 6.6%), the emerging economies argue that their average emissions per person entitle them to "credit", i.e. the right to more emissions, to offset their late industrialisation. The largest producers of renewable energy are in China, but Chinese industry continues to be driven primarily by coal. Aiming for carbon neutrality in 2060, the country will reach peak emissions in around 2030. ♦



**On the front line of decarbonisation**

Over the course of 2020, Navigator pressed ahead with the measures set out in its Roadmap for Carbon Neutrality. In order to honour its commitment to achieve carbon neutrality at all its industrial complexes in 2035, fifteen years ahead of the Portuguese and European targets, the company is working with the Science Faculty at the University of Lisbon to review and update its plans and to set medium and long term goals.

The recent start-up of a new biomass boiler at the Figueira da Foz plant was another massive stride in this direction, and other measures are planned for this year, including work to substitute fuel oil with natural gas at the Setúbal complex.

Since last year, greenhouse gas emissions are being measured in accordance with the GHG Protocol methodology, in a joint project with the Faculty of Science and Technology of Universidade Nova de Lisboa. The aim is to apply a broader spectrum in calculating the inventory of these key climate change gases and, at the same time, to align the group with international benchmarks for scientific target-setting.

A new methodology was also introduced last year for calculating CO<sub>2</sub> stocks in woodlands under Navigator's management. The equations used to

quantify carbon in eucalyptus woodlands have been updated, and other forestry species (holm oak, oak and other deciduous trees) have been included in calculations of CO<sub>2</sub> stocks, along with agricultural areas, scrubland, dead biomass and undergrowth. This resulted in a higher figure for sequestered CO<sub>2</sub> than reported in previous years, approximately 6.1 Mt at year-end 2020. ♦



The new Navigator biomass boiler at Figueira da Foz is an important step on the road to carbon neutrality at the Company's industrial complexes.

## The big global decisions are vital but, at our individual scale, we can each of us change our behaviour and contribute to the common effort.

Figures reported in April by the World Meteorological Organisation, in its 2020 State of the Global Climate Report, set the alert level to red. Not even the 7% reduction in greenhouse gas emissions resulting from the pandemic halted the rise in concentration of these gases, which stood at the second highest level ever: 1.5 billion tons.



António Guterres, UN Secretary-General.

At the current pace of emissions, the UN itself estimates that the world will be 3.2°C hotter at the end of the century, far higher than the 2°C defined as the tolerable limit in the Paris Agreement. In her book, "Portugal, Year 2071", published in April, the journalist Isabel Lindim based herself on scientific predictions to paint a picture of life in fifty years time, unless we change course: for example, there will frequently be temperatures of 50°C in em Beja and most of the coastal beaches will have disappeared.

Between 2000 and 2019, 266 billion glaciers were lost, according to the Nature, the scientific journal. As well as rising sea levels, the consequences are dramatic for one third of mankind, whose access to drinking water is directly dependent on these frozen reserves.

In a book published in January ("The New Climate War: The Fight to Take Back Our Planet"), the climatologist and geophysicist Michael E. Mann recommended changes in behaviour, such as taking less flights and eating less meat. These are attitudes that do not depend on laws, but which are crucial.

One area of consensus in this "war" is that, more than waiting for new sources of energy or less pollutant productions processes, what matters is that everyone should take part in change, even with simple gestures. Consumers concerned about sustainability will be the most effective "arm" in this vital battle for the future of mankind. ♦

## Innovation for a circular economy

In addition to investing in R&D and Innovation projects in the circular bioeconomy, Navigator is seeking to establish partnerships with other companies to leverage the reuse of by-products and waste materials from its processes. One of these projects is reclaiming waste carbonate sludge from pulp manufacture as a raw material for paper production. This waste product has taken the place of lime - a non-renewable resource - in producing precipitated calcium carbonate (PCC), a substance used as coating, filler and pigment in the manufacture of printing and writing paper (UWF). The plant operated by Specialty Minerals Inc. (SMI) on the Figueira da Foz site succeeded in using around 1 200 tons of carbonate sludges in 2020, and the level of incorporation is planned to increase in 2021. The project has also featured as a case study in the Circular Bioeconomy Report produced by WBCSD (World Business Council for Sustainable Development).

Another example of how the pulp and paper industry is a trailblazer for the circular economy is the Paperchain project, funded by the European Union's H2020 programme. This is a partnership between twenty organisations in five countries (the Portuguese partners are the University of Aveiro, The Navigator Company, RAIZ - Instituto de Investigação da Floresta e Papel, Spral, Megavia and the Sustainable Habitat Cluster), assessing the use of waste from the industry in civil construction, in pre-cast concrete structures and in tarmac mixtures for road surfaces. In conjunction with the University of Aveiro, RAIZ is involved in the technical and environmental monitoring of new applications, and of their long-term performance. Navigator is involved in the use of dregs and grits (inorganic waste from paper production) as fine aggregates and fillers in the surface layer of roads. A 250-metre section of road has been built to test different asphalt mixtures. ♦

## Increased industrial efficiency

The Navigator Company is committed to improving energy performance, which contributes to decarbonisation and mitigation of climate change. An example of this is the Energy Monitoring and Management System, which is being designed by Siemens to cater for the complexity of Navigator's industrial complexes. During the first stage of the project, currently in progress, the main aim is to develop and implement energy management software for the Aveiro, Figueira da Foz and Setúbal plants. This will collect and management information, as a first step to more efficient decision making.

Navigator is also investing in the upgrading, optimisation and increased monitoring of its industrial waste water treatment plants. At the plant in Aveiro, international experts have worked with RAIZ to achieve improved functional stability, with a positive impact on the quality of the effluent treated (30% reduction in organic load emitted in 2020, in relation to 2019), and a similar project is at the implementation stage in Figueira da Foz.

Work also started in 2020 on research to assess the potential impact of treated effluents on the water masses into which they are released. This work is being done in a partnership with MARE, the marine and environmental sciences centre at the University of Coimbra. The study looks at the potential area of influence of the outfalls in Aveiro, Figueira da Foz and Setúbal. ♦



Between 2010 and 2019, carbon losses in Brazilian Amazonia were 18% greater than the gains.

# Amazonia in danger

**D**eforestation in Amazonia is a cause for global concern. Between July 2019 and August 2020, an area of 11 088 km<sup>2</sup> was legally deforested. Since the year 2000, the world's largest tropical forest and the habitat with the greatest biodiversity has shrunk by more than 8%, equivalent in size to the land mass of Spain.

According to the WWF (World Wide Fund for Nature), the legislation that Bolsonaro has again put before Congress will permit deforestation of 16 million hectares in Amazonia by 2027.

Last year, some forty multinationals wrote to the Brazilian government, calling for restrictive measures and steps to combat illegal deforestation. They have now returned to the offensive, with large international supermarket chains threatening to boycott Brazilian beef products until the European Parliament adopts the rule currently before it to force companies exporting to the European Union to prove that they have not contributed to unlawful deforestation.

If the boycott goes ahead, which many environmentalists doubt, packaged beef and soya for animal feed will be the imports hardest hit. Brazil is the world's second largest beef producer (10.3 million tons a year), after the United States (12.5 million tons), and the industry is one of the main driving forces behind deforestation of the Amazon.

Even worse news comes from a study involving researchers from a number of countries and published in Nature Climate Change in late April, showing that degradation of forests has been even more prejudicial than deforestation. Between 2010 and 2019, in Brazilian Amazonia (more than half of this entire tropical forest, spread between more than eight countries), the carbon losses were 18% greater than the gains. Deforestation accounts for 27%, but the remaining 73% was due to degradation.

Forest degradations results from the fragility of trees along the fringes of deforested areas, small fires, tree mortality due to drought and other undesirable factors. ♦

# “The economy grows, everything grows, but the Earth does not grow”

Filipe Duarte Santos has been a climate researcher since the mid-1980s. Professor at the University of Lisbon's Faculty of Sciences and chairman of the National Council for the Environment and Sustainable Development (CNADS), he knows that change is urgently needed, but is aware of the difficulties.

## Is the news that the Brazilian Amazon is now a net emitter of carbon the "alarm bell" that mankind needed to unite around resolving the problem of climate change?

Yes, although it is very difficult to calculate carbon flows, between emissions and sequestration, over an area as vast as that this occupied by the Amazonian forest. This is something that has not been fully quantified, but it's highly concerning. I understand the Brazilian government, when it argues that countries with developed economies have very little of their original forests left, which is not the case in Brazil. The question is that in Europe, for example, the change in the landscape was much slower. And

the truth is that satellites confirm the reduction in the size of the Amazon forest.

## And the tropical forest is essential for the planet...

That's beyond doubt. It's the forest we're losing fastest, and it contains 50% of the biodiversity we know about. If we preserve it, we will enjoy a double benefit. What's happening in tropical forests - not just in Brazil, but also in Indonesia, in Equatorial Africa and other Amazonian countries - is one of the most worrying phenomena in the Earth's system and of mankind's interference in the environment.



## Do the plans of European Union countries for use of the recovery funds, allocating more to green projects than originally targeted, make you believe that we've reached a turning point?

The pandemic we have suffered is a zoonosis, a disease in which a virus moved from an animal to humans. Since last century, zoonotic diseases originating in wild animals have been increasingly frequent, largely due to reduction of forests, which puts animals under stress and leading, as has been proven, to the tendency to infect others, including humans, propagating viruses which, under normal conditions, would live in their bodies with no ill effects. The pandemic has caused people to reflect on their relationship with nature, which is not harmonious. I think we are all more worried. It's an opportunity to set another course, and the European Union has taken this opportunity to launch the Green Deal and the new climate law. It remains to be seen how long this tendency will last.

## You are of course worried by the track record of unmet targets...

For the average atmospheric temperature to stop rising, greenhouse gas emissions have to be cut to zero. It's a huge challenge. At the beginning of the century, the aim was for emissions to be residual. We know today that, if that happens, heating will not stop so quickly and sea levels will continue to rise. We have actually got to lower the temperature, and that can't be only in 2200. But reaching zero emissions is almost impossible. Will we all give up eating meat. And in order to have negative emissions, we have to plant forests or have "artificial trees", fans that suck the air through a tunnel to remove the carbon. It's an expensive process, and it uses a lot of energy. It's a colossal challenge.

## Is the target of carbon neutrality in 2050 plausible?

OECD countries are not far from complying with the Paris Agreement. The European Union has cut emissions by 24% since 1990. The problem is the rest of the world, which is travelling in the other directions and where emissions are soaring. Even so, per capita energy consumption in these countries is much lower. Can India and China not set themselves the goal of achieving the same quality of life as in the advanced economies? That's a hard problem to solve. Coal remains very cheap, in comparison with renewable energies. The advanced economies will have to help the others to make the energy transition.

## Do we need ambitious interim targets?

The US says it will cut emissions by 50 to 52% by 2030, but their baseline is 2005, when their emissions peaked, as they did, by coincidence, in Portugal. In relation to 1990, their commitment is not even 45%. Even in Europe, which leads the way on this, it has not been possible to persuade all the twenty-seven to go further.

## António Guterres has spoken of "a 45% cut in global emissions by 2030, in comparison with 2010". Is this achievable for Portugal?

Yes. I think Portugal can meet this target. But it will have problems. A fair energy transition is a top concern. For example, China has millions of miners who will lose their jobs. In Portugal, the power stations in Pego (Abrantes) and Sines will be closed down. It will be a change for all of society.

## Can economic growth be compatible with fighting climate change?

A lot can be resolved by improving energy efficiency. We need more efficient equipment. And we also have to consider the concept of "energy sufficiency": it's not enough for people to worry about the efficiency of their appliances, i.e. about using less energy to maintain the same level of comfort. We need to consume less energy, less and less. It will be very hard to find non-pollutant energy sources able to satisfy the entire human population, which continues to grow. There are 7.9 million of us, and in 2100 there will be 11 million. Where will we find energy for all those people? And food? The economy grows, everything grows, but the Earth does not grow. The planet, the space we have is the same.

## Do you see signs of good intentions among world leaders?

In democracies, politicians reflect the population and do whatever secures them votes. It's technically possible to capture the carbon emitted by a coal-fired power station, but the kilowatt/hour cost is higher. Who wants to pay more for electricity?

## But we'll reach a point where there is no other way out.

There are cities where you can only take babies out at night, airports where planes cannot take off because the air is not dense enough, roads where the tarmac melts. Tropical cyclones are fiercer and more frequent... Yes, we'll reach an unworkable situation, if we don't make changes. ♦

**“It's not enough for people to worry about the efficiency of their appliances, i.e. about using less energy to maintain the same level of comfort. We need to consume less.”**



# The "Covid effect"

The economic downturn caused by the pandemic reduced pollutant emissions worldwide. The world is breathing easier, but at the same time consumption of plastics increased, recycling fell and pollution from personal protective materials grew. What have we learned and how will we act now?

Covid-19 was not just a shock to the human immune system, it was also a shock to the planet's systems. With the population predicted to rise from almost 7.9 billion today to 9 billion by 2050, caring for the planet's resources and health is a growing challenge, and the pandemic has offered an opportunity for us to study human impact on the Earth and our relationship with the natural world, and to learn lessons for the future.

For example, will we manage to maintain the "Covid effect" of reduced global emissions of pollutants? And how will we face the challenges of increased pollution caused by personal protective equipment?

The sudden downturn in economic and transport activity, caused by lockdowns, has reduced concentrations of nitrogen dioxide (NO<sub>2</sub>) - a pollutant emitted mostly by industry and road transport using fossil fuels - in many European cities, as well as concentration of inhalable fine particulate matter (PM<sub>2.5</sub>), one of the air pollutants that causes the greatest harm to public health.

In Wuhan, China, where the first outbreak of Covid-19 was reported, emissions of nitrogen dioxide fell by 60% when restrictions came into effect, as they did in Milan, whilst in New York they dropped by 45%.

A global study on "Fossil CO<sub>2</sub> emissions in the post-Covid-19 era" by researchers at the University of East Anglia and published in Nature speaks of a drop of 7% in carbon dioxide emissions in 2020 - a figure not seen since the Second World War. Photographs of blue skies above Delhi, the Indian city normally shrouded in smog and pollution, have caused a sensation in the media around the world. But whilst in April last year, when most countries implemented lockdowns, carbon dioxide levels dropped by 27% in relation to the previous year, the reported reduction of 7% means that they increased again from the summer onwards.

Globally, in comparison with 2019, the carbon footprint fell by 2.6 gigatons (Gt), equivalent to the annual emissions of Europe as a whole. In order to determine how much of this reduction might actually be due to the pandemic (and so to human activity alone), [researchers at NASA](#) used computer generated models. With data from 46 countries, they created a simulation of 2020 free from the virus, and discovered that between February and October that year, the restrictions imposed reduced global concentrations of NO<sub>2</sub> by almost 20%. Looking at the world's cities, in 50 of the 61 cases studied, the reduction in this pollutant stood at between 20 and 50 per cent.

This "Covid effect" has demonstrated the scale of the action that needs to be taken to address climate change: the Paris Agreement's goal of keeping average temperature rises below 2°C requires cuts of one to two gigatons each year over this decade. As soon as lockdowns were lifted, emissions shot up again, and so to find solutions that succeed in bringing down the figures year after year, without halting the economy, will be "the big issue", according to Corinne Le Quéré, a climate change expert at the University of East Anglia.



## How can air pollution be reduced?



Restricting traffic in cities is one of the solutions recommended for cutting air pollution.

For the European Public Health Alliance (EPHA), the solution means restricting traffic in most European cities. This was the call they made in March last year, based on a new study of air pollution and transportation.

Banning pollution-causing vehicles could reduce hazardous particulates and NO2 by 23% and 36%, respectively, saving “up to 130 million euros a year in health and other costs”, argues EPHA, which represents more than 80 public health NGOs and associations of patients and health professionals. Implementing a policy of charges for these vehicles entering cities would bring down particulate matter by 17% and nitrogen dioxide by 12%, with a saving of 95 million euros in social costs. Increasing parking prices would achieve a reduction in pollution of 5 to 10%, whilst reserving areas for cycle lanes and pedestrianised areas has less effect, say researchers.

The secretary-general of EPHA, Sascha Marschang, has said it is now clear that pollution also aggravated the pandemic, and that the time has come to use the recovery funds to “build back better”, to improve human health and the environment. The fact is that air pollution is the main cause of death due to environmental factors, according to the European Environment Agency (some 4.2 million people worldwide, every year). The WHO points out that it causes diseases with higher mortality rates than Covid-19, such as heart disease, chronic obstructive lung disease, lung cancer and acute respiratory infections.

