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AMBIOS PORTUGAL

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GEIA

YEARLY MAGAZINE OF AMBIOS PORTUGAL

NATIVE PLANTS IN THE CITY - RETHINKING OUR URBAN GREEN SPACES

Get to know the project that aims to promote the use of native plant species in urban green spaces

THE LAMPREYS OF THE SORRAIA RIVER

Discover the species of lamprey present in the Sorraia river and how important it is to conserve them

PRODUCING DESERT TRUFFLES
READ ABOUT THIS PROJECT!

GEIA No. 5 12 / 2023

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When a number is referenced in between parathesis (for example: (1)) in the text, it is referencing the photograph of the same number.

AMBIOS PORTUGAL

is a non-governmental not-for-profit organization founded in 2018 and based at the Cork Oak and Cork Observatory in Coruche, Portugal.

Ambios Portugal was founded by a team from universities, non-governmental organizations, companies, and the public administration, with links to the environment sector. The principle of Ambios Portugal is to contribute with the professional experience and skills of each member to achieve a common goal: promote the conservation of biodiversity, sustainable development, and social involvement within these goals.

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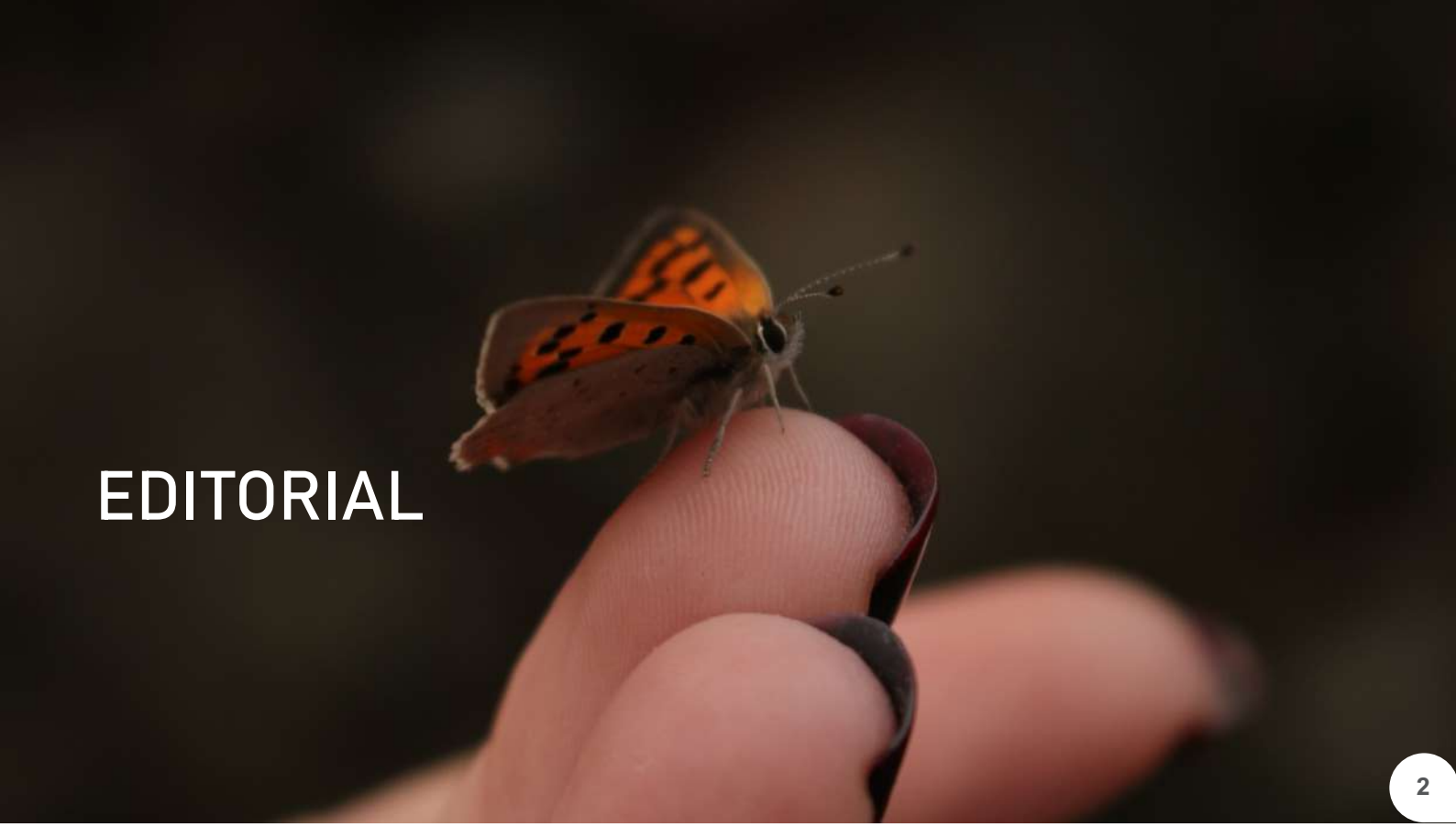
EDITORIAL