At the same time, air quality is related to climate and ecosystems, because the main source of pollution - the burning of fossil fuels - is also responsible for emissions of greenhouse gases. Policies to cut atmospheric pollution are therefore fundamental both for health and for mitigating climate change.



## Reacting to Covid pollution

As the pandemic continues, personal protective equipment (PPE) is being used in vast quantities, creating a new wave of waste - Covid-19 rubbish - consisting primarily of disposable masks and gloves, elastic bands, gel bottles and polypropylene gowns.

An international study published in Science Direct calculates that the quantity of plastic waste generated worldwide since the start of the pandemic stands at around 1.6 million tons a day, with close to 3.4 billion single-use masks being discarded. This suggests that Covid-19 will set back by many years the fight against plastic pollution, which is killing wildlife which ingests the plastic, or is trapped or suffocated, as well as creating a new source of microplastics harmful to human health.

The pandemic has caused disruption in many of the policies and measures adopted to combat the linear economy, to reduce consumption of single-use plastics, increase recycling and develop bio-alternatives to materials made from fossil fuels. For reasons of safety, the disease has led to an explosion in demand for and production of single-use plastic products (such as protective screens and food packaging, with the increase in home deliveries). Recycling services have been interrupted to avoid cross-contamination and, at the same time, a drop in demand for energy has lowered oil prices, making it even cheaper to produce virgin plastic, undermining the economic viability of recycled plastics.

In order to overcome these issues, experts in the environment and natural resources at Harvard University are now recommending an innovation-focused approach to plastic. This means redesigning products to make them easy to recycle and reuse. For example, instead of combining different types of plastic in a single product, which makes recycling more expensive and difficult, efforts should be made to produce items with only one type of plastic and to limit the number of additives. New recycling facilities just for bioplastics. Mandatory incorporation of recycled materials in all new products. Decarbonising production through use of renewable energy sources and replacing petroleum-based plastics with bioplastics using sustainable materials. One example of this is cellulose fibre.



Cellulose fibres are a natural alternative to petroleum-based plastics.

## Green recovery

One piece of good news is that, during the pandemic, renewable energies have proved resilient, while electricity generated from coal dropped by 8.3% in the first half of 2020. However, research by the London-based consultancy firm, Vivid Economics, warns that most of the post-Covid recovery plans of 30 countries analysed, including the G20, are inconsistent with their climate commitments. Only ten of these countries have announced policies with a positive environmental impact (such as rates carbon, offsetting, electrification of transport and green energy), instead of stimulus packages with negative effects.

Aware of this backsliding, the World Resources Institute and the United Nations Programme for the Environment launched in April a new guide on legislation to encourage behaviour by businesses and consumers that builds the circular economy in plastics. The Marshall Islands, which in 2016 banned the importation, production, sale and distribution of disposable cups and plates and plastic bags, has been held up as a model for the rest of the world. But the document also calls for taxes on plastic or tax breaks to encourage alternative products. Portugal is cited as a good example, for having applied a 10 cent tax on each plastic bag, resulting in a 74% drop in use, in just four months. Other measures involve extended producer responsibility, whereby manufacturers are made responsible to collecting, recycling and reusing their disposable products.



Renewable energy sources proved their resilience during the pandemic.

It is therefore fundamental to involve the business community. Covid has helped people to understand that existential threats can undermine business, encouraging investors to put pressure on companies to work towards environmental targets. Global initiatives by industry, such as act4nature, the World Business Council for Sustainable Development (WBCSD), of which The Navigator Company is a member, through BCSD Portugal, have challenged companies to protect, promote and restore biodiversity, by redesigning their business models and value chains to include action and solutions for sustainable and, if possible, regenerative use of natural resources, and for improving ecosystem services.

According to “Post-Covid-19 Consumer Habits”, a report by MARCO, a specialist independent climate agency, 73.5% of interviewees around the world said they now attach more value to the fight against climate change than before the crisis.

The way that the pandemic altered the way people work may do a lot to help reduce atmospheric pollution in cities, if less commuting is encouraged, along with increased use of bicycles, walking and public transport, as well as more flexible working hours, to avoid rush hour traffic. And the use of reusable rather than disposable safety equipment may help to minimise the production of waste. “The way we build back after the pandemic will have a huge impact on climate change”, explained Corinne Le Quéré, an expert at the University of East Anglia. ♦

**Restoring degraded ecosystems is essential in the fight against climate change and biodiversity loss.**

## The decade of ecosystems

By 2030, the regeneration of 350 million hectares of degraded ecosystems and soils could generate nine billion dollars in ecosystem services and remove between 13 and 26 gigatons of greenhouse gases from the atmosphere.

**E**cosystem restoration on a global scale will have impacts on biodiversity, but also on climate change. This is to say it will have effects on farming, on food, on quality water supplies and a fairer and more equitable division of natural resources. The United Nations Decade on Ecosystem Recovery, running from 2021 to 2030, is led by the United Nations Environment Programme (UNEP) and the Food and Agriculture Organisation (FAO) and aims to "speed up global promotion of degraded ecosystems".

According to UNEP, degradation of marine and terrestrial ecosystems currently affects the well-being of around 3.3 billion people, and has an annual costs of around 10% of the planet's gross output, resulting in loss of species and ecosystem services which are essential for food, agriculture and quality water supplies. UNEP also reports that 20% of the planet's surface presents declining yields, with erosion and pollution as the main causes for the decline in soil fertility.

The Global Land Outlook, a report presented at the 13th United Nations Convention to combat desertification, warns that consumption of natural reserves will double in the next 30 years and that degradation will have a serious effect on one third of soils worldwide. According to this report, with each year that passes the Earth loses 15 billion trees and 24 billion tons of fertile soil.

Regeneration of degraded ecosystems and soils, using processes that restore their ecological functions, is the way to halt this process. According to UNEP, if over the next decade we restore 350 million hectares of degraded ecosystems and soils (an area corresponding roughly to the size of the Indian subcontinent), this will generate nine billion dollars in ecosystem services and remove between 13 and 36 gigatons of greenhouse gases from the atmosphere.

**Setting priority areas**

A study entitled "Global priority areas for ecosystem restoration", published in Nature last October, precisely identifies the degraded ecosystems around the world that need to be restored. The first study of its kind to provide concrete data on where this work should be done was conducted by 27 researchers in 12 countries, who used a mathematical platform and mapping technology to search and assess 2 870 million hectares of ecosystems which have been converted to farmland in regions around the world.

The findings were surprising. Restoration of 30% of the world's ecosystems in priority areas would not only save 70% of the species thought to face extinction (the UN has predicted that a million species will become extinct in the decades ahead) but would also absorb practically half the carbon accumulated in the atmosphere since the start of the industrial revolution. According to the researchers, analyses conducted in regions or overlapping types of habitats suggest that restoration can be achieved at a relatively low cost and that regeneration of priority areas could be 13% more profitable than maintaining the current situation.

The ecosystems assessed by the study included land which had been converted to farming use. Originally, 54% of this land would have been forest, 25% prairies, 14% shrubland, 4% arid land and 2% wetlands. In more than half of all cases (55%), restoration of these ecosystems would not have an impact on food production, if combined with better planning, sustainable production and waste reduction.

The study published in Nature also shows that the costs and benefits of ecosystem restoration vary greatly from place to place. Whilst it has been proven that forests are essential for mitigating global warming and protecting biodiversity, the other ecosystems also have crucial roles to play. In other words, tree planting has a direct effect on reducing carbon in the atmosphere, but the forestation of ecosystems which were not previously

forests will have negative consequences for native biodiversity, and care should always be taken to avoid this. According to this report, the inclusion of different biomes (ecological areas formed by a distinct group of animals and plants) is the key to obtaining multiple benefits from ecosystem restoration.

**Portugal's national strategy**

With 22% of its territory included in the Natura 2000 Network, Portugal is home to 35 thousand species of animals and plants, corresponding to 22% of all species described in Europe and 2% of terrestrial biodiversity, according to figures from the International Union for Conservation of Nature (IUCN). In order to "stem the loss of natural biodiversity, to step up conservation and sustainable use of that biodiversity and to promote its improvement, appropriation and recognition by all actors and by society", Portugal's national nature and biodiversity conservation strategy (ENCNB2030) was reviewed in 2018, setting targets for 2030.

Approved by the Council of Ministers (resolution 55/2018), the strategy is based on three pillars: improving the state of conservation of natural heritage, promoting recognition of natural heritage and encouraging society to appropriate natural values and biodiversity.

Rural flight, changes in natural systems, exacerbated by climate change, and the proliferation of invasive species are identified as the main threats to biodiversity. Portugal's national strategy therefore regards human presence as essential to a natural balance, and the Institute of Nature Conservation and Forests (ICNF) has been entrusted with drawing up a plan of action and identifying sources of funding and the financial resources needed to implement the strategy. "Without people, there is no stewardship, without economic activity, there is no one to protect natural resources and heritage and to contain the processes of biodiversity loss", the strategy declares, whilst also recognising the dangers of overpopulation or overuse of these areas.



Restoration of just 30% of the world's ecosystems would be enough to save 70% of the species thought to face extinction.

Portugal's national strategy for nature and biodiversity conservation stresses that a human presence is essential for keeping a natural balance.



The Peneda-Gerês National Park (PNPG) was the first area to have a pilot plan drawn up on the basis of this strategy, after the fires that affected this protected area in 2016. This plan is due to be implemented by 2025 and includes restoration of the national woodlands in Mezio and Ramiscal, work to protect habitats in the Gerês national forests, and also preservation of yew and maritime pine woodlands, covering a total of 7 000 hectares. Improvements are to be made to telecommunications and ten additional teams will be recruited for the National Forest Wardens Corps.

Based on the successful results so far, five new projects have been set up, covering the Montesinho Natural Park, the International Douro Natural Park, the International Tagus Natural Park, the Serra da Malcata Nature Reserve and the Portas do Ródão Natural Monument. The plans are all along the same lines: additional personnel and investment in prevention and habitat restoration, in keeping with the specific features of each area. ♦

**Over the next decade**

**350 million**

Hectares of degraded ecosystems and soils to be restored

**9 billion**

Value (in dollars) to be generated in ecosystem services

**13-26 gigatons**

Greenhouse gases to be removed from atmosphere

## Ecosystem restoration in Navigator forests

In view of their importance as havens of biodiversity and the associated ecosystem services, The Navigator Company pays constant attention to water courses and riverside gallery forests.

**T**he first step is to establish protective strips either side of water courses, the size of which varies, depending on whether the water course is permanent or temporary. No earth moving, commercial planting or use of chemicals is permitted in these areas. "Another part of this process consists of learning more about the wildlife and resources in these gallery forests, whether or not they are part of the **Natura 2000 Network**, whether there are protected species of fauna or flora, or whether this is a degraded area", explained Nuno Rico, Navigator's biodiversity conservation manager. This information allows us to design action plans to protect these ecosystems, and in some cases to restore them. "It's an ongoing task, it's not something you can do just once", he told us.

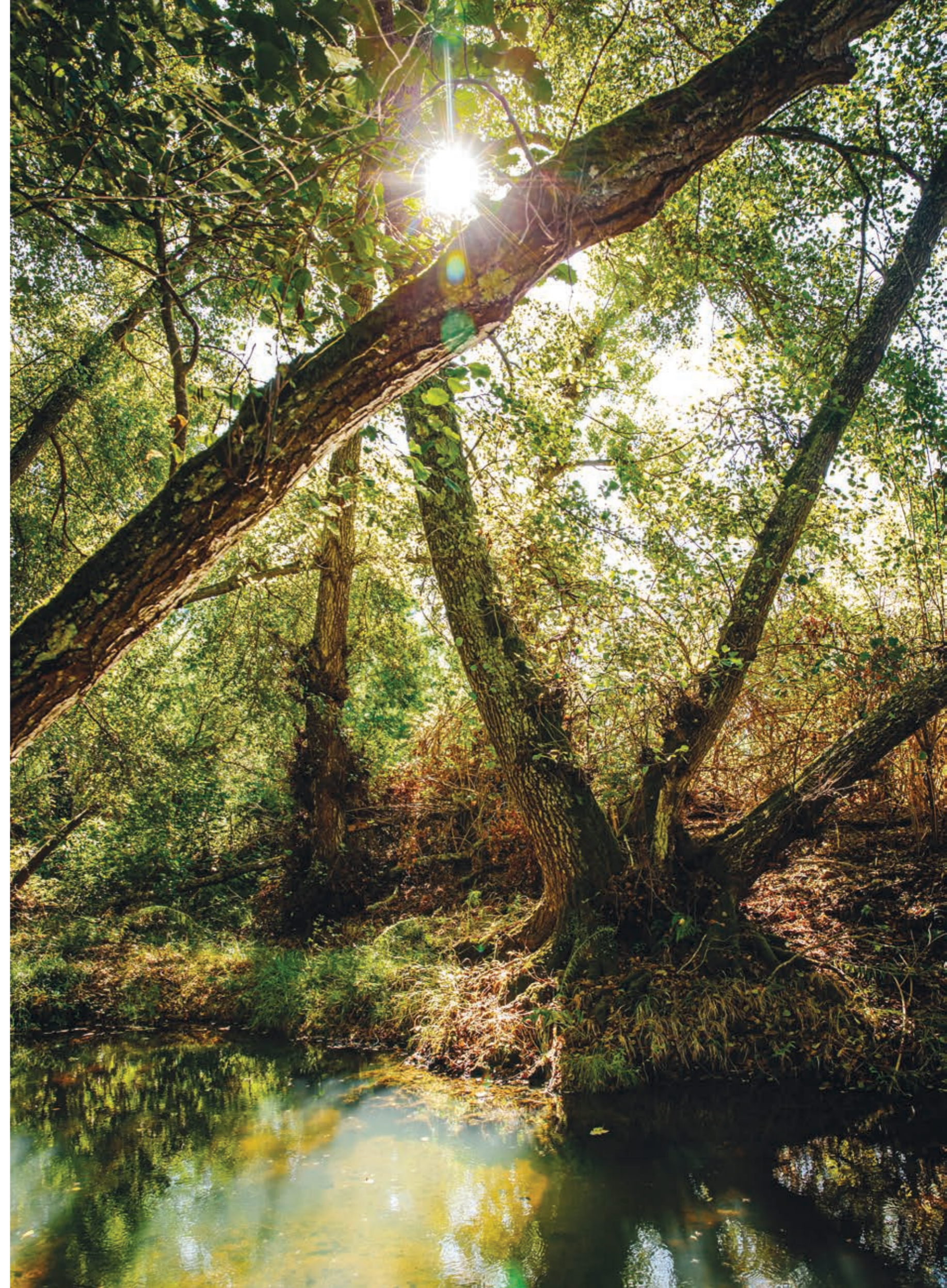
Woodlands under Navigator's management include 4 162 hectares classified by the Natura 2000 Network.

"We work on the vegetation, and not on the hydromorphology", explained Nuno Rico. Nonetheless, control of brushwood, the planting of native species, elimination of invasive species such as acacias and the creation of protective strips all makes it easier for water courses to revert to their natural meandering state.

### Decades of work

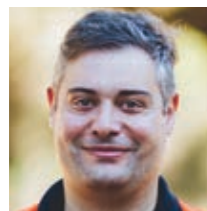
It takes years to restore a degraded ecosystem, but some results can be observed even at an early stage. Nuno Rico gives the example of one of Navigator's properties, in Valongo, where, after debarking and eliminating a number of acacias, improved growth has been observed in the oaks (*Quercus robur*) planted there. "They have still not grown enough to create shade and avoid acacias from growing, but they are developing", he explained, pointing out that native species, such as alder, willow, ash and oak, always grow more slowly than invasive species, which is why these require constant attention. Another seasonal task is the cutting of brambles, to allow the other vegetation to recover.

According to research by the University of Coimbra, led by Verónica Ferreira and published in Biological Reviews, the multiplication of acacias along water courses is harmful, because this is a species that retains nitrogen, which over time alters the characteristics of organic matter, the quantity of water and the concentration of nutrients in the aquatic environment. This is why Navigator invests significantly in controlling the species.





Acacia is an invasive species with harmful effects on water courses: it retains nitrogen, which alters the characteristics of the organic matter, the quantity of water and the concentration of nutrients in the aquatic environment.



“It’s an ongoing task, it’s not something you can do just once.”  
Nuno Rico, biodiversity conservation officer at Navigator

**Invasive species are species “whose introduction and/or spread outside their natural area of distribution, past or present, threatens biological diversity”, according to the Conference of Parties to the Convention on Biological Diversity.**

On the Espirra Estate, for example, acacias have been felled along riparian galleries, where the Water Laboratory at the University of Évora is monitoring the ecological quality of the water.