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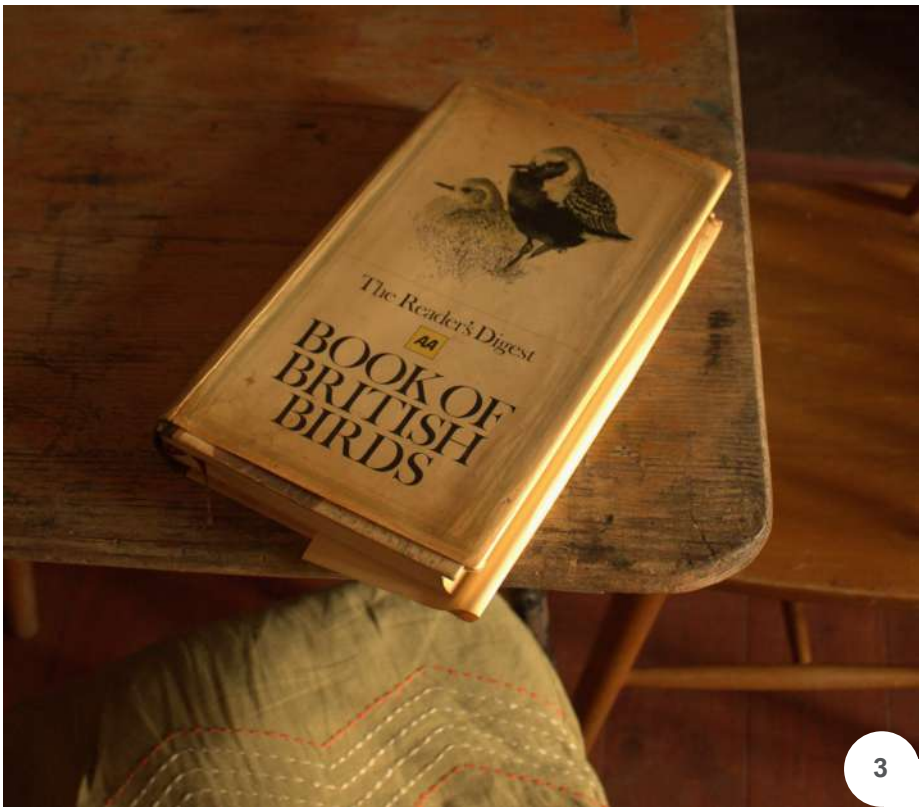
That late afternoon encounter was unexpected. I hadn't walked in the city for a long time. I had forgotten how busy and full of details it was. So many details, that when I lived there, and walked those paths repeatedly, there was something new to see every day. When I passed in front of the door, a familiar, nostalgic smell filled my nostrils. It mixed with the smell of chestnuts roasting in the street on that mild November day, and mingled with the sound of the electric bus announcing itself with virtual bells. I hadn't smelt that in the street for a long time. Perhaps because bookshops are now almost always inside shopping centres and the entryway door leads to a busy corridor that doesn't mix with the real life of a city, full of people on their way back home. It was the books. The smell of books was the thing that stood out in that street, at nightfall. And my home, which was far away, was suddenly there. In that smell.



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It was in that city, and in books like those, that I learnt that our home, everyone's home, is far from being a priority in our busy lives. When I first heard about the ecological footprint, there were still six billion of us "making footsteps". Twenty years later, there are more than eight billion of us. Perhaps it's because I was born in the same year as Europe's environmental awareness, forged in the first environmental legislation - the Birds Directive – that I tend

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to measure the state of nature conservation in our age. More than four decades later, over 80% of habitats in Europe are in a poor state of conservation. With the degradation of habitats, the number of species they harbour is also decreasing. We couldn’t protect. We must restore.

In November 2023, the European Parliament and the member states of the European Union finally agreed on the Nature Restoration Law. This law comes from the 2nd target (out of a total of 23) of the Kunming-Montreal Global Biodiversity Framework, signed at the end of 2022, at the 15th meeting of the Conference of the Parties (COP15) of the United Nations Convention on Biological Diversity. The Nature Restoration Law paves the way for a common policy aimed at repairing at least 20% of the European Union's degraded terrestrial and marine ecosystems by 2030, and all of them by 2050.

In this edition of GEIA, we bring you some topics that remind us that all of us have the power to help the world "turn in the right direction": that of seeking balance with nature. We talk about native plant gardens and innovative solutions for cultivating the desert truffles of our moorland. We also talk about the lampreys in our river and the many species we found when monitoring biodiversity in Coruche. We meet two more volunteers who tell us about their experiences in bird and sea turtle conservation, in Portugal and Australia. The rest you'll have to discover for yourself - don't stop exploring, because we also give you tips on how to make your garden more sustainable. (If you don't have a garden yet, think about it! A few pots on the balcony count too. Your health and that of the planet will thank you).

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What awakens our senses is what makes us take new actions, sometimes with surprising results. So, we hope that this GEIA, even without the smell of paper, but full of colour and the knowledge shared by the authors, will be able to awaken yours.

Inês Roque

CONSERVATION

planned management of a natural resource, to avoid exploitation, destruction or negligence.