Collaboration with research institutions is a priority in Navigator’s work to restore habitats and control invasive species. “We work in partnership with various organisations, such as the University of Coimbra, the Coimbra Agricultural College, and with RAIZ, searching for solutions and alternatives that allow us to address this issue better. The presence of these species is a constraint for our forestry activities, for several reasons”, explained Sérgio

Maggiolli, conservation coordinator at The Navigator Company.

**Controlling and learning to live with invasive species**

Navigator is currently gathering up-to-date information on invasive species in all the woodlands under its management, in order to design and implement an improved strategy for addressing the problem. “Controlling invasive species needs to be an ongoing process, and something in which all landowners and forestry producers should be involved. We can sometimes be working to eliminate invasive species along a water course, but if the owners upstream don’t take the same trouble, the seeds are

In woodlands, water courses are important as areas of biodiversity and because of their associated ecosystem services.



washed down the water course and end up spreading over long distances. This is an issue that needs to be tackled jointly, involving different stakeholders (municipal authorities, conservation agencies, forest landowners, etc.) in designing a strategy”, explained Sérgio Maggiolli.

Invasive species compete with the other vegetation and, in the case of Navigator, make it difficult to develop and manage its forests.

Invasive plant species are to be found ever more widely in Portugal, and in most cases, whenever there are fires or other forms of disruption to the soil, they encroach further on the territory of native species.

The methods used to control invasive species, and the timing of work in the field, depends on variables relating to the plants themselves. “Constant monitoring and the ability to take coordinated and ongoing action are crucial. In some cases, confining the invasive species to areas where mechanical control is feasible, is one way of stopping it from invading other areas. There are several methods used, ranging from debarking, uprooting, a combination of mechanical and manual removal, application of chemicals, controlled burning... It’s often a cocktail of different operations that

proves most successful in combating and controlling invasive species”, said Sérgio Maggiolli.

“In some areas, where invasive plants are dominant in relation to other species, the best strategy sometimes involving any major disruption to the areas, and merely intervening to prevent them spreading to adjoining areas,” explained Maggiolli. “In certain situations, it’s a question of learning to live with these species and stopping them from dominating other areas”, he told us.

In addition to the operations already mentioned to control invasive species, biological techniques are being used to combat a species of acacia on another two Navigator properties, one in southern Portugal and the other in the central region. This is being done in partnership between RAIZ and a team from the University of Coimbra and the Coimbra Agricultural College, who have studied and released an insect that attacks *Acacia longifolia*. This tiny insect creates galls on the plant, reducing the formation of blossom, and consequently the production of new seeds. This insect is currently limited to very small areas on Navigator’s properties, but the expectation is that it will expand its territory, helping to reduce the invasive potential of this species of acacia. ♦



“Constant monitoring and the ability to take coordinated and ongoing action are crucial.” Sérgio Maggiolli, Navigator Protection Coordinator

# Let's talk about pollinators



Food security and health, sustainable farming, environmental and ecosystem balance, biodiversity... These are serious and essential issues, and their future lies in the hand, or rather the paws, of animals which are being decimated by human activity.

**N**ot just the bees. All over the world, more and more species of pollinators have been vanishing, due mostly to human activity. However, almost 35% of the world's farming output is dependent on them: bees, flies, birds, butterflies, bats, rodents, squirrels, reptiles and even monkeys. It is these creatures who improve the yields of 87 of the world's most widely farmed food crops, as well as a large number of medicinal plants. Worldwide, three quarters of crops producing fruits or seeds for human consumption and 90% of wild flower species depend at least partly on pollinators.

These figures from the FAO (the United Nations Food and Agriculture Organisation) point to the vital role of pollination and its contribution to food security, sustainable farming, to the health of the environment and ecosystems, to enriching biodiversity and many other aspects of sustainable development. The vast majority of flowering plant species produce no seeds unless pollinator animals convey the pollen from the stamens (the plant's male organ) to the stigmas of the flowers (the receptive area, where the grain of pollen starts the process of germination). Without this service, many interdependent species would vanish, and many processes within the same ecosystem along with them.

## Pollination

Transfer of grains of pollen (male gamete) between the stamen anthers and the stigma, making the connection to the plant's "ovary", allowing it to reproduce.

This explains why the European Union is concerned about the fact that, at present, around 35% of invertebrate pollinators, especially bees and butterflies, are at risk, along with 17% of vertebrates, such as bats (attracted to flowers that open at night). Although more than twenty thousand species of bees are known, they face a risk of extinction one hundred to a thousand times higher than normal, due mainly to intensive farming (resulting in deforestation and wider use of agro-chemicals), to invasive alien species (such as the Asian hornet) and to climate change, which alters habitats (see insert about the main threat to beekeeping in Portugal).

If this trend continues, the European Commission has warned that the world's plantations of fruits, vegetables and nuts will have to be replaced by rice, potato and corn, resulting in an unbalanced diet.

## For health and against poverty

In Europe, where the main pollinators are bees, butterflies, beetles, hoverflies (Syrphidae), moths and wasps, there are 200 wild species of bees, of which the best known is *Apis mellifera*, or the western honey bee. This species is associated with beekeepers and the production of honey and other hive products, used in the food and



## “In Portugal, the main threat to beekeeping is climate change”

Manuel Gonçalves, chairman of the Portuguese Federation of Beekeepers, told us that operating costs for beekeepers are increasing, affecting the sector’s profitability, even when production continues. The causes? In essence, it all comes down to one thing: climate change. Beekeepers have to spend more on travel, because they have to visit their apiaries more often, for example to set traps for Asian hornets. And why are these appearing in increasing numbers? Because average temperatures in Portugal are rising. “When the winters were colder, they didn’t survive”, he says.

And if beekeepers have to feed their feed more and more in winter with water and sugar, or honey, it’s because they failed to establish sufficient reserves in the spring. Why? Because of increasingly frequent extreme weather phenomena, such as heat waves that dry the nectar in flowers or cause forest fires that destroy the plants on which the bees feed, or very dry winters which curtail the growth in their favourite natural sources of food, such as heather and rosemary. In 2020, atypical spring weather caused heavy losses, but the mild and rainy weather in 2021 promises a good year for honey, at least in most of the country, because when the flowers are over in the south, they are just starting in the north.

This territorial diversity offers at least one advantage, explained the chairman of the beekeepers’ federation: “In other countries there is another threat to bees, the use of pesticides, but in Portugal that is less of a problem, because there is less contact between apiaries and intensive farming, which is not possible in several areas of the country, where there are largely unproductive woodlands or scrubland.” These are a paradise for the hives. ♦



### Propolis

Resinous substance released by plants and used by bees to coat their combs and stabilise the temperature and humidity inside the hive. This is a product used by the pharmaceutical and cosmetics industries.

pharmaceutical industries, such as pollen, wax, propolis, royal jelly and even apitoxin (the bee poison used in apitherapy, highly valued in Eastern Europe and Asian countries).

The ecological and economic services provided by pollinators, but especially by bees, have been valued by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services at 577 billion dollars. In Europe, it is estimated that they contribute at least 22 billion euros each year to the agricultural sector, by pollinating more than 80% of crops and wild plants in Europe, in addition to apiculture products.

Concern about the sharp reduction in the number of bee colonies, observed especially in western nations of the EU, has led the European Commission to implement a number of measures to prevent mortality, including a reduction in the use of pesticides. However, many other countries in the world, such as the United States, Russia and Brazil, are experiencing the same problem, meaning that we face a global crisis.

Since the signing in 1992 of the UN Convention on Biological Diversity, the sustainable use of pollinators has been classed as a priority. For this reason, the FAO also provides technical assistance to countries seeking to produce queen bees and to find sustainable solutions for producing and exporting honey. Above all in poorer countries, beekeeping projects offer an economic activity with low environmental impact, requiring little investment and able to provide income and improve the food and nutritional security of populations which depend on forestry products for their survival.

### Portugal on the map

In Portugal, where there are more than a thousand species of pollinator insects, including bees, hornets, wasps, flies, butterflies, beetles and ants, the National Apiculture Programme (PAN) for the period 2020-2022 reflects the European goal of improving the general conditions for the production and marketing of apiculture products. The programme explains that the number of apiaries in Portugal continues to rise, and that there are 17 million hives in the European Union.

In the UN’s 2020 report on forests and trees in promoting pollination by bees, butterflies and other animals, where it is argued that urgent steps are needed to halt the degradation of the habitat of these species and to protect biodiversity, Portugal gets a special mention, with the FAO highlighting the importance of riverside shrubland, ciliary forests and woodlands as essential havens for pollinators. This is because the



latest research underlines the idea that “domesticated pollinators”, such as bees, complement, but do not substitute wild pollinators in the balance of ecosystems.

Even so, in the absence of wild pollinators, farming has created a good business opportunity for beekeepers: provision of pollination services. According to FNAP (the Portuguese National Federation of Beekeepers), “hives are rented to pollinate the crops that benefit most from them, in orchards and arable farming”. This is widely used in almond and other orchards. “There is already a tradition of renting hives in orange orchards in the Algarve, but the practice is now spreading to other areas of the country, such as the south-west Alentejo and the Vicentine coast, for raspberry and other similar plantations.”

More than just increasing yields, the work done by these insects, which visit all the flowers at the same time, results in production of better quality fruit, better shaped and of uniform calibre, that ripens at the same time. This means that more can be harvested over a shorter period, which also brings down costs.

The result of a job well done, as only nature knows how. ♦

**11 690**  
registered  
beekeepers in  
Portugal

**753 770**  
hives in the country

**44 033**  
apiaries

**11%**  
of Portuguese  
beekeepers have  
an average of  
383 hives each

**64%**  
of working hives in  
Portugal are owned  
by 1 257 beekeepers

Sources: FNAP and DGAV  
(figures from 2020)



## How eucalyptus forests help beekeepers

Eucalyptus blossom in the winter. And that is when bees have the most difficulty in finding food. This means that beekeepers can move their hives to eucalyptus woodlands, complementing the production of honey in other seasons. Eucalyptus honey is also considered monofloral and restricted to specific regions, which helps it to command a better price. There is a good market for honey from the nectar of eucalyptus blossom, known for its menthol flavour and its soothing properties for coughs, sore throats, sinus problems and flu symptoms. The agreement signed between The Navigator Company and the Portuguese Federation of Beekeepers (FNAP) is intended to support apiculture, giving beekeepers the right to install their apiaries on a temporary basis, free of charge, at specific locations in the company’s forestry holdings. It also helps to improve the biodiversity of ecosystems: Navigator’s holdings are home to around 800 species and sub-species of flora and 241 species of fauna. ♦



# Biodiversity: conservation makes the difference

Figures from the latest version of the IUCN Red List point to a growing number of extinct and endangered species, but also bear witness to the success of conservation measures, with 26 species in the process of recovery.

**C**lose to five hundred species are endangered in Portugal, according to the Red List of the International Union for Conservation of Nature (IUCN), updated at the end of last year. This figure puts the country in second place (behind Spain) in Europe in terms of mammals and plants at risk, and in third place for fish and reptiles. Since the last update, seventeen animals have joined the severely endangered category and nine species (six species of animals and three of plants) have vanished from the country. But there has also been a recovery in some of these endangered species, as in the case of the Mediterranean monk

seal, the Iberian lynx and the Iberian imperial eagle.

Worldwide, the report points to climate change and invasive species as the main threats faced by biodiversity. In a list that currently includes 128 918 species, more than 35 thousand (more than 15 thousand animals and 20 thousand plants) face the risk of extinction, and 31 have been lost since the previous revision. By groups, 26% of mammal species, 14% of birds and 40% of amphibians are currently endangered worldwide. On a positive note, 26 species recorded a recovery, including the European bison (*Bison bonasus*), the continent's largest mammal.



Iberian imperial eagle  
(*Aquila adalberti*)

## Biodiversity in forest management

The Navigator Company, the mentor behind the My Planet project, has integrated biodiversity conservation into its forestry management model, implementing a raft of measures to maintain or improve the state of conservation of habitats and to preserve protected, threatened and endemic species.

In 2020, Navigator signed up to act4nature Portugal, organised by BCSD Portugal with the precise aim of mobilising companies to protect, promote and restore biodiversity.

It was also in 2020 that it planted 50 Monchique oaks (*Quercus canariensis*) on its Águas Alves estate. This is a rare native species, of which there are only around three hundred in Portugal. The project will be ongoing, because the acorns provided by the Porto Botanical Gardens have also been gathered for breeding at Navigator's nurseries, for subsequent planting.

In the woodlands holdings managed by the company, around 800 species of flora and 241 species of fauna have been identified, subject to regular monitoring, especially in the cases of those with the highest conservation status. In addition, 4 162 hectares of these forests are classified as protected by the Natura 2000 network. ♦

### The situation in Portugal

In Portugal, the Mediterranean monk seal (*Monachus monachus*), known locally as the 'sea wolf', the Iberian lynx (*Lynx pardinus*), the Iberian imperial eagle (*Aquila adalberti*) and the Azores bullfinch (*Pyrrhula murino*) are some of the species where conservation work has succeeded in reversing their decline. The four species remained under threat, but populations have grown (in the case of the first three) or stabilised, as in the case of the Azores bullfinch. The most dramatic story is that of the Iberian imperial eagle (an Iberian endemism), which was actually declared extinct, but which has returned and is today represented by seventeen breeding couples. Classified as "vulnerable" on the Red List, it has "critically endangered" status in Portugal.

The Red List classes the Azores bullfinch as "vulnerable", although in the early years of this century this species, which only exists on the eastern part of the island of São Miguel, in the Azores, it had been considered "critically endangered".

## In Portugal

**107**  
animals classed as "critically endangered"

**33**  
plants classed as "critically endangered"

**94**  
animals classed as "threatened"

**54**  
plants classed as "threatened"

**133**  
animals classed as "vulnerable"

**54**  
plants classed as "vulnerable"

The work carried out by the *LIFE Priolo* programme, which ran from 2003 to 2008, was intended primarily to tackle threats such as the invasion of natural forests by exotic plants and the lack of food resulting from the shrinking of laurisilva forests over recent centuries. This small bird today has an adult population thought to vary between 627 and 1996 individuals, and is classified in Portugal as an "endangered species".

In the case of the Iberian lynx, the Red List had already downgraded its classification from "critically endangered" to "endangered", reflecting the improvement in the total population (the number of animals in both Portugal and Spain) and the number of breeding units. But it continues to be regarded as the most severely threatened feline in the world and Europe's most endangered carnivore. The decline of the Iberian lynx, for which the number of individuals in the wild reached its lowest point in 2002, has been caused by far-reaching changes in habitat and the dwindling population of wild rabbits

(another species classed as "endangered" in the Red List). The latest figures published by the Institute of Nature Conservation and Forests (ICNF) show that the population of Iberian lynx reintroduced to the Guadiana valley as from 2015, as part of the Iberian LIFE Iberlynx project, has grown to around 150 individuals. There are now an estimated 1 100 individuals in total in the Iberian Peninsula.

"The difference between the Red List status and the conservation classification in Portugal is explained by the fact that the IUCN list considers the state of the species worldwide, and not just in this country", explains João Loureiro, Director of the Nature and Biodiversity Conservation Department at ICNF. This is why, for example, the Iberian wolf is not listed as threatened in Portugal in the Red List. "In Portugal, the wolf is a protected species and classed as 'endangered', but globally its status is not a cause for concern", he told us, pointing out that the wolf population has held steady in Portugal in recent decades, thanks to conservation efforts.



**The Azores bullfinch is a threatened species, but its population has stabilised, thanks to conservation efforts.**



**The Mediterranean monk seal remains on the list of threatened species, but has been recovering.**



**The European bison was reintroduced to the wild in the 1950s and is today a successful example of ongoing conservation measures.**

The IUCN Red List tells us that there are in Portugal 78 endangered species of fish, 15 mammals, 16 bird, five reptiles, three amphibians, as well as molluscs and invertebrates, 144 species of plants and 10 of fungi, adding up to a total of 488. “Critically endangered” status has been given to 107 animals and 33 plants; a further 94 animals and 54 plants, are classed as “threatened”, and the numbers for “vulnerable” species are higher, at respectively 133 and 57. In all, close to 2 500 species of animals and more than 800 plants face a degree of threat in Portugal.

These are clearly worrying figures. However, as João Loureiro confirms, there is another explanation for the fact that Portugal and Spain emerge as the European countries with the largest numbers of threatened species: the countries of the Mediterranean present the highest levels of biodiversity in Europe. It is only a question of logic that species are more likely to face threats. “The main types of threat to biodiversity are the same worldwide: climate change and the rise of invasive species”, he explained.