THE NATURE AROUND US

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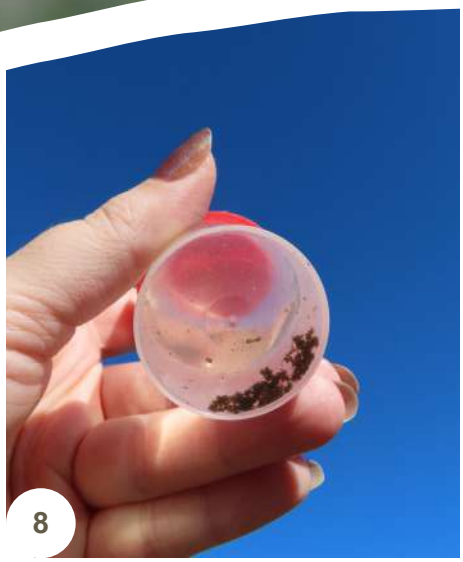
Throughout 2023 we performed two concentrated monitoring efforts to sample the species groups that we usually survey, one in April and one in November. These two times within the year—Spring and late Autumn—allow for us to sample both species that are more active or easily identifiable in Spring (such as some insects and plants, respectively) and still catch species that flower later or migrate here for the winter, for example.

We have compiled the results of those efforts into a graph on the following page.



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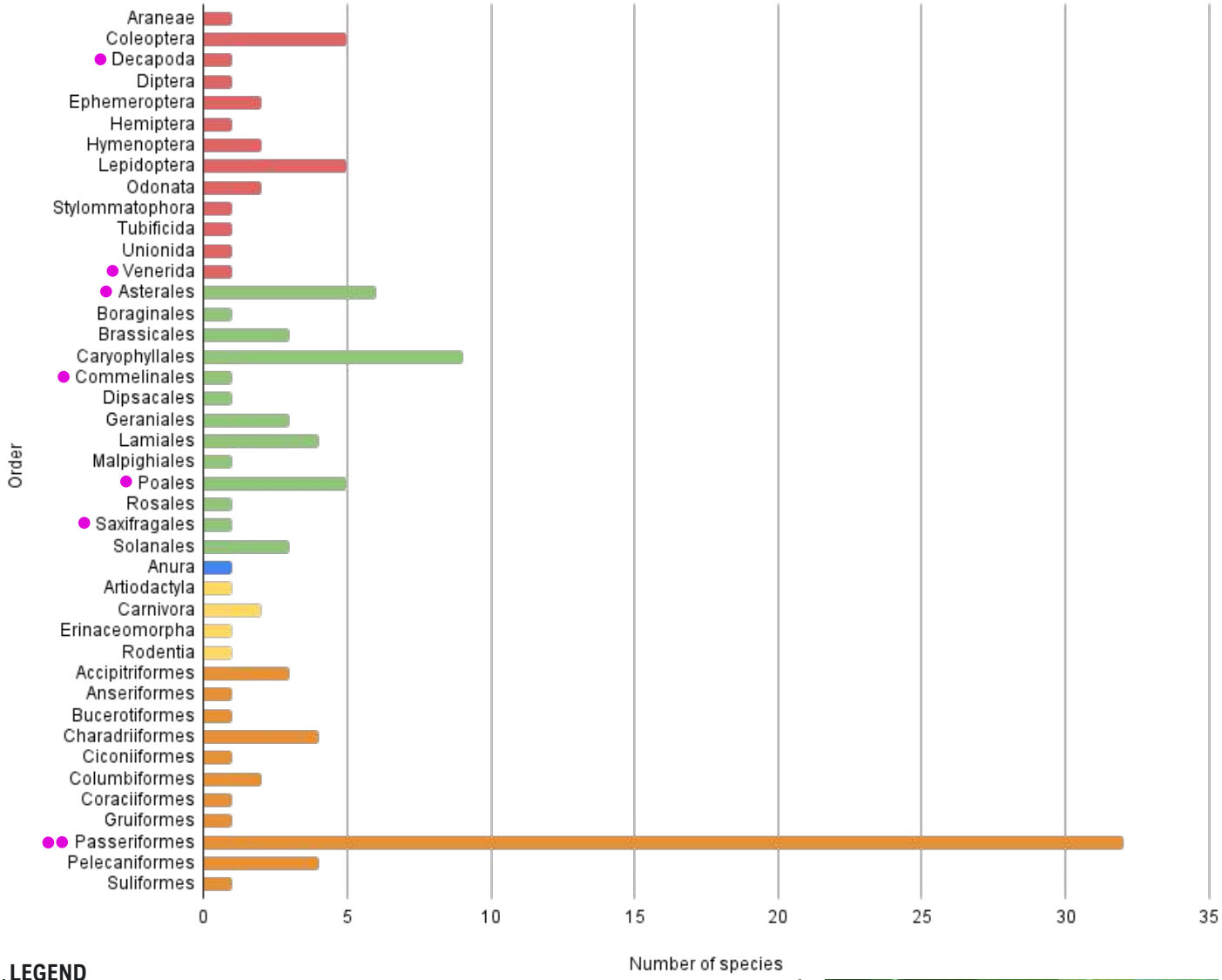
Number of species per taxonomic order found throughout the monitoring of the Sorraia river in 2023



LEGEND

- Indicates the presence of an exotic species within the Order it is next to.

Invertebrates Plants Reptiles and Amphibians Mammal Bird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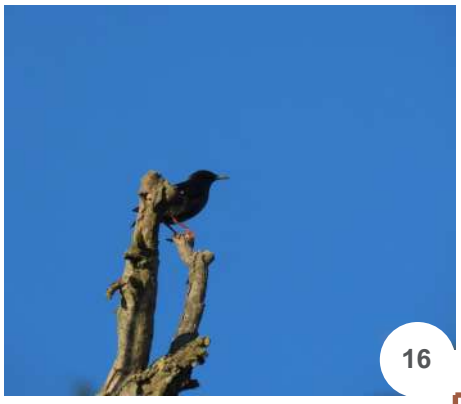
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Although all species are great to see, we'd like to point out a few species that particularly piqued our interest. We registered the presence of most of the same exotic species as last time, but noticed that the amount of pin-tailed wydah (*Vidua macroura*) (18) seems to have grown, with larger flocks being spotted near the point furthest from the village. The river unfortunately is still plagued by parrot's feather (*Myriophyllum aquaticum*) and water hyacinth (*Pontederia crassipes*), two highly invasive and hard to get rid of plants. The first monitoring efforts, carried out in April, saw very little in the way of aquatic invertebrates, we think due to the recent addition of sand to the margins of the river in front of the village, which had gotten partially washed downstream, covering plant life in the stream and possibly washing away invertebrate nymphs and other aquatic lifeforms. However, when we performed another check in November, there was a decent presence of aquatic invertebrates, mostly nymphs of the Ephemeroptera order—commonly know as mayflies (17). We also saw various kingfishers (*Alcedo* atthis) up and down the river, most likely due to the fact that the artificial dams are currently open, allowing for a shallower, more natural river stream. In the same vein, in April we saw little ringed plovers (*Charadrius dubius*) (20) performing mating displays in the riverbed. If you are interested in registering your observations, of either exotic or native species, you can do so by uploading observations within the area of the project Rio Sorraia—Percurso Pedestre da Cegonha (PR1 CCH) on iNaturalist. Feel free to join the project too to keep up with updates!

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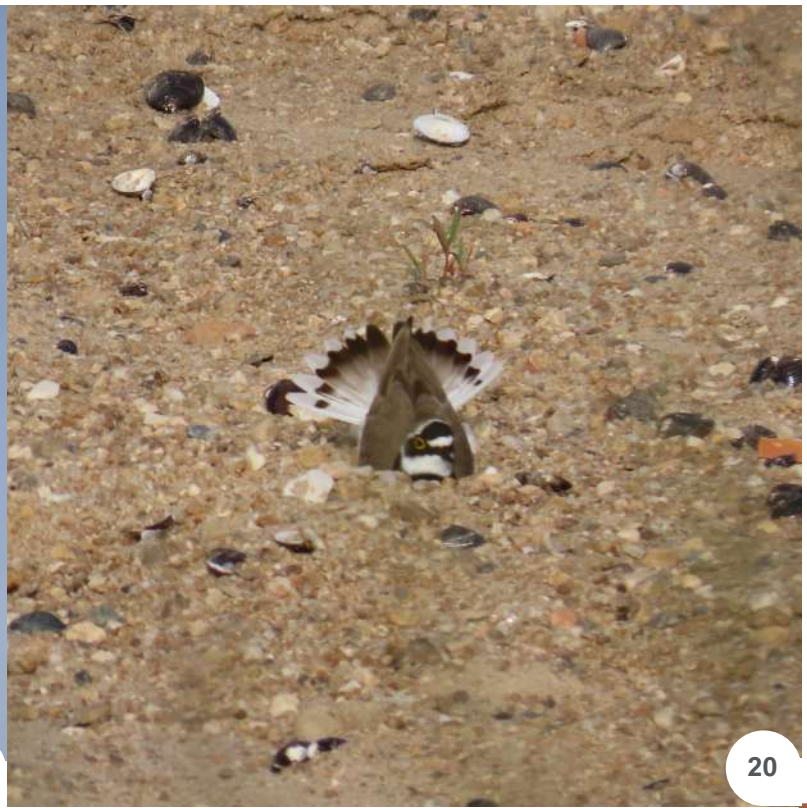

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THE LAMPREYS OF THE SORRAIA RIVER

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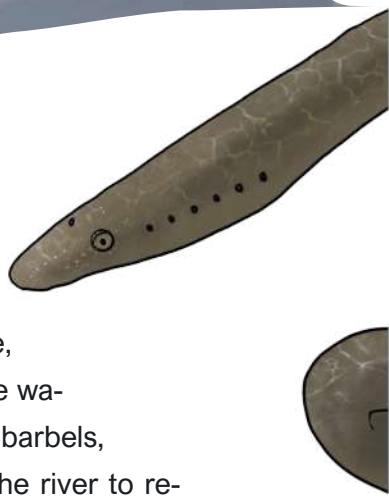

The Sorraia river, a force that moulded people's lives, imposing its annual whims dictated by the amount of rainfall. The water came and the water went, taking with it more than itself. But it also brought things. Large floods were, and are, fundamental to the nutrient cycle of the surrounding fields, and to the dynamic of the water bodies in the area. For many species of fish, it is an essential element. Eels, barbels, bogues, mullets and even shads use the higher water levels to swim upstream in the river to reproduce. The locals knew to make use of this sudden abundance of fish too. Fishing is a local art that has been passed down through generations until today.