**Action is possible**

Freshwater dolphins are among the most threatened species on the planet. With the reclassification of the tucuxi (*Sotalia fluviatilis*) – a small grey dolphin from Amazonia – as “endangered”, all freshwater dolphins are now listed as “threatened” on the IUCN Red List.

The 31 species declared extinct include a shark from the South China Sea (*Carcharhinus obsoletus*), which had been described last year and was last sighted in 1934. Considering that its habitat lies within one of the most over-exploited areas in the world, it is highly unlikely that this species has managed to survive. In the case of fifteen extinct species of freshwater fish native to Lake Lanao, in the Philippines, the cause was a combination of invasive species, overfishing and inappropriate fishing methods. The new version of the Red List also reflects the extinction of three frog species from Central America, which fell victim to a fungal disease.

In the plant kingdom, oaks are the main source of concern. Of 430 known species,

**The decline in the Iberian lynx has slowly been turned around. There are now an estimated 1100 individuals in total in the Iberian Peninsula.**

113 are threatened with extinction. Climate change and invasive species are the main threats, joined by deforestation.

“The recovery of the European bison and another 25 species documented in the new version of the Red List serves to demonstrate the power of conservation. However, the growing list of extinct species is a clear warning that conservation efforts need urgently to be expanded”, said Bruno Oberle, Director-General of the IUCN, when presenting the list. He has argued that incorporating conservation work into all sectors of the economy is the only way of addressing global threats such as unsustainable fisheries, deforestation and invasive species.

Jane Smart, global director of the IUCN Biodiversity Conservation Group, stressed the importance - and effectiveness - of conservation work. “The conservation success stories included in the Red List at the living proof that the world can set and achieve ambitious biodiversity goals”, she said. ♦

**The year of the bison**

In 2003, there were only around 1 800 European bison still living in the wild in Europe. Numbers have since grown to around 6 200, and the species has been reclassified from “vulnerable” to “almost threatened”. A success story for a species which, at the start of the twentieth century, could only be observed in captivity, and was reintroduced to the wild in the 1950s. Despite this significant improvement, the IUCN warns that the 47 herds of bison living in the wild in Poland, Belarus and Russia occupy “non-optimum” habitats, and are very isolated from each other, making the survival of this species dependent on ongoing conservation measures, such as moving animals to more appropriate and open habitats, and reducing conflicts with human communities. ♦



# The wonderful world of ants

They may look insignificant, but ants play a fundamental role in the balance of ecosystems. And they live lives that present surprising parallels with our own.

**W**hat they lack in size, they make up for in numbers. It is estimated that the planet is home to ten trillion ants and that they have been here since the Jurassic period, meaning that, long before they ever raided a picnic, they had already been around for well over a hundred million years. Not only did they survive the asteroid which exterminated the dinosaurs, they spread out from the tropical forests and conquered the world. Only the polar regions remain beyond their reach.

An important element of biodiversity, ants play a significant role in the workings and balance of ecosystems.

They turn over and air the soil, allowing water and oxygen to reach the roots of plants. And they provide a composting

service, by taking organic matter to their galleries, thereby adding nutrients to the soil.

They carry seeds into their tunnels, in order to eat the nutritious **elaiosomes**, and then discard the seed where it can germinate and sprout. As they gather preferentially the seeds that they find in the greatest abundance, this serves to control plant biodiversity.

They are an essential part of the food chain: they eat a large variety of organic matter and supply food for many different organisms. They eat plants, seeds, decomposing plants and animal matter. Many animals, such as termites, feed on insects. Others feed on the honeydew produced by aphids, and actually protect these tiny insects from natural predators, "domesticating" them to ensure a supply

**Elaiosomes**  
Fleshy structures attached to seeds, rich in fats and proteins. They help to disperse the seeds, attracting ants.

of food. Ants are also a source of good for other arthropods, amphibians, birds, mammals and even some carnivorous plants.

## A real society

Ants live in highly evolved social systems and lead lives that, observed closely, appear surprisingly human. They wage war and stage uprisings, they cultivate fungus plantations and breed aphids like cattle, they take care of their young and sick, and make vaccines. All this has been observed by Susanne Foitzik, a biologist and myrmecologist (specialist in ants) who has travelled the world to study these fascinating insects. Last March, in collaboration with a science journalist, Olaf Fritsche, she published "Empire of Ants: The Hidden World and Extraordinary Lives of Earth's Tiny Conquerors".

This breathtaking study offers the reading public an insight into parallels between ant society and our own, including the building of cities, the work ethic, division of labour, intra-group cooperation, deadly wars and even a kind of national loyalty.

In addition to their social skills, Susanne Foitzik reflects on the importance of ants to the planet. Many species, she says, are "the refuse collectors, or funeral directors of ecosystems", because they feed on dead insects. Ants that live in the ground air the soil and recycle nutrients. Because they are omnipresent and extremely numerous, they develop close relations with other organisms, ranging from aphids (which they "domesticate" and care for), plants which they defend and inhabit, and even fungi, which leafcutter ants cultivate in their underground chambers.

Some of Susanne Foitzik's research focuses on "slave owner" ants, which make recurrent raids on colonies of other ant species, stealing clutches of worker ant eggs. When the work ants hatch, they work for the social parasites which stole them, doing all the necessary tasks in the colony, from nursery care to gathering food. Research has established that slave owner ants use chemical weapons to manipulate their slaves, preventing them from attacking them. It has also shown that sometimes the enslaved ants become immune to this manipulation and rebel against their oppressors, killing their offspring. These are wars and egoistic acts that take place in acorns or the hollow of a tree, or under the carpet of dead leaves on the forest floor, right under our feet, without our ever suspecting.

Tiny but intrepid, an ant without its colony is left defenceless. But when they work together, they are unstoppable. Which is why Susanne Foitzik and Olaf Fritsche call them "Earth's tiny conquerors".

## Wealth of species in eucalyptus woods

According to the "world map of ants", Portugal is home to 133 native species of ants. Eucalyptus plantations present a high level of variety in ants, higher than that documents for any other type of woodlands, natural or planted. A meta analysis conducted by the University of Lisbon and RAIZ, based on research conducted between 1990 and 2015, in dozens of eucalyptus plantations up and down the country, identified 25 species of ants, meaning that a total of 44 have been found in eucalyptus plantations in Portugal. This corresponds to around 30% of the total number of ant species found in the country.



Communities of ants are headed by one or more queens, whose purpose is to lay thousands of eggs to ensure the colony's survival. Worker ants are females that never reproduce: they search for food, care for the queen's offspring, work in the nest, protect the community and carry out many other tasks. Male ants generally have just one role - mating with the queen; once they have performed this duty, they can die.

## Identity file

**Common name:** Ant  
**Phylum:** Arthropod  
**Class:** Insecta  
**Order:** Hymenoptera  
**Family:** Formicidae  
**Diet:** Omnivore  
**Collective noun:** Army, colony  
**Average life expectancy:** Several weeks to several years





# How to be an eco-aware and responsible tourist

Now that travel restrictions have been eased to some extent, the tourism sector is set to recover this year. This is excellent news for the economy, but puts pressure on the planet's resources. Find out how to travel sustainably, minimising your ecological footprint and contributing to local communities.

**A**fter another year of lockdown and travel restrictions, due to Covid-19, expectations for summer 2021 are high. We're all looking forward to getting away: 82% of families say they have plans and 65% plan to travel more than before the pandemic, according to the "Vacation Rental Survey", conducted by Europ Assistance in eight countries, including Portugal, and presented in late April.

Prior to the pandemic, the problems caused by growth in global tourism were clear to see in overcrowded cities, in environmental degradation and high levels of pollution. But last seasons offered a glimpse of what more sustainable tourism would look like, with a lower carbon footprint, less water consumption and less waste: the number of flights and cruises dropped sharply, at the same time as demand for caravans and bicycles increased. For reasons of health

and safety, a lot of people opted for more sustainable accommodation alternatives, preferring holiday apartments over hotels. According to the Europ Assistance survey, this tendency continues in Portugal in 2021, with 40% of respondents preferring a self-catering option.

Research shows that consumers have changed and are now looking for sustainable experiences that conciliate their need for well-being with that of the planet: 58% have thought more about sustainability since the pandemic started, according to the report from Accenture on the challenges facing the sector in 2021.

A more sustainable revival in the tourism industry is viewed by the sector itself as a question of survival. The United Nations World Tourism Organisation is calling for a "responsible recovery", in order to "balance the needs of people, the planet and prosperity". A response to the new



priorities of holidaymakers.

The Accenture research shows that the emphasis is now on travelling as safely and as healthily as possible, but that consumers are also more aware of the environmental and social impact of their choices. Holidays in people's home countries will be their main option in the short term, with 68% of tourists planning not to travel by plane next time they go away.

But whilst 86% of the travellers questioned by this survey said they want to travel more sustainably, only half as many say they are able to do so. If you are one of those unsure where to start, here are some tips on how you can travel more responsibly, helping to conserve the natural and cultural heritage of your destinations, and helping to make a positive impact on the community. As a consumer, what should you look for in the goods and services you buy for your holiday, in order to be an eco-aware traveller?

## Choose certified options

If a company or product has ISO (International Organisation for Standardisation) certification, you can be sure that they comply with globally accepted good practices. So if you're looking to book sustainable accommodation, you're making a good choice if the place is certified under ISO 21401, which ensures it is managed so as to reduce environmental impact and make a positive contribution to the local economy.

If camping out at a summer festival is more your style, or enjoying other open air events, look for those that comply with the ISO 20121 rules. This will mean they make efficient use of resources, respect their workforce and assess the event's impact on the community.

If you dream of diving into clear waters, there are some other ISO numbers for you: companies with ISO certifications 21416 and 21417 respect the aquatic environment and promote good practices, such as preventing divers from feeding or removing aquatic life.

Adventure tourism is regulated by the rules in ISO 20611, in order to minimise negative



environmental, economic or social impacts. And if you're planning a break in natural surroundings, look out for companies and services certified under ISO 18065, awarded by authorities in charge of protected natural areas.

## Plan when you pack

There are very simple ways of reducing your ecological footprint when you travel, looking just at the moment you pack your case. Take only a little luggage, because the more weight you carry, the more fuel will be needed for the trip. Choose clothes that don't need to be ironed, to save energy and take certain items to cut down on plastic consumption, such as metal straws, reusable water bottles and personal hygiene products (instead of the single use packages in hotels).

## Choose your mode of transport carefully

Air travel (responsible for around 2.5% of global greenhouse gas emissions, according to research by IATA) and cars are the highest emitters of CO<sub>2</sub> per passenger, for each kilometre travelled. But in view of their size, the cruise ships are also major polluters. Avoid them if possible, and instead choose a more ecological solution, such as rail.

If that's not possible, try to minimise your impact by taking direct flights, for example,



as most emissions occur at take-off and landing. Or try to offset your emissions: when you buy your air ticket, a lot of airlines offer the option of a charge to offset the flight's carbon footprint.

At your destination, use public transport to get around and make use of hotel and event shuttles. You also have greener options, such as electric bicycles, and other non-polluting and healthy alternatives, such as traditional bicycles or walking.

## Go in the low season

Outside the busiest holiday season, you can pay less for your hotel stay or travel, which is nice in itself. But it also has an environmental impact: you contribute to a more sustainable balance between the volume of tourists in the destination, resources and local populations. What's more, in terms of public health, it's even better to avoid crowds.



## Choose sustainable accommodation

There are several listings websites for green hotels, so search before you decide. First of all, avoid staying in facilities built in preservation areas or fragile ecosystems. Then give your preference to those built from sustainable materials, that use renewable energy and save water, and that serve local produce and avoid waste.

There are also holiday establishments that are committed to social responsibility, contributing to the local community, giving jobs to local people and paying fair wages. And others that are involved in environmental conservation projects, sometimes offering the chance for visitors to join in the task.



## Outdoor pursuits

A greener holiday in a natural setting, to boost your physical and mental health, can also include birdwatching, visits to educational farms, walks in natural parks or relaxing on river beaches. But take care along the way not to cause any negative impacts.

Among other things, don't leave litter: if there's no bin, take your waste with you. Don't remove souvenirs from the site you're visiting, like pieces of coral or plants. Respect the local wildlife, avoid elephant or donkey rides, or photographs with wild animals kept in captivity.

## Green behaviour

All your small choices can be more ecological. Buy only what you really need and choose local crafts in sustainable materials, rather than mass-produced and plastic souvenirs. At your accommodation, don't change your towels and sheets every day, to

save water, power and chemicals. Don't use disposable materials, like plastic cups and straws. And always switch off the air conditioning when you leave the room.

Have a great holiday! ♦



# Explore the wild and step back in time

Portugal's only national park is a haven for biodiversity and a place to explore mankind's historical relationship with nature. A green pilgrimage, and one worth making on foot.

**T**wo hundred kilometres can be travelled in a few dull hours on a featureless motorway, or over several days of inspiring communion with nature, following the pathways around the Peneda-Gerês National Park (PNPG).

From Castro Laboreiro (in the municipality of Melgaço) to Tourém (Montalegre), 19 paths have been marked to cater for different interests and every level of walking ability, cutting across these 70 thousand hectares which fifty years ago were declared Portugal's only national park, the jewel in its wildlife conservation crown.

Over an area seventy times the size of the Monsanto Park in Lisbon, seventeen times the city of Porto or the same size as the island of Madeira, it is the footpaths that keep open the routes followed by cattle or smugglers. You need to be fit, and one of the walks can take all day. But there are shorter and easier alternatives, such as the Birdwatching Path (in Tourém, home to the Birdlife Interpretation Centre), which is almost all on the flat, and will take you some time to complete its 1.5 kms, because of the opportunities to stop on the way and watch the birds. Whichever you choose, walking is the best way to visit the oak woodlands, to cross the old bridges, visit the water mills or spot the Garrano horses.

On the northern border with Spain, the PNPG, in conjunction with the Galician Xurés, has been classified as a biosphere reserve by UNESCO, the United Nations organisation for education, science and culture, because of its valuable heritage.

Much more than just somewhere to enjoy stunning landscape views, the Peneda-Gerês National Park is one of the last places in Portugal where you can observe the vestiges of pastoral ways of life. For centuries, local communities moved with their livestock in a pattern of seasonal migration. Although less and less people do this, there are still those in Castro Laboreiro who spend the mild summer months in the uplands, and the colder winter months in the valley, along the River Laboreiro.

The marks left by human settlements is in fact one of the great attractions of the PNPG, clearly visible in the villages of the 22 civil parishes, belonging to

five municipalities (Melgaço, Arcos de Valdevez, Ponte da Barca, Terras de Bouro and Montalegre), stretching from the Castro Laboreiro uplands to those of Mourela, taking in the serras of Peneda, Soajo, Amarela and Gerês.

Inhabited since prehistoric times, as shown by the rock art in Lindoso and the largest Megalithic burial site in the Iberian Peninsula, in Castro Laboreiro, this region of north-east Portugal reflects the relationship between mankind and nature over the ages.

## Planted forests

At altitudes of between 700 and 1500 metres and with a climate predominantly influenced by the Atlantic, this upland landscape was shaped by the needs of farmers over many centuries. It was one of the first areas to receive the attention of the Portuguese forestry authorities, created in 1886. The forestation of the Gerês mountains started three years later, along with the Estrela uplands. Prior to this the tendency, since time immemorial, had been for forest clearance, using traditional burns, to claim land for agriculture and pasture.

It was much later, on 8 May 1971, precisely fifty years ago, that the Peneda-Gerês National Park was formally created, at a time when nature conservation was far from being a central political concern. Even since its founding, the park has lived through contrasting periods, in terms of the funds invested in it and the management approach adopted.

2016 marked a turning point. Fires had destroyed more than 10% of the park's area, and funds were finally allocated to fire prevention, monitoring and conserving wildlife and to improving conditions for visitors. In the past three years, nine million euros have been spent on the park. Whilst environmentalists decry this as insufficient, it is almost one third of the funding for all protected areas in Portugal.

Without its own director since 2009, the PNPG has been managed on a joint basis since 2020 by the Institute of Nature Conservation and Forests (INCF) and the five municipalities, which have created the same number of gateways to the park, each with its own thematic focus, leisure areas, information services and environmental education.

## Biosphere reserve

Living laboratory for conservation of landscapes, ecosystems and species, through development which is socially, economically, culturally and ecologically sustainable.

The yew, which grows here, is considered an "endangered" species.



## The Peneda-Gerês National Park occupies an area seventeen times the size of Porto or equivalent to the island of Madeira.