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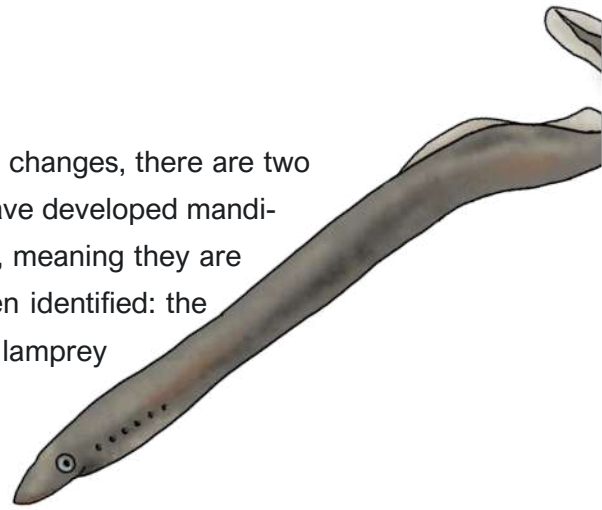
But times change, and so did the river.

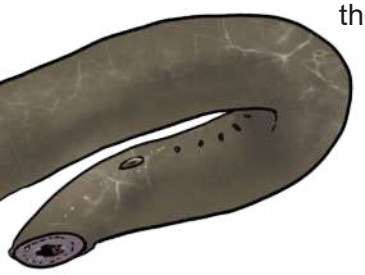
The installation of artificial barriers, the agricultural intensification, the disappearance of kingfishers and the expansion of exotic species has altered life on the river. Nowadays, the fish community has changed drastically. Largemouth bass, Eastern mosquitofish, pond perch, common bleak, and black bullhead occur in abundance, and along with the red swamp crayfish and the Chinese mitten crab they have profoundly altered the biology and ecology of Portuguese

waterways.



Beyond the native fish mentioned above as being affected by these changes, there are two that few people know: lampreys. This group of primitive fish don't have developed mandibles and have maintained the same form for over 360 million years, meaning they are considered living fossils. In the Sorraia river, two species have been identified: the European river lamprey (*Lampetra fluviatilis*) and the brook lamprey (*Lampetra planeri*), both species with no commercial value. Of these, only the first is anadromous, meaning it swims upstream to reproduce and is particularly affected by barriers. Unfortunately, these species' situation isn't very encouraging. In an evaluation done for the **Red Book of Freshwater and Migratory Fish** that was published this year, the brook lamprey is classed as Endangered (EN), and the European river lamprey is classed as Critically Endangered (CR).

Studies have revealed that the Erra rivulet is particularly important for both species of lamprey and is classified as a maximum conservation priority in the National Plan for the Conservation of European River Lamprey and Brook Lamprey (2011). Despite this, during surveys carried out by the same team in recent years, no individuals of these species were caught. The alterations to the river may have caught up to them.



Yet, while there is life, there is hope. Through amateur sightings, ammocoetes (the larval stage of lamprey) were found in years past, the last sighting being in 2016. It is a tentative sign that these species may still have a future in our waterways.

Luís Guilherme Felizardo de Sousa

Luís Guilherme Felizardo de Sousa, born in Coruche, found a passion and fascination for the natural world from a young age. Frequently his playtime would lead him to the middle of woodland and fields, hills and valleys, temporary ponds, and rivers, where, beyond playing, he noticed and learnt about what was around him. Following this passion, he decided to study Biology at the University of Évora, where, thanks to what his teachers and colleagues taught him, he deepened his knowledge on various topics. After having participated in various scientific projects at the university, he decided to take the next step and do his masters in Conservation Biology, also at the University of Évora, where he discovered the fantastic world of Mediterranean temporary ponds, and the incredible species that reside in them. This allowed him to elaborate further on the sweet water crustacean he had found in Coruche, which turned out to be a new species for Portugal. He participated in more projects such as the LIFE+ Charcos, where he aided in the census of species of fauna and flora in temporary ponds, and in the LIFE LINES project, where the focus of the work was on the issue of road mortality, participating in the development of adequate mitigation methods for various animal groups. He holds his connection to the University, maintaining his status as a member of the Conservation Biology Unit and as a collaborator of MED - Mediterranean Institute for Agriculture, Environment and Development of the University of Évora. Currently, he is part of the Nature Conservation and Environmental Education sector of the Municipality of Lousada, where he is responsible for the registering of municipal flora and fauna, elaborating management plans for protected areas within the municipality, creating communication materials, facilitating environmental education and awareness activities for all ages, collaborating in national and international scientific projects, managing "Live Spaces", among other tasks. Along his whole career, he has employed his love for photography as a tool for raising awareness and disseminating knowledge.

NATIVE PLANTS IN THE CITY

RETHINKING OUR URBAN GREEN SPACES

The **Native plants in the city— rethinking our urban green spaces** project was a very interesting challenge, as it permitted, even on a small scale, to employ plans in real life. In truth, the Botany Laboratory of the University of Évora had been working on these theme – the use of native plants in public urban green areas – since 2016. This line of work is highly relevant in current circumstances, where the use of soil for urban application (habitation and infrastructures) and agricultural employment are ever growing, to the detriment and fragmentation of natural ecosystems. The use of native plants with ornamental value in public urban green areas has advantages, particularly important in current times, when compared to the ornamental plants generally used in green spaces in Portugal. One of these advantages is the lower water consumption required by native plants when compared to the majority of exotic ornamental plants. Water, a scarce resource, who's sustainable use is particularly important in the Mediterranean, can have it's usage cut back — a garden with native plants can require only 5% of the water used in a "traditional" garden. Native plants are also more resistant to pests and diseases, because they have always been exposed to them. It is due to this long coexistence, which results in coevolution, that there is an interdependence between both parties, in a synchronistic life cycle that doesn't fail. Beyond this, the use of ornamental native plants in green areas allows us to dodge the enormous economic and ecological risks associated to the introduction of exotic orna-

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mental species. Of these latter, 667 are already naturalised in the country. This corresponds to 18% of the native flora of Portugal, and 15% of these species have invasive behaviour in the territory — many of the invasive plants that exist today in Portugal (e.g., pampas grass or water hyacinth) are plants that were introduced as ornamentals and escaped the intended area, competing with native flora. On the other end, if urban green spaces have native plants, they can also function as ecological corridors, connecting them to more natural, peri-urban zones. Finally, beyond playing an important role in the support and conservation of biodiversity, they are equally important for the cultural services they offer, for leisure and environmental education activities.

One of the objectives of the 2030 Biodiversity Strategy is "Bring nature back into our lives". Meeting this goal implies a change in the way that we look at natural ecosystems and their connection to the cities we live in. For this, local administration should integrate nature-based solutions while drawing out, during urban planning, the allotment of the space that urban green areas deserve. In this journey, it is essential to gain understanding and appreciation from citizens, making them accomplices to this process in which information is a determining factor. Our hope is that the urban green spaces that we intervened with during this small project — our lightning project — hold a demonstrative value that helps contribute to the modification of society's perception of these native plants.

Anabela Belo and **Carla Pinto-Cruz**

University of Évora

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The project **Native plants in the city – Rethinking our urban green spaces** was financed by the Fundo Ambiental 2020, under the theme of Nature and Biodiversity Conservation, and took shape withing the final trimester of 2020. Beyond the urban plots that we installed, we also created a technical guide, available online for free on MED's site: https://www.med.uevora.pt/pt/plantas-nativas-na-cidade/, that includes information about the species used.

The authors are both lecturers at the University of Évora and investigators for MED - Mediterranean Institute for Agriculture, Environment and Development & CHANGE – Global Change and Sustainability Institute; University of Évora | Pólo da Mitra, Apartado 94, 7006-554 Évora, Portugal.

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MARIANA TOMAZ

PORTUGUESE SOCIETY FOR THE STUDY OF BIRDS (SPEA)

AVEIRO-NAZARÉ SPECIAL PROTECTED ZONE, PORTUGAL

OCEANS2EARTH — CAIRNS TURTLE REHABILITATION CENTRE

FITZROY ISLAND, AUSTRÁLIA

INÊS ALMEIDA

IN MOBILITY

SPEA — PORTUGUESE SOCIETY FOR THE STUDY OF BIRDS

AVEIRO-NAZARÉ SPECIAL PROTECTED ZONE

IN MOBILITY

SPEA — PORTUGUESE SOCIETY FOR THE STUDY OF BIRDS

AVEIRO-NAZARÉ SPECIAL PROTECTED ZONE

MARIANA TOMAZ

VOLUNTEER

August 2023 marked the two-year anniversary since I had the opportunity to volunteer with the Portuguese Society for the Study of Birds (SPEA), in the LIFE PanPuffinus project.

Halfway through my studies — studying Biology in the University of Évora — already with some knowledge and with an affinity for birds, I decided to apply to volunteer at SPEA, a non-governmental , environmental association that has always fascinated me with their tireless daily work to help the conservation of birds and the habitats they occupy.

It was while I explored their website that I learned about the LIFE PanPuffinus project, which has been running since 2020. Coordinated by BirdLife Malta, its aim is to protect and better the conservation status of two marine birds endemic to the Mediterranean, the Balearic shearwater (*Puffinus mauretanicus*) and the Yelkouan shearwater (*Puffinus yelkouan*), through transnational cooperation. These entities seeked to mitigate the impact of two of the most significant threats to these species: predation by non-native species and becoming accidentally entangled in fishing nets. In Portugal, the implementation was at the Aveiro-Nazaré Special Protected Zone, which is considered the most important protection area for the Balearic shearwater in the country. This project invests a large effort to deepen knowledge on the problem of bycatch in fishing, in collaboration with fishermen, and to develop and test mitigation methods that aim to prevent or mitigate these impacts.

Through this volunteer work, I gained what I could call "my first professional experience", in a branch of biology that has long fascinated me, ornithology. Beyond being very well received and integrated into the work expected of me, I had the opportunity to learn a lot about seabird identification, their flight patterns,

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differentiating the juveniles, adults and immature birds, throughout the seabird census that was done from the coastline (RAM – Bird and Marine Mammal Network), specifically from Cape Carvoeiro (Peniche). From there, we observed various birds using telescopes and binoculars, such as the lesser black-backed gull (*Larus fuscus*), the yellow-legged gull (*Larus michahellis*), the shag (*Gulosus aristotelis*) (33), the gannet (*Morus bassanus*) and the Balearic shearwater (*Puffinus mauretanicus*).