### Five gateways, five topics

In the west, the Mezio Gateway (Arcos de Valdevez) serves the Biodiversity Park and the Mezio and Ramiscal woodlands, with a focus on nature and biodiversity conservation. One of the most popular sites for visitors arriving here is the Mezio swing, in the parish of Cabana Maior (15 minutes' drive from Soajo). The swing is seven metres high, offering views over the Soajo uplands in every direction.

Further north, the Lamas de Mouro Gateway (Melgaço) addresses issues of territorial planning, providing access to the many waterfalls and pools in the vicinity (and throughout most of the park) or the historical centre of Castro Laboreiro, the village which has given its name to a breed of dogs and stands sentry over uplands which are ideal for camping or sporting activities, such as tree climbing, in Lamas de Mouro.

To the south, at the Campo do Gerês Gateway (Terras de Bouro), the focus is on the history of civilisations. The Geira Museum showcases a first century Roman road that linked Bracara Augusta (Braga) to Asturica Augusta (Astorga, in Spain), and visitors can also enjoy the Vilarinho da Furna folk museum (named after a village submersed by a reservoir), sanctuary of São Bento da Porta Aberta or the Gerês spa resort, with its park of redwoods and ancient oaks.

Eastwards, the focus is on the landscape, at the Montalegre Gateway, part of the Barroso Ecomuseum, close to the *fojos* (wolf traps) in Fafião and nearby platform offering panoramic views. Visitors can gaze down on the valleys of the Rivers Cabril and Cávado, and also explore the monastery of Santa Maria das Júnias, in a lonely position in the valley, in Pitões. Other sights in summer include the Green Well and the Pinçães waterfall.

The park hugs the frontier with Spain, and in its centre the Lindoso Gateway (Ponte da Barca) features a medieval castle,

where the focus for visitors is on water and geology, because of the rock art and sites of geological interest, as well as the many *espigueiros*, the traditional stone constructions raised off the ground, to store cereals.

### Diversity of flora

Seeking to maintain a balance between the needs of local communities and of conservation, the Peneda-Gerês National Park has preserved a unique store of biodiversity. The region also faces challenges if it is to overcome the continuing threats to the survival of some of its plant and animal species.

This is the case of two native forestry species: yew (*Taxus baccata*), classified as "endangered" in the Mainland Portugal Vascular Flora Red List, and the whitebeam (*Sorbus aria*), classed as "critically endangered".

As well as the dry forest, which forms the bulk of the landscape, the park also contains rare and vulnerable habitats, such as oak woods, riverside woods, peat bogs and wet forests, as well as seminatural habitats (natural vegetation transformed by humans), such as woods of maritime pine, marshes and mountain grasslands.

Some of Portugal's largest oak woodlands are in the PNPG, notably the extensive Albergaria woods, some of the best preserved in the Iberian Peninsula. Oak woodlands form a complex and highly diverse ecosystem, dominated by deciduous species, where the various layers of vegetation (tree cover, shrubs and grasses) are well represented. The deciduous woodlands in the PNPG are made up predominantly of oak (*Quercus robur*), along with chestnut trees (*Castanea sativa*), sycamore (*Acer pseudoplatanus*) and common pear (*Pyrus communis*).

The riverside woods, which are priority areas for conservation, occupy narrow strips

The common snipe's only known breeding ground in Portugal



## Animals in the Park

161 birds

40 mammals

11 fish

20 reptiles

13 amphibians

between water courses and the deciduous forests, and are home to alders (*Alnus glutinosa*) and ash (*Fraxinus excelsior*), as well as yew and other species. Peat bogs, which are rare in Portugal, are wetlands where peat (a natural fuel) forms, offering an ideal habitat for mosses and scientifically valuable species of flora, such as bog cotton (*Eriophorum angustifolium*) and the carnivorous round-leaved sundew (*Drosera rotundifolia*) and pale butterwort (*Pinguicula lusitanica*), which feed on insects, to compensate for the lack of minerals in the soil.

In its vast areas of dry forest, the PNPG is also home to species of great interest for conservation: irises (*Iris boissieri*), timeleia (*Thymelaea broteriana*), the wild tulip (*Tulipa sylvestris subsp. australis*), thrift (*Armeria sp. pl.*) and caldoneira (*Echinopartum ibericum*). All these are rare, and visitors must refrain from picking any of them.

### Rare animals

Whilst the brown bear vanished from this

region long ago, other species rarely found in Portugal persist here, some of them endemic. Of the 246 vertebrates identified (161 birds, 40 mammals, 11 fish, 20 reptiles and 13 amphibians), 53 belong to threatened species included on the Portuguese Vertebrates Red List.

Large animals, such as the Iberian wolf (*Canis lupus*), deer (*Capreolus capreolus*), mountain goats (*Capra pyrenaica*) - reintroduced, after being considered extinct in the region, since the late nineteenth century -, are emblematic of the region. But the long list of rare and threatened species features butterflies, beetles, slugs, fish, amphibians and reptiles. *Vipera seoanei*, for example, is a viper which is only found in Portugal around Castro Laboreiro, Soajo and Montalegre. Birds are well represented, and many are migrating species, like the common snipe (*Gallinago gallinago*), not known to breed anywhere else in Portugal. The black woodpecker and the golden eagle are only rarely sighted.

Shall we go and explore? ♦





# The power of nature

The twittering of birds, the green of the trees, the sound of running water in the distance, the unmistakable scent of eucalyptus. The São Francisco Estate, just a few kilometres from Aveiro, is the ideal place to enjoy the power of nature on a summer's day.

**T**he imposing *Eucalyptus globulus* that welcomes us at the gate is more than a hundred years old. This monumental tree sets the tone for what awaits us in the fourteen hectares of this estate. The country air and gentle birdsong tells us we have left Lisbon far behind, although we left the capital little more than two hours ago. João Ezequiel, the caretaker and our guide for this visit, welcomes us like old friends, rather than people he's never met before. Instinctively friendly and informal, the sparkle in his eyes show that he's smiling under his mask.

Our first stop is close at hand: the house built in 1908 by Jaime de Magalhães Lima, currently being renovated to house the Forest of Wisdom project, an initiative for school children (see insert). Built in an unpretentious style, the front of the house faces the woodlands, and not the road, reflecting the importance attached by the owner to the countryside and his espousal of Franciscan ideals. Indeed, the estate was originally known as the Quinta do Vale do Soão, after the valley that runs across it, but Jaime de Magalhães Lima, a prominent intellectual from nearby Aveiro, changed its name to Quinta de São Francisco, in honour of St. Francis, when he inherited it.

Much of the biodiversity of the estate today is owed to his passion for woodlands. Of eucalyptus alone, then a new genus, he planted no less than 89 species, helped by his brother-

in-law, Júlio Henriques, director of the botanical gardens in Coimbra, who procured seeds and plants from around the world, and provided scientific advice for planting the arboretum. What Jaime de Magalhães Lima looked for in nature was inspiration and peace, but also a lesson in economics. In 1920, he wrote that "there is now savings bank which compares in terms of security and returns with planting a tree".

In 1982, the Quinta de São Francisco was bought by the then Portucel Group, today The Navigator Company, as the home for a **research centre**, in view of its important arboretum, with long-established trees that Jaime de Magalhães Lima's heirs had consistently refused to fell.

In 1984, under the direction of Dantas Barreto, Portucel planted a new eucalyptus arboretum, to which it added in 1987 and again in 1991. Telling us this story, João Ezequiel tells us to look carefully. "You can see that the trees are planted in straight lines, clearly the work of a forestry engineer, and not of an amateur or tree enthusiast, like Dr. Jaime de Magalhães Lima", he says. "All in all", he goes on, "attempts have been made to plant 170 eucalyptus species on the estate! At the moment we have around a hundred, because that's what happens in experiments, many of those that Jaime de Magalhães Lima planted were unsuitable, and didn't survive, and the same happened with others that Portucel tried to plant".

In 1996, the estate became home to RAIZ, an institute which conducts research and provides consultancy services in forestry and paper industry technology.



**A showcase of biodiversity**

The estate faces south, stretching over 14 hectares of the valley. Seen from the outside, the tall eucalyptus trees dominate the landscape, but inside you can appreciate the immense variety of the planting: "more than 200 species of trees and shrubs, and more than four hundred species in all, if we include herbaceous plants", our guide tells us.

There is also an abundance of animal life. By now it is late morning and we are more focused on listening to João Ezequiel's stories than on keeping silent to disguise our presence in the landscape, so we don't see any of the wild boar, foxes, rabbits or squirrels, which are in any case more nocturnal in their habits. But the birds (seventy species have been identified on the property) sing blithely on around us and the rustle of dry leaves on the ground gives away the movements of reptiles and amphibians of varying shape and form.

João Ezequiel's enthusiasm is contagious and we soon start to see the estate in a different light. He has a ready answer for all our questions, and he can identify all the plants, however small. The solemn expression on his face, as he rubs a leaf between his fingers and offers it to us to identify from its scent, is matched only by the smile of friendly amusement with which, unfailingly, he listens to our wildly erratic answers. We managed to identify a bay leaf! But, with some embarrassment, we failed to name lemon balm...



Papyrus was a forerunner of paper as a medium for writing. The Egyptians took the papyrus stems, cut them into strips, which they laid side by side and pressed, to form sheets.

João Ezequiel, caretaker at Quinta de São Francisco.



We tasted wild strawberries (spoiler alert: rather insipid), we got acorns mixed up with oak galls, and called a magpie a jay (both species are to be seen on the estate). We learned that bamboo is, technically, a kind of grass, that the largest in the world can grow to a height of 42 metres, and that some species grow a metre a day! We saw eucalyptus trees of different heights, with different types of bark and different kinds of leaves, and even one that smelled of lemons.

We saw ancient oaks, cedars, cypresses, magnolias, tulip trees, palm trees, ferns, mosses, lichens, ash trees, alders, willows, nettle trees, elders, camellias and even a redwood, the world's tallest species, planted in 1901 by Jaime de Magalhães Lima.

We saw more acacias than we knew existed, and learned how they spread quickly and why they are a problematic invasive species. And we saw how this mixture of native and exotic species, living side by side, is one of the charms of the Quinta de São Francisco. In the case of the invasive species, "care is needed", as João Ezequiel explained.

Three hours later, we said goodbye to João Ezequiel and the Quinta de São Francisco, knowing a lot more than when we arrived. We could have taken a picnic to eat at the long wooden table, in the shade of the trees. But to be so close to Aveiro and not stop there for lunch seemed a waste. And who said that ovos moles don't make a meal...? ♦



# Forest of Wisdom

RAIZ recently joined the Portuguese network of UNESCO Clubs, alongside other organisations whose missions and values are aligned with those of disseminating education, science and knowledge. In this field, the institute is implementing the "Forest of Wisdom" ("Floresta do Saber") project, an education and communication initiative in the area of sustainability. Supported by the Calouste Gulbenkian Foundation, it is aimed at the student population and combines the cutting edge expertise generated by RAIZ' research work with the natural beauty of the Quinta de São Francisco. The project seeks to teach children about the importance of planted forests and about new forest-based products, derived from natural and renewable raw materials, with the potential to replace fossil-based products, such as plastic. ♦

**More than a thousand trees and shrubs will be planted on the estate this year, including native and exotic species.**



This *Eucalyptus botryoides*, standing 58.5 metres high, is the tallest tree on the estate and in the municipality of Aveiro.



Visits have been limited due to the pandemic, but it is hoped that the restrictions will be gradually eased, as the public health situation improves. In any case, all visitors (groups and individuals) must book in advance. You can book your visit online: <http://raiz-iifp.pt/en/visit-us>

## So close to Aveiro

To visit the Quinta de São Francisco and not stop in Aveiro is like going to Rome and not seeing the pope (as the Portuguese say...).

**A**veiro is a beautiful city at any time of year, but the warm glow of early summer, when we visited, makes it even more inviting.

Large enough to cater to a range of tastes, Aveiro is still small enough to explore on foot. Visitors can enjoy a stroll along the estuary, and stop to rest at an outdoor café or on a garden bench.

Even if you don't want to look like a tourist, you still can't miss taking a trip on one of the *moliceiros* on the canals, and over-indulging in ovos moles. You can also lunch on excellent fish at Cais dos Botirões, visit the City Museum and cathedral, and photograph the colourful *Ponte dos Laços*.

Shall we go? ♦

1. The *moliceiros* are boats that were traditionally used to remove *molço* (sea weed) from the canals, and now offer trips around the canals for tourists.

2. Ovos moles are confectioned from egg yolks and sugar, and are a traditional delicacy in Aveiro, famous throughout Portugal. If you prefer something less sweet, try an *almendrada* - almond biscuit - with your coffee.

3. Right in front of the fish market, the brightly painted houses on Cais dos Botirões offer restaurants, cafés and bars where you can relax.

4. The traditional padlocks have given way to colourful ribbons, still symbolising the same thing: a promise of undying love. The *Ponte dos Laços* 'bridge of ribbons', also known as the 'lovers' bridge', is where everyone stops to take a photo.

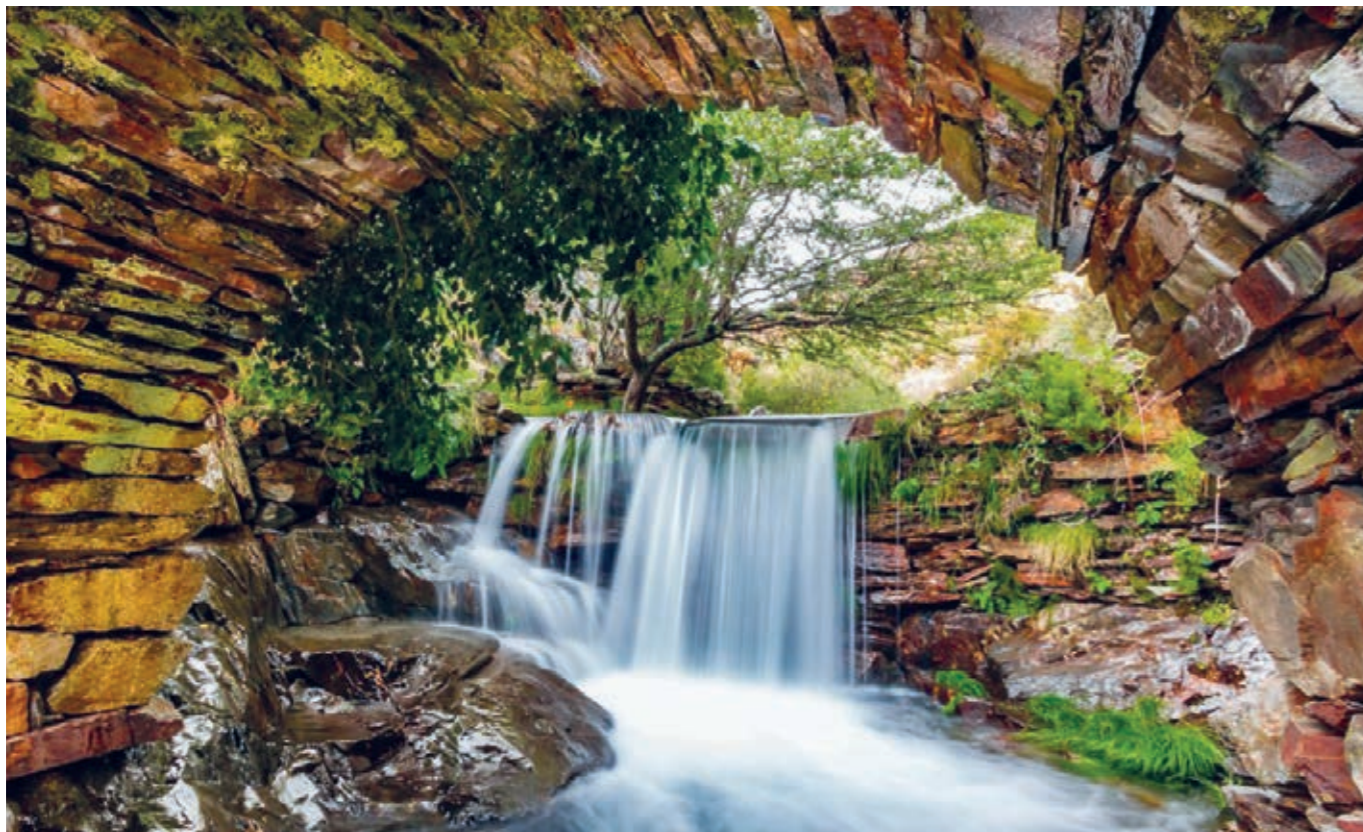
5. The City Museum commemorates the key events, moments and figures in the history of Aveiro.