I also had the opportunity to work on my communication skills while I interviewed the fishermen, getting involved with the local fishing community (35). Throughout a series of days, I visited three fishing ports multiple times: Nazaré Port, Figueira-da-Foz Port, and Aveiro Port. These days were dedicated to finding ship's captains or talking to the ones already in their boats — close, according to them, to heading out to high seas for another day of work, or just getting back from there. In the latter case I tried to be as quick and succinct as possible, as the fatigue was evident in their faces. Tens of inquiries were conducted, and in the end it was a satisfactory feeling, as there was a lot of success in our communication about accidental bycatch. With joy, I noted that many of the fishermen knew of this problem and actively employed some solutions to reduce bycatch, and also tried, as often as possible, to return birds captured in the nets to the wild. Last but not least, I carried out various coastal sweeps on different beaches with the aim of counting washed-up birds (36). Beyond being a completely new experience for me, it was quite productive, not only because it alerted me to the quantity of birds that wash up on Portuguese coastlines, but also because it gave me the opportunity to verify, first hand, many of the direct impacts of pollution and other anthropogenic actions on sea life.

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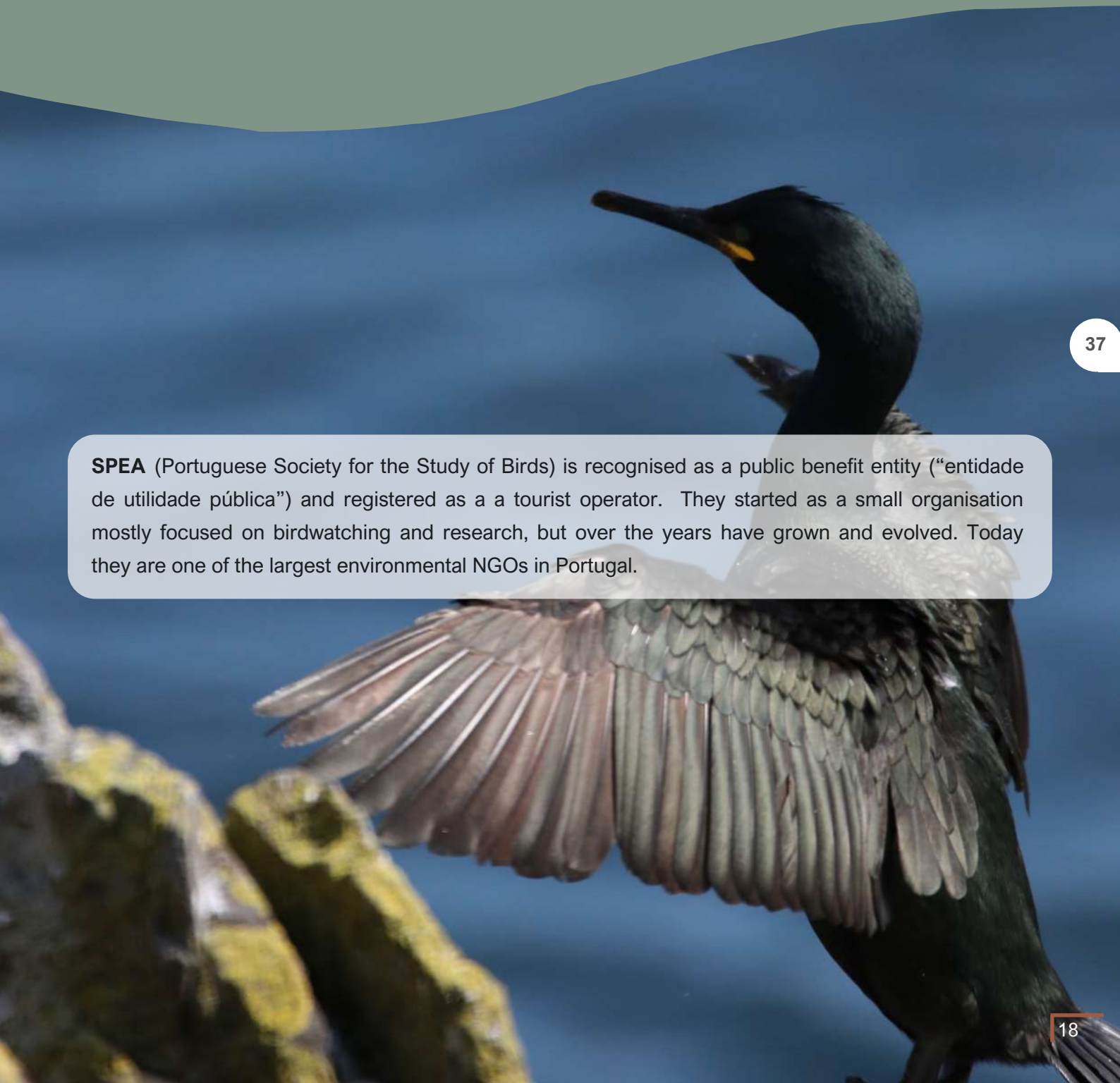

SPEA (Portuguese Society for the Study of Birds) is recognised as a public benefit entity ("entidade de utilidade pública") and registered as a a tourist operator. They started as a small organisation mostly focused on birdwatching and research, but over the years have grown and evolved. Today they are one of the largest environmental NGOs in Portugal.