6. Housed in a former Dominican monastery, the cathedral is classified as a monument of public interest.



# "Welcome to our town"

The Navigator Company's employees invite you to visit their home towns. A chance to step out of our daily lives, in Portugal and further afield.



## Arouca is nature in its pure state

The municipality of Arouca covers a large area, much of which is forested. The river beaches at Areinho or Vau, where you can dip your toes in the River Paiva with rolling green scenery all around, are the perfect setting for an idyllic family picnic or a lazy afternoon with a good book in the shade of a tree.

The riverside walkways - the Passadiços do Paiva - are a natural paradise. Stretching over eight kilometres on the left bank of the river Paiva, among natural landscapes and the chance to observe the local biodiversity.

The whole municipality of Arouca is classified as a Unesco World Geopark, with the green woodlands and the waters of the Paiva guarding no less than 41 sites of geological interest, many of them included in the Natura 2000 network.

The Serra da Freita is an upland region well worth a visit. Sometimes called the "enchanted hills", because of the sense of a lost paradise and the magic of the green mantle stretched out above Arouca. This is where you can see the unique *Pedras Parideiras*, or reproducing stones. As a result of erosion, nodules are released and accumulate on the ground, each leaving a cavity in the granite. You will also find the *Frecha da Mizarela*, the highest and most spectacular waterfall in mainland Portugal.

Arouca is all this, and more. It's also a great place for hiking, BTT trails and adventure sports. And for crafts, folklore and traditions. The distinctive flavour of the local beef. The traditional pastries and sweets: *barrigas de freira*, *pão de ló*, *castanhas* and *morcelas doces*. ♦



**Ana Duarte,**  
Forestry  
Division -  
Projects  
Office



## Setúbal: between the sea and the mountains

Setúbal is a great base for exploring this region. You can take a trip on the River Sado, or drive along the coast to Arrábida, or even Tróia My favourite beaches or Galapos and Galapinhos, but I also love Tróia Rio: lots of sand and not many people. It also has another attraction, you can see the Navigator mill, on the other side of the estuary, where I've worked since 1982.

The food is all fabulous, but don't miss the irresistible sheep's cheese, made in the municipalities of Setúbal, Palmela and Sesimbra (and with 'protected designation of origin'). Torta de Azeitão is a traditional Portuguese cake, made with plenty of eggs and flavoured with lemon and cinnamon.

Take the chance to visit the wine cellars in Azeitão, the Convento de Nossa Senhora in the Arrábida hills and the medieval castle in Palmela. Just a few kilometres from Setúbal, if you take the ferry, you will find Comporta with its famous sandy beaches, part of the Sado Estuary Nature Reserve. ♦



**António Neto Alves,**  
Head of  
Legal  
Services

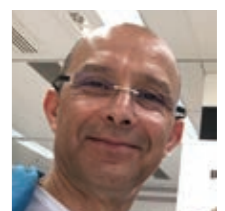
## Lisbon is a city on a human scale

Lisbon is an increasingly cosmopolitan city, where you can find anything, like any other major European capital. You can see this in the way we have restaurants offering cuisine from all over the world. There are high-end restaurants with prize-winning chefs, side by side with the traditional Lisbon tascas, serving traditional food and where the customers know the owner by name, and vice versa.

And now The Navigator Company, where I've worked for ten years, has some of its offices in the city. Of course, the company does business all over Portugal and around the world but, just like when we go on a foreign holiday, it's always great to get home.

But Lisbon is more than just the capital. It's also "Greater Lisbon". Caparica, Cascais and Sintra. Beaches and mountain scenery. A radical change of scenery in just a thirty minute drive. Or even less if, for example, we head for Monsanto, and the woodlands park in the heart of the city. Or to the parks and gardens: the Gulbenkian, Estrela, the Jardim Botânico.

For those less familiar with the city, I'd say don't just follow the crowds to the Castelo de São Jorge, the Belém Tower, Terreiro do Paço and the Belém Cultural Centre. They're all worth visiting, of course, but you shouldn't miss the flea market (*Feira da Ladra*), antiquarian book sellers, the vinyl record stores, and a match at the Sporting Lisbon's Alvalade Stadium. Or if you must, at Luz, home to Benfica; because no one's perfect... only Lisbon is. ♦



**João Rebóia,**  
Assistant  
Manager,  
PM4,  
Setúbal

## Verona, city of love

"If you love someone, take them to Verona." In the city of Romeo and Juliet, love is in the air all year round, but in February, around Valentine's Day, Verona in Love takes romance to a whole new level. So much so that a couple can't say they're really in love until they have kissed, at 9.00 p.m. on 14 February, in the Piazza dei Signori, inside the huge heart specially prepared for the occasion.

Verona is an ancient city, mostly medieval in its architecture, and a stroll through the city's streets is a journey into the past. The Arena is in pristine condition, as if it had just been built, despite dating back twenty centuries.

Verona is surrounded by mountains, which offer a quick escape from the city. In just a few minutes you can enjoy the fresh air in the Alpine foothills in Lessinia, as well as the upland scenery and the authentic cuisine. Or visit Lake Garda, the largest in Italy, with an area of 370 km<sup>2</sup>, where in summer you can swim or in winter enjoy the thermal waters in Sirmione. Diving, sailing, jogging and cycling are options all year round. Or enjoy a day in Gardaland, Europe's eighth most popular theme park. ♦



**Massimo Coletti,  
Regional  
Manager**



## Rendez-vous in Figueira da Foz

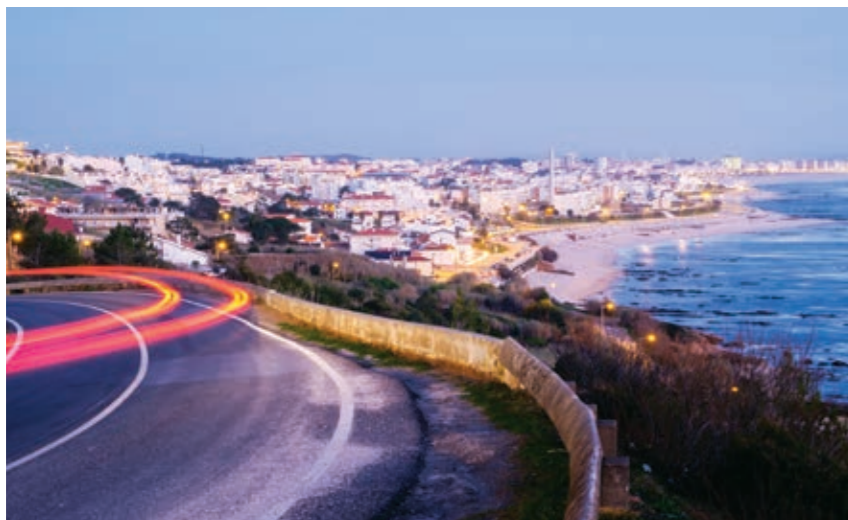
Ramalho Ortigão was the first to say it: to live in Figueira da Foz is to witness the annual gathering of Portuguese holidaymakers, as they flock to the seaside to find their place in the sun. Praia da Claridade, a beach where the sand stretches away into infinity under a magical light, is where this ritual unfolds.

The beach around here is famous for water sports. It appears magical, in the spectacular sunlight and endless sand. It's the ideal place to relax and think, and it's practically impossible to resist getting the sand between your toes.

The ritual of the beach is followed by another - lunch at a local restaurant. You can sample the

excellent seafood and fresh fish, such as the sea bass cooked in salt in the traditional style. For those with time to spare, Figueira da Foz has much to offer, combining the apparently irreconcilable: the architecture and design redolent of the Belle Epoque, when the city had its heyday, and the trappings of a major fishing port. The Bairro Novo district is one place where the two currents come together, and home to some of the city's main attractions. And in the evening, it's always worth visiting the Casino.

But it's the city's natural setting - from the banks of the Mondego to the uplands of the Serra da Boa Viagem, running down to the Atlantic beaches - that remains its main attraction. ♦



**Pedro Matos  
Silva, Plant  
Manager**



**Francisco Nobre,  
Sustainability  
/ Occupational  
Health and  
Safety Director**

## Maputo, city of smiles

Mozambique is a welcoming country, the people are kind and friendly, and don't need much to be happy.

The capital, Maputo, is laid-back and safe. The rush hour is the same every day, starting very early, when you can hear the chapas (minibuses) rattling through the streets. The climate is perfect for the outdoor life and for a quick break on fabulous beaches, which are relatively close - just 3 or 4 hours away...

It's a city with a long history and some well-preserved contemporary architecture. The highlight is the magnificent railway station, next to the port of Maputo.

There are several places not to be missed, that offer a lot for sightseers - the traditional smells, the organised chaos, stunning landscapes and good food.

One of the traditional sights is the cathedral, not just for the building itself, but also because, nearby, you can see one of the city's most emblematic and imposing statues, of Samora Machel. Another essential sight is the Central Market, in the downtown commercial district, and renovated some four years ago. Here you'll find milling crowds and the characteristic scent of spices, the thousand varieties of chilli peppers, the myriad colours of the fruit and, in the midst of all this produce, you'll also see hair extensions, statuettes and wicker crafts. ♦

# Shall we read?

No two children are the same and there are no universal rules, but a taste for reading can be "cultivated" in the family. It's enough for parents to read them stories when they're small. And to show them it's something they love. But that means we need parents and teachers who are book lovers themselves.

**R**eading is one of the most important skills in human life, and also an essential first step to any kind of learning. So schools and families have an added responsibility to ensure that each child acquires reading skills and becomes a reader for life.

Reading on paper has countless advantages for learning, and researchers working in this area have made some interesting findings. For example, a research project at the University of California estimated that children who read books on paper learn 50 per cent more words, and that children whose parents encourage them to read start to form full sentences earlier than those who only watch TV. And as meta analysis by the University of Valencia showed that people who read on paper have a better understanding of what they read, and that this is particularly evident in children. Even so, Portuguese children read only a little.

And there are many houses in Portugal without books, and where books are regarded as strange objects, due to a long history of resistance to reading. So how can children be encouraged to enjoy reading? And how can parents and teachers be involved in this mission?

"There are countless strategies for encouraging and educating people to read at home and at school", explained João Manuel Ribeiro, writer and directors of Tropelias & Companhia, an association working to promote and disseminate literature for children and young people. But he admits that the simple act of reading to a child is actually the most effective. "Reading with the child, to the child, or just reading, is by far the best way to instil a taste for reading", he said, and then elaborated: "If a child sees her parents and teachers reading and talking enthusiastically about the books they read, they will probably want to try it

too, and to understand why those people in their lives read and enjoy reading".

He then enumerated some other strategies that can be used: "reading aloud, reading for pleasure (when the child chooses what to read), informal conversation about the books they have read, reading as a family (intergenerational reading), reading combined with other art forms (such as illustration, drama/performance, dance, music)...".

He also pointed out that it is important not to force children into reading: they should associate it with fun... and emotions. So what João Manuel Ribeiro suggests is this: "Read to your children, read with your children and let them read to you". And above all, "create an emotional connection with reading in your family".

### Ten minutes a day

The National Reading Plan (NRP) runs a number of programmes ("Now I can read" and "Reading To and From") aimed at the parents and teachers of pre-school and primary school children, with guidelines on how to read together for the ten minutes each day they recommend. It reminds them that "reading with children helps them to like books, to learn to read and to improve their reading".

Here are some tips for the parents of primary school children (years 1 to 4):

- Choose somewhere comfortable and quiet and sit where you can both see the pictures and the text.
- If the child cannot yet read or has difficulties, point to each word and pronounce it clearly; where he or she already knows some of the words, read together and, whenever possible, let him or her read first.
- Talk about what you're reading or seeing in the illustrations, and make sure the child is enjoying it.



To learn more about this topic, consult here edition no. 6 of this magazine.



Illustrations of the cast of characters in the Give the Forest a Hand project, organised by The Navigator Company to contribute to environmental education for children, bringing them into contact with the natural world and woodlands.

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## Improved success and affect

Reading brings many advantages. A study conducted by the American Academy of Pediatrics<sup>(1)</sup> shows that reading books to children in early infancy helps them to increase their vocabulary and reading skills four years later. But there are other benefits: it contributes to cognitive development, improves communication and self-expression, fosters emotional development, helps create an appetite for knowledge and curiosity, it helps children pronounce words correctly and improves their concentration and memory.

And these are not the only important skills: books also stimulate the imagination and creativity, by offering fictional dimensions and imaginary scenarios and characters. In addition, many stories have a moral, and so reading is also important in shaping character and values and learning to distinguish right from wrong.

Lastly, the NRP reminds us that "reading makes for calmer children", helping them to gain self-confidence and the ability to decide for themselves. "The pictures, information and ideas in books expand their knowledge of the world and help them to greater success at school and in life". ♦

## Predilection for paper

João is 8 years old and has grown up with books. "I've read him stories since he was tiny," says his mother, Filipa Miguel, recalling that "before he could even walk he already had a lot of books around him". The result is that João has his own library and turns to books whenever he needs to find something out for school. "Books are the first tool to be used; only afterwards does he go online, if he needs to".

Filipa has no real explanation for her son's predilection for paper. "It's happened naturally", she said, and then elaborated: "As he's always had paper books around him (in his bedroom, in the living room, in the bathroom, in the kitchen...), both in our house and at his grandparents', he regards them as normal and useful". What's more, "whenever he's asked for books, I've given them to him" and "I make a point of giving books to his friends on their birthdays".

A proud mother, she has no doubt that her son's enthusiasm for paper books and reading will make him "a better person". Because, she says, "books force us to use our imagination, they arouse our curiosity and interest in other worlds". ♦



- If it's a big book, read it in easy sections.
- If the child shows signs of being tired or uninterested, try again the next day.
- When the child is able to read, let her or him read aloud, and listen in silence.
- If the child asks for it, read the same story one or several times.
- When you finish reading, talk to the child about what they liked best in the book.

As for the choice of book for children of this age, the National Reading Plan suggests books with brightly coloured pictures, and above all a lot of variety: books with only a little text, to children to read alone and practice deciphering the words, or with a longer text, to listen to it being read and to discover syllables, words and sentences. Family stories, traditional tales, stories about animals or about Christmas, and the seasons of the year, about going to school, holidays... There is no lack of choice, so let the child choose the stories they like best and encourage them to look for new books and to lend their old books to friends at school.

The NRP lays great stress on the importance of encouraging children to enjoy reading from a very early age. This is because "listening to someone reading aloud, reading in pairs and talking about books develops the intelligence and the imagination," as well as adding to their knowledge of the world and helping them to "do better at school and in life" (see insert).

### Set an example

Leaving aside the tips and strategies, there is no one single way of encouraging children to read, and so "what works with one child may not work with another", as José Fanha pointed out at a seminar on children's literature. "We have a long history of being reluctant readers", he warned, recalling that "there are many homes without books, and lots of children never see a parent reading..." and that the mere act of reading is sometimes regarded as odd, as if reading were "something peculiar".

João Manuel Ribeiro, a writer who runs a literary education programme aimed at schools and families, agrees. "The main obstacle is the lack of a culture of reading, in the family, at school and in society", acknowledging that "as a society, we still have little belief in the power of reading".

So the secret may be to start by "educating" parents, so that they can set an example, and instil the love of reading in their children. ♦

(1) <https://url.gratis/L59U2>

# Wanted: Nature

Children play less and less in the street. The pandemic has accentuated what was already a trend and threatens to bring serious for the physical and emotional development of children.



Children increasingly live (and play) between four walls: playing out in the street, which was a natural and fundamental part of childhood, is becoming rare. In Portugal, only 2.2% of children aged under 10 play in the street. At the same time, 65.3% of kids include tablets and smartphones in their games and 21.6% already have their own devices.

The figures are from a survey entitled "Portugal at Play", conducted by the Escola Superior de Educação de Coimbra, in partnership with the Instituto de Apoio à Criança. "How societies play, all round the world, has changed very significantly in recent years", says Rui Mendes, who coordinated the survey, recalling that "in the past, there were more places and more possibilities for children to play outdoors" and that "the constant emphasis on success, the hectic pace of life and the idea that play is not serious have brought dramatic consequences for children's development".

The situation is almost alarming. A study by the Portuguese Pediatric Association has shown that children with an average age of five years spend 54.3% of their time in front of a screen. A few years ago, an international study by Unilever in ten countries showed that prison inmates spend more time outdoors than children: two hours of sun and air each day, whilst most children spend less than an hour (a third of children aged 5 to 12 spend less than 30 minutes out of doors). The survey gave rise to a campaign called "Set Children Free", a title which Carlos Neto, professor of Physical Education and one of

the world's leading experts in the field of play, has borrowed for one of his books.

"We shouldn't be playing with toys, but with materials we find from nature", he argues, denouncing a "culture of fear", that imprisons children and forbids them to take risks. The situation is getting worse and worse, he warns. After being kept indoor by the pandemic, "children are going back to school to be confined in their classrooms", he contends.

Advantages and repercussions  
Scientists and paediatricians agree that playing outdoors contributes to sound physical, cognitive and intellectual development, as well as combating a sedentary lifestyle and obesity. Several studies conducted by the National Association for the Education of Young Children (NAEYC) have shown that playing in a natural setting awakens curiosity, the sense of discovery, experimentation and the desire to learn more.

The Portuguese Paediatric Association has noted that playing in freedom helps to protect against stress, anxiety or even more serious mental problems.

Aware that children are spending "too much time" indoors because of the pandemic, paediatricians have warned that this will have "obvious repercussions for their neuro-development and mental health". Recalling that playing involves "exploring the outside environment, facing new challenges, running without any set destination, rules or obligations, as well as laughter and tears", their call is: "Let the children go outdoors and play!" ♦

## Facilitating play

"We have to be aware that, as parents and educators, the responsibility is ours alone. There is no child who does not enjoy being outside, in a natural setting, the idea of play, but 'being' means having time, space in our mental lives, to let things happen". We're listening to Francisco Lontro, coordinator of "Street Play", a project that sets out to "restore community relations" and so attract children and adults into the street.

"Why shouldn't I, once a week, take a few kids, whose parents aren't able to do this (friends, neighbours), and give them the chance to get together, to run, skip, use their imaginations... In short to play, like we did when we were kids?", he asks, pointing out that "it's not fair to say that it's hard to get the kids out of the house after we've spent years swamping them in TV, smartphones and consoles".

Four years on from setting up his project - the "world's first online platform for georeferenced open air events for children" - he has clocked up "more than 4 300 children and 35 000 hours of play". Francisco Lontro has no doubt: "It's inevitable we'll go back to playing outdoors and in natural settings". But in order for us to "again value the street as a place to meet people, for happiness and personal growth", we have to create "friendly" spaces, "green and attractive towns and cities, that encourage us to talk and confront us with the beauty of life and not just concrete". ♦

## The Navigator Company's industrial complex in Figueira da Foz

### 30 years of making the best paper!

The Navigator Company's first machine producing UWF (uncoated woodfree printing and writing) paper at the Figueira da Foz Industrial Complex recently celebrated its 30th anniversary. PMI, as it is known, was the first world-scale venture in southern Europe and featured a level of robotisation and automation unmatched anywhere in the world at the time, anticipating the developments of what is now called Industry 4.0 by more than twenty years. The Figueira da Foz Complex started producing pulp in 1984. In May 1991, the site started to produce paper, with the creation of the Navigator brand, with which the Company first made a name for itself around the globe, gaining it the worldwide reputation enjoyed today by the products of The Navigator Company, the current European leader in the production of premium papers. PMI was built in record time, around two years, thanks to the mobilisation of a multidisciplinary and highly specialised team, in a triumph of Portuguese engineering and leadership. Responsibly manufactured paper is a naturally sourced product and an example of sustainability along its entire value chain. ♦



### Further investment in renewable energy



A new facility featuring 7 700 solar panels, with a rated capacity of 2.6 MW, i.e. able to power more than 1 300 electric cars each travelling twenty thousand kilometres in a year. This is The Navigator Company's largest solar power plant, and it started operation in January this year, at the Figueira da Foz Industrial Complex. Generating power for the industrial operations on the site, this renewable facility is the group's fourth solar power plant and has been installed on the roof of the Figueira da Foz mill, occupying a surface of approximately 13 500 m<sup>2</sup>. The new solar plant was built in line with the company's strategy of decarbonisation and has increased Navigator's capacity for generating renewable electricity with zero CO<sub>2</sub> emissions, enabling it to avoid the emission of 1 296 tons of CO<sub>2</sub> every year. Navigator has set itself the target of achieving carbon neutrality at its industrial plants by 2035, 15 years ahead of the Portuguese and European targets. ♦

## Portucel Moçambique

### First exports of wood destined for Portugal



Portucel Moçambique, The Navigator Company's subsidiary in Mozambique, is preparing to export its first batch of eucalyptus wood, to be sent to Portugal for production of paper pulp. The first consignment, comprising 140 thousand cubic metres, is being harvested from the forestry plantation in Sussudenga, in Manica province, and will be the first step to "putting Mozambique on the international map of countries exporting wood from planted forests", we were told by Paulo Silva, managing director of the company. Classified as a project of value to Mozambique's economy, the sustainable plantations of eucalyptus in Manica and Zambézia provinces represented investment of 110 million euros up to the end of 2020. This figure may rise to 217 million euros in the near future, with the construction of mill to produce wood chips for export. The Portucel Moçambique project also envisages a second phase of socio-economic development, with an additional investment of 1.9 billion euros in further forestation and the construction of a pulp mill, with estimated annual exports worth one billion euros. ♦

### Support for construction of surgery block

Portucel Moçambique's social development programme has already invested more than six million dollars (around five million euros) in improving living conditions in local communities. One of the most recent projects was support of 150 thousand dollars (125 thousand euros) for construction of a surgery block at the Ile district hospital, in Zambézia province. The construction of this important facility will help reduce the distance that local people have to travel to obtain medical services, and is part of Navigator's social responsibility programme in Mozambique, which has reached around seven thousand families in 120 local communities. ♦





## Decarbonisation: soil and forests on the right track



Portugal is on the right track in seven out of twelve indicators analysed by the European Union's Life Unify project, notably in land use, land use change and forests (LULUCF), where behaviour in greenhouse gas emissions (GEE) is 56.4% better than expected.

The performance of ten countries, recorded on a tracker of National Energy and Climate Plans, can be consulted at [www.unify.caneurope.org](http://www.unify.caneurope.org). An interactive map takes us to twelve indicators, with data from 2019, where it can be seen that Portugal needs to improve its greenhouse gas emissions in five of these: agriculture (11% above target), end energy consumption (8.2%), industry (3.5%) and transport (2.4%). In terms of the percentage of renewable energy in the electrical sector, Portugal is 8.2% short of the target.

The tracker is intended to function until 2022, in order to help countries understand their baseline and progress on measures adopted to achieve carbon neutrality. ♦

## Portugal well placed to attain carbon neutrality ahead of target date

The accounts for Portugal's transition to carbon neutrality, possibly even before the target date of 2050, have been drawn up by McKinsey & Company and show that the cost may be below the European Union average. Drawn up in collaboration with BCSD Portugal, the study concludes that Portugal needs to accelerate by 20% in relation to the existing tendency towards decarbonisation over the past decade and a half. The investment needed will be equivalent to around 7% of GDP, and may create "opportunities for growth of up to 10-15% of GDP". "The more favourable position of the power generation sector, increased penetration of electrical vehicles, and also the greater potential of forestry for sequestering emissions" means that 50% decarbonisation (in relation to 1990) is a possibility by 2030, the consultancy firm asserts, recommending "a strategic approach to forestry and land use". ♦



## IMF now assesses environmental sustainability

The International Monetary Fund (IMF) has announced that it will include environmental sustainability as one of the criteria in its annual appraisals of the economies of its member States.

The organisation's executive director, Kristalina Georgieva, pointed to the profound and

lasting impacts of the pandemic to justify its recommendation to member States to "commit to projects with an environmental impact", and called for "fairer distributions of the rewards", that can "foster the online economy, green, sustainable and climate resilient investment, that promotes talent". ♦

## An example in paper manufacture

The Insider news website (previously Business Insider) chose The Navigator Company for a detailed report on the paper production process, from the extraction of raw material from the forest through to the end product leaving the mill.

Navigator was chosen for its scale and its sustainable practices, which make it an international benchmark in the paper sector. Its achievements in preventing forest fires were scrutinised by Insider's reporters, who travelled to the Espirra Estate and the Setúbal Industrial Complex in May, to take photographs and ask questions. First launched as Business Insider in 2007, it shortened its name to Insider in February this year. It reaches a global readership, with editions in 20 countries in America, Europe, Asia and Oceania, in seven languages. ♦



## Flamingos nest in Portugal

The pandemic has helped two flamingo colonies that have taken up residence in Portugal to succeed in nesting, leading to the birth of the first young of this species in this country.

Wildlife wardens and staff from the Bird Migration Study and Protection Centre (CEMPA) of the Institute of Nature Conservation and Forests (ICNF) have identified hundreds of nests in both colonies. The flamingo (*Phoenicopterus roseus*) population has grown in Portugal, finding more feeding and resting grounds in the coastal wetlands, between the Tagus and the Algarve. ♦

# Eyes on the future

Year after year, fears have grown of worsening environmental imbalances (climate change, extinction of species, natural disasters) and depletion of non-renewable resources. Unless these tendencies can be reversed, they may undermine our quality of life, or in the worst scenario render the Earth uninhabitable for humans. What once appeared a fantasy portrayed by science fiction writers has gradually entered the daily concerns of ordinary people and a wide range of institutions, such as the United Nations.

The UN has been working to create a sense of urgency around the need for the economy to adapt to the parameters of sustainable development, and multiplied its efforts to establish platforms of understanding between countries, geared to this purpose.

In more recent years, it drew up and approved the Millennium Development Goals, setting targets to be achieved by 2015. When that year arrived, the lack of sufficient progress prompted the overwhelming majority of nations to approve the Agenda 2030. We are now almost half way through the period for implementing the Agenda 2030, and fears are growing that not enough is being done to address the risks which may become catastrophic. That is the backdrop against which the UN has called for the next ten years to be a Decade of Action 2020, so that the Sustainable Development Goals can be achieved. This call is for everyone - citizens, governments and businesses - to redouble their efforts to reduce their environmental impact, in particular by reducing emissions of greenhouse gases.

Business will of course play a crucial role if these outcomes are to be achieved. It is very clear today that only companies that fully accept their environmental and social responsibility will be in a position to prosper and to provide their shareholders - employees, customers, suppliers, local communities and, of course, shareholders - the level of satisfaction corresponding to the interest invested in them.

The Navigator Group is strongly committed to contributing to a world with a more positive outlook. That is why, in close coordination with its main stakeholders, it has drawn up a challenging Sustainability Agenda, centred on the concept of Creating Value Responsibly, built around three fundamental areas: Nature, Climate and Society. Progress on this Agenda is monitored regularly by

the 2030 Sustainability Roadmap, so that the goals in each area involved are effectively achieved on schedule, as reflected in implementation indicators. The Agenda 2030 shows that Navigator is aligned with global concerns in this field and is a fundamental element in the process of innovation and modernisation of the Group itself, enabling the whole organisation to align itself with its fundamental goals.

As an integrated group that bases its operations on producing and processing renewable raw material drawn from forests, self-sufficient in energy to a high degree, which produces recyclable consumer goods and attaches great importance to research and innovation, Navigator is fairly well placed to take advantage of the growing importance of the circular economy, the crucial touchstone for assessing how sustainable an industry is.

The highly responsible way in which the Group has faced its challenges in this particular field is clearly reflected in its creation of specific internal bodies to help its management arrive at the right decisions: the Sustainability Forum, the Environmental Board and the Communities Monitoring Committees.

Despite the seriousness of the problems we face, I believe we have reasons to be confident, as regards our Group, and as regards society in general: confidence based on the determination to make the changes needed, supported by the best scientific expertise, and also on the capacity mankind has always shown to overcome the greatest challenges, whenever it has faced them. Only an optimistic outlook will enable us to harness the energy, the resources and the willpower needed in order for our planet to be somewhere all its inhabitants can realise their legitimate aspirations.

The great Danish physicist, Niels Bohr, is credited with saying "Prediction is very difficult, especially about the future". This unpredictability may perhaps enable us to keep alive our belief that the future holds every conceivable possibility, including the brightest. Provided, of course, that we all succeed in working for it. ♦

**Manuel Regalado**  
Member of the  
Board of Directors of  
The Navigator Company



# Companies as drivers of change

Companies exist as the sum of their people. Their skills and their ideas. Companies are like living organisms which, as such, interact with and shape their surroundings. The greater this awareness of their context and priorities, the more positive this dynamic will be. At a time when the quest for a more sustainable future has become imperative, this way of thinking about companies is also increasingly relevant.

Companies, organisations in general, are the engines of change. The many examples we all witnessed of companies overcoming difficulties in the recent pandemic have merely confirmed that it is here that the strength of the collective is greater than the sum of its parts - provided we think strategically and stay aware of the problems of our time. The success of a company in the face of adversity, and its resilience when confronted with new challenges, will therefore depend on the decisions it takes and the commitments it is bold enough to own.

It is no coincidence that the Decade of Action, the United Nations challenge for us to do more and do it faster, is addressed to organisations, and specifically to corporate decision makers.

In the case of The Navigator Company, sustainability has long been built into our decisions and our way of working, thanks to systematic policies for conserving biodiversity, in the sustainable forestry management we practice and encourage along the value chain, as well as in our commitment to carbon neutral industrial complexes by 2035, a decade and a half ahead of the international target dates. Sustainability has also grown out of our close relationship with stakeholders, our policy of corporate social responsibility, and of what we give back through our business, either as shareholder value, generating jobs or payment of taxes. But we acknowledge the challenge. And we know we have to go further and faster.

That is why we have adopted our "Agenda 2030", a programme for action, guided by a fundamental principle: Creating value responsibly.

This agenda took form after listening to our internal and external stakeholders, as well as a process of reflection that led us to three essential areas for action: "Climate", "Nature" and "Society".

These three areas present very clear and specific challenges, related to promoting and conserving biodiversity, sustainable consumption, the circular economy, sustainable and resilient supply chains, climate mitigation and the low carbon economy, technology for good, the future of work and investment in human capital.

We are aware of the growing importance of ESG (Environmental, Social and Corporate Governance) criteria in the business world, and there are less and less investors who believe that a company can generate value while neglecting these concerns. What is more, in a globalised society that has started to wake up to the imperative need for sustainability, and with the arrival of new generations of consumers equipped with the skills to make this assessment, the actual survival of companies is at stake.

This virtuous cycle, which allies the interests of companies with social priorities, is clear and unambiguous, but it will be worthless if the decisions makers lack a profound conviction that goes beyond merely enhancing the value of their assets. That is why we believe that sustainability will have to be guided by ethical standards, by responsibility and by transparency. Sustainability cannot be a parallel dimension in the life of a company - it has to be its backbone, the beginning and end of everything it does.

The Navigator Company's declared purpose sets out its commitment to creating sustainable value for our shareholders, and for society as a whole, leaving a better planet for future generations, through natural products that are sustainable, recyclable and biodegradable, that help to sequester carbon and produce oxygen, that protect biodiversity, improve the soil and combat climate change.

Guided by this set of principles, we believe we have a contribution to make. For The Navigator Company, sustainability is not a strategy: it's how we live. ♦

**Fernando Araújo**  
Member of the  
Executive Board of  
The Navigator Company



# Personal views of woodlands

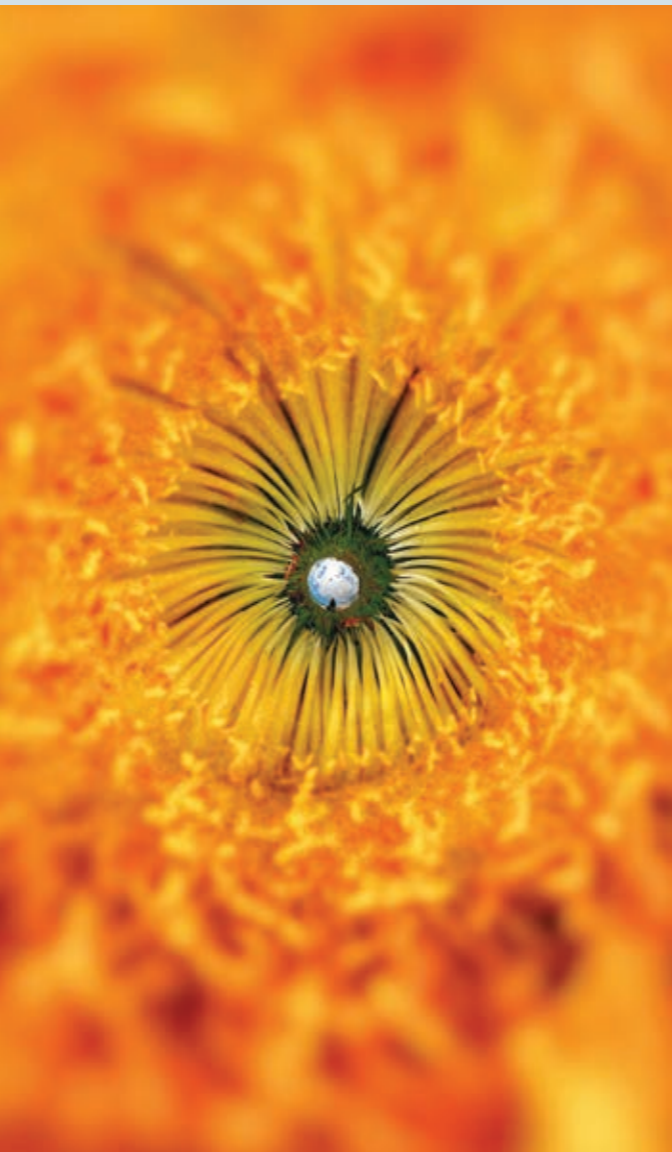
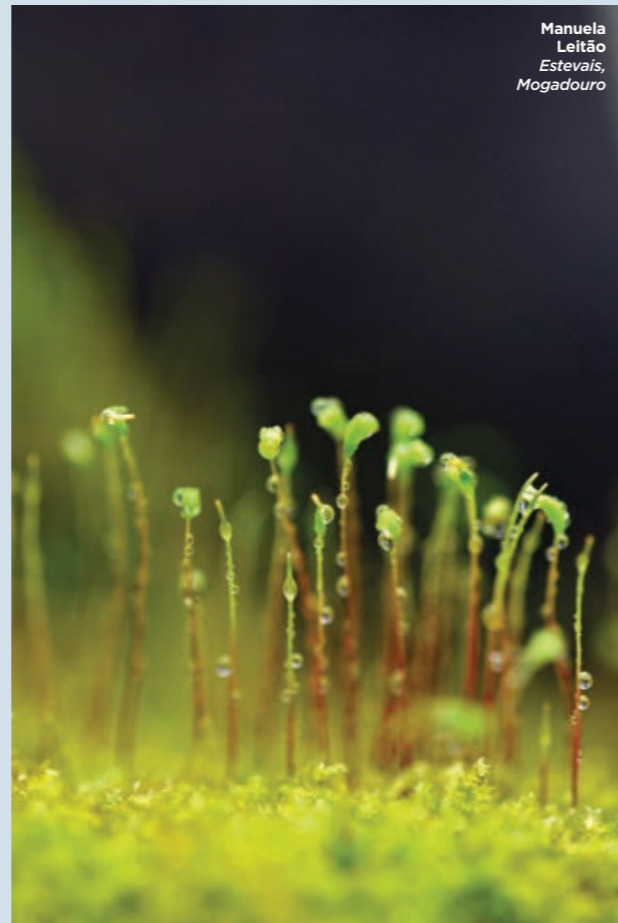
What if defending our forests started with the ability to capture their beauty, the changing light, their tiny details or their vast spaces? That was the challenge that My Planet set for keen photographers, with the help of the olhares.com website. Our "Personal views of woodlands" competition attracted more than 600 entries. We've selected just a few, to inspire you to join in and send in your own entry, in our next competition.



Tânia Montes  
Biological Park

Manuela  
Leitão  
Estevas,  
Mogadouro

2º  
Sérgio  
Conceição  
Peneda-  
Gerês  
National  
Park



Luís Tiago  
Praia Das  
Maças,  
Colares

Pedro Pais Martins  
Corno de Bico  
Protected Landscape



3º  
Diogo  
Matias  
Fragas de  
São Simão



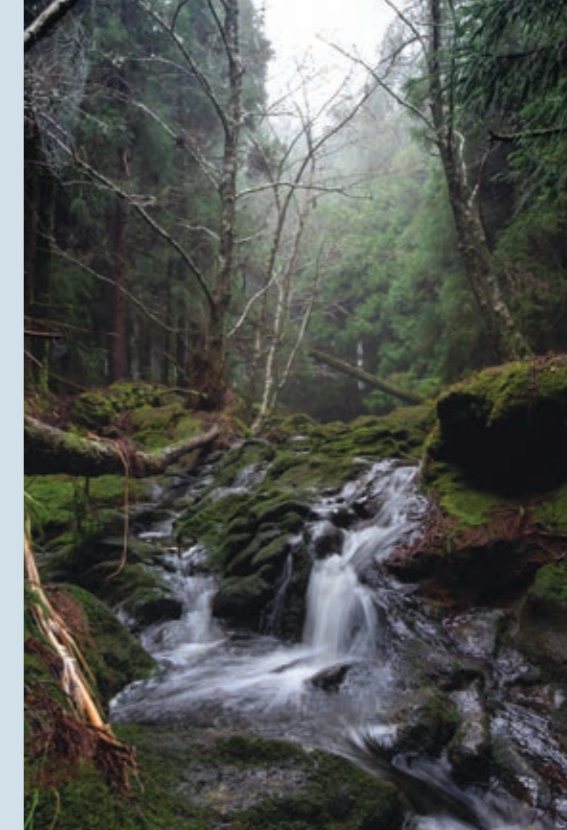
Margarida Nobre  
Ria de Alvor,  
Portimão



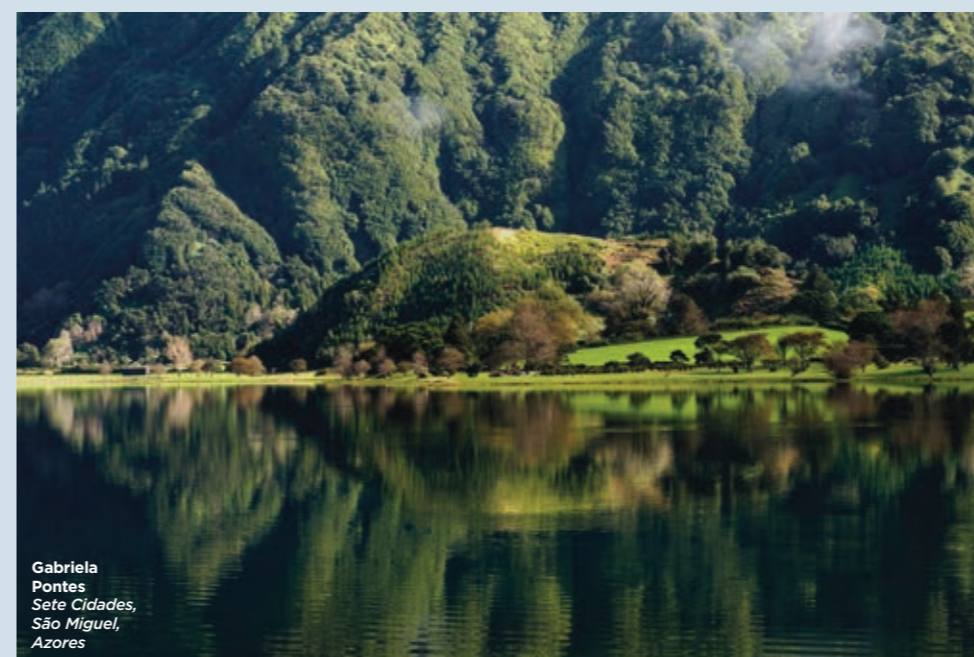
André Miguel  
Zeferino Farinha  
Hintersee,  
Germany



António Carlos  
Carvalho  
Sete Cidades, São  
Miguel, Azores



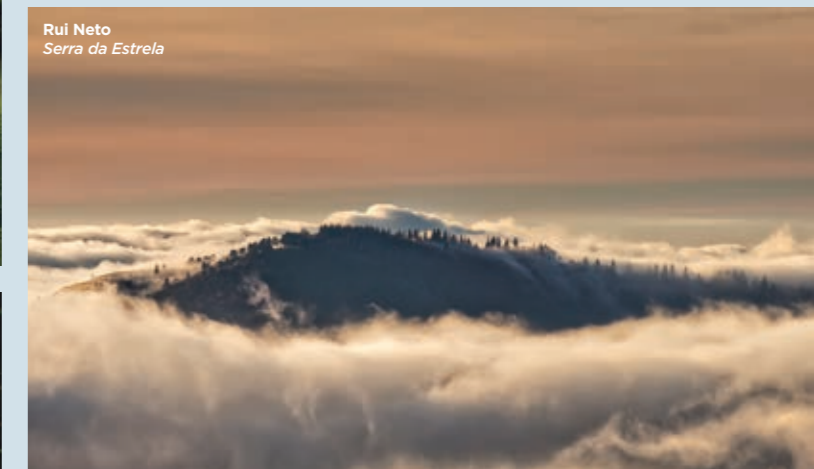
Adriana  
Santos  
Terceira,  
Azores



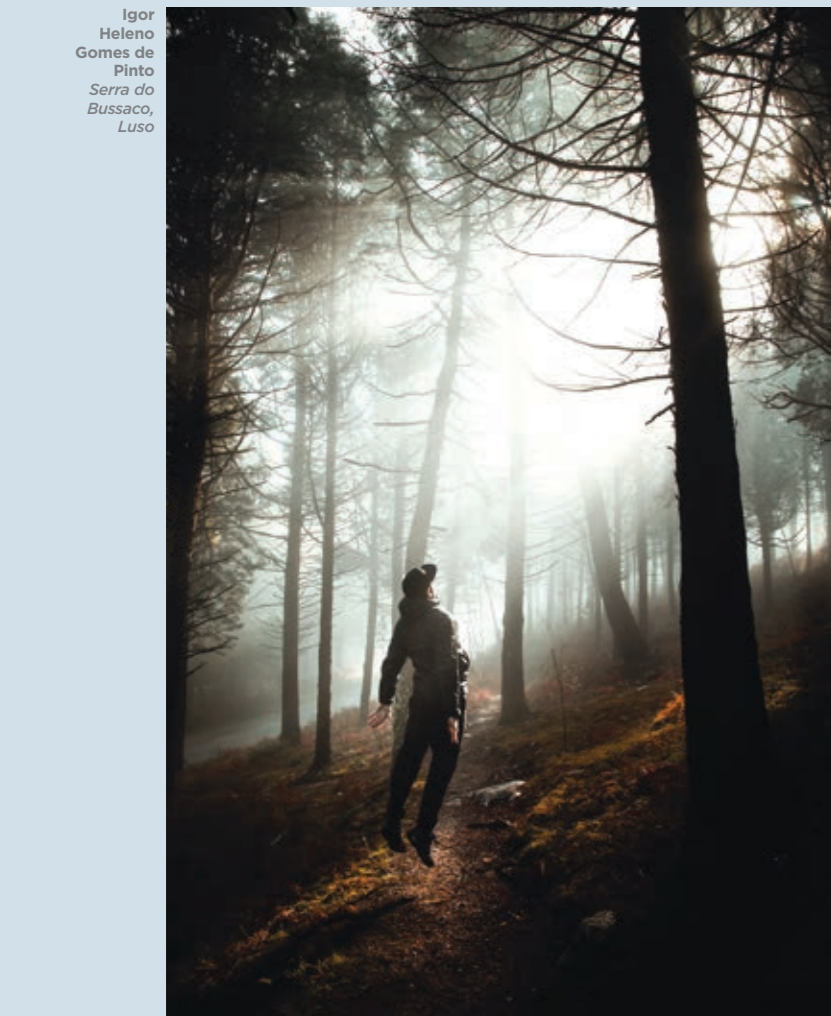
Gabriela  
Pontes  
Sete Cidades,  
São Miguel,  
Azores



Paulo Jorge  
Madeira  
Figueiredo  
Manteigas



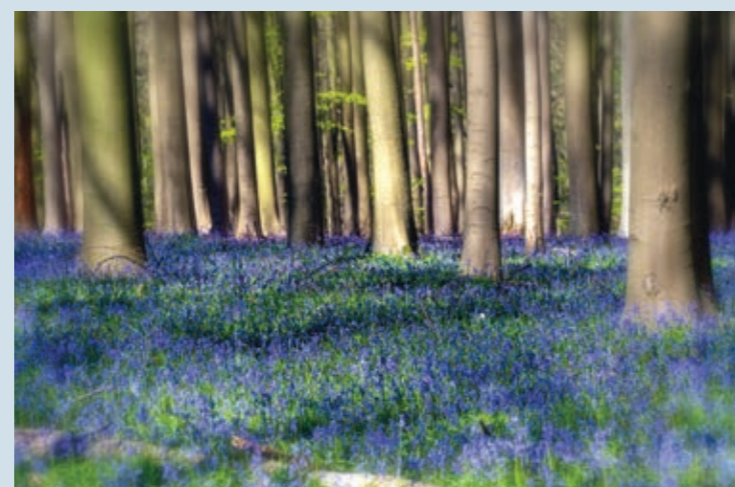
Rui Neto  
Serra da Estrela



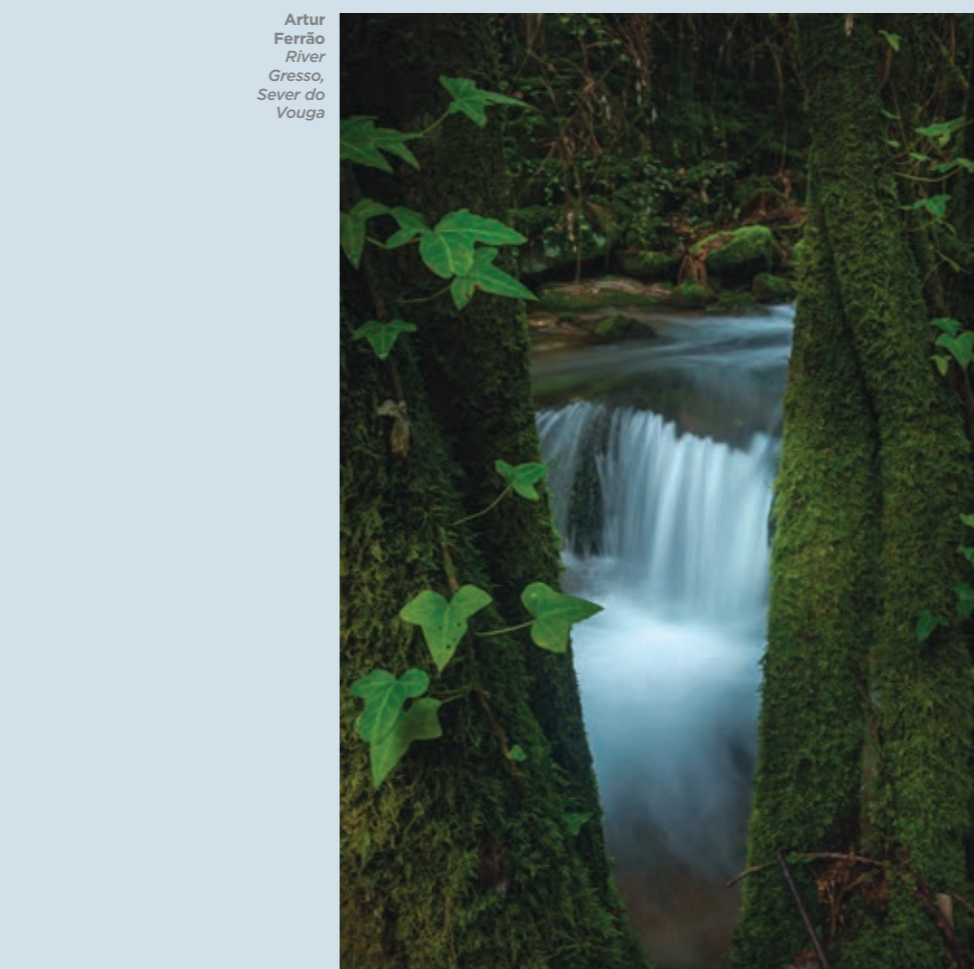
Igor  
Heleno  
Gomes de  
Pinto  
Serra do  
Bussaco,  
Luso



Francesco  
Cerruti  
Dolomites,  
Catinaccio,  
Italy



Fernando  
Fortes  
Belgium,  
Hallerbos  
forest



Artur  
Ferrão  
River  
Grosso,  
Sever do  
Vouga



João Santos  
Ribeira de Vila Moinhos

# Congratulations to the winners!

The overall standard was extremely high, so it was very difficult to select a single winner. We decided in the end to award two first prizes. Our congratulations go equally to Armindo Ferreira, for his imposing shot of a stag on the Serra da Lousã, and to António Bernardino Martins Coelho, for his blow-up of a tiny snail.



Winner  
Armindo  
Ferreira  
Serra da  
Lousã



Winner  
António  
Bernardino  
Martins  
Coelho  
Recarei,  
Paredes