OUT MOBILITY

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OUT MOBILITY

OCEANS2EARTH — CAIRNS TURTLE REHABILITATION CENTRE

FITZROY ISLAND, AUSTRALIA

INÊS ALMEIDA

VOLUNTEER

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One of the best decisions I've ever made was to go volunteer at the Cairns Turtle Rehabilitation Centre, with Oceans2Earth.

Right after I finished my bachelor's degree in biology, I decided that I would like to explore how it would be to work with different animal groups, before I went on to a master's degree. During my research of volunteering programs, I came across the Oceans2Earth website, that offers these programs, a bit all over the world.

Australia was a long-time dream so, in April 2018, I joined the team of volunteers at the Cairns Turtle Rehabilitation Centre, in Fitzroy Island, northeast Australia – one of the most beautiful places I've ever seen.

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A typical day would start at 8 a.m. with the 45-minute ferry ride from Cairns to the island, and was followed by the work at the Centre, that would go from 9 a.m. to 12 p.m. The volunteers oversaw a multitude of tasks, that varied daily. These included washing the filters, siphoning particles in the water and, if the pools were particularly dirty, deep cleaning the tanks – for which was necessary to relocate the turtles. The Centre took care of injured and sick turtles, many of them incapable of eating by themselves, making it necessary to feed them directly.

The Centre supervisors were incredibly nice and always ready to share their experiences and their

knowledge on the turtles.

Even though the work finished just before lunch, the volunteers could choose to take the ferry back to the mainland at the end of the day. Our afternoons were spent exploring the island: trekking through the trails, crossing the tropical rainforest to go to the beach, paddle boarding or snorkelling through the corals. It didn't hurt that the volunteers had free access to the diving and water sports material.

I stayed at the hostel recommended by Oceans2Earth, where I met incredible people that became lifelong friends. The staff was always very friendly and helpful, always willing to help with any problems we had.

I loved volunteering at the Cairns Turtle Rehabilitation Centre and had an amazing experience volunteering through Oceans2Earth. I had incredible pre-departure support – they always answered my (many) emails, with questions regarding the project and necessary documents.

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The array of projects available through O2E guarantees options for all tastes, whether it be turtles in Australia, elephants in Thailand or even penguins in South Africa.

In the end, this opportunity let me achieve exactly what I wanted to: visit an incredible new country, meet people from all over the world, and feel like my work made a real difference in the care of these animals.

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Oceans2Earth is a non-political, non-religious organization that works to provide assistance and resources to programs working towards the wellbeing of animals and the environment. O2E believes that the best way to solve the issues of animal mistreatment and environmental destruction is to allow people the opportunity to contribute and interact, so they may develop their own sense of responsibility and conservation of the natural world.

All O2E projects are with non-governmental organizations (NGOs) and non-profit organizations, who value the contribution volunteers represent.

The Cairns Turtle Rehabilitation Centre is a voluntary non-profit organization, that is dedicated to rehabilitating sick and injured turtles. Their objective is to do all they can to make it possible to return the turtles in the care of the Centre to their natural environment – during my stay, two turtles were returned, all treated and tagged –, as well as raise public awareness and promote sustainable practices.

KEEPING A NATURE JOURNAL

Shirley Therese van der Horst

Biologist and illustrator

WHAT IS A NATURE JOURNAL?

Nature journals are a visual and creative way of keeping notes on the natural processes and species in our local area, or any area we may visit. Their objective is to be informative, giving us clues on which species may be seen at certain times of the year, the behaviour these species may adopt, how they interact with each other and their habitat, and how populations can change over the years, among other data that can be gathered. At a personal level, nature journaling is good at tackling stress, connecting us to nature and allowing our brain time to focus on what we are seeing and how to represent that on paper. Thinking about how it can make us citizen scientists, data collected through nature journaling can be very useful for understanding local natural processes, changes in species diversity, and communication of this information to the general public in a visually appealing and simple manner.

Here, I have decided to share a different experience of nature journaling each time, to hopefully inspire you to try it out!

SÃO MAMEDE MOUNTAINS

PORTUGAL

Although I appreciate aspects of summer, these months are perhaps some of the least bountiful for nature here. Of course, there is always life to be found regardless, but the heat keeps me from fully enjoying being outside, which makes me resent it. It is in this time of year, most likely due to this hindered contact with nature (little time to actually take my time observing the world around me at leisure), that I feel the least creative. Contrary to this, autumn is my favourite season. It marks the passage from our arid summers to damper, cooler days, where the rain resuscitates the forests, woods, and fields around us.

Last year was one of the first times I had the opportunity to fully explore the wilder side of my parents' property, nestled in the São Mamede mountain range. It is a section of Portugal under Atlantic influence, and thus sees more rain and humidity. While tending to a few things on the land, we had cleared and cut a few dead trees, stacking up the wood while it wasn't in use. However, we did not yet have a place to keep it covered. As such, it was left open to the elements, and this year we have had an amazing amount of rain in the area — around 740,7mm up until the 8th of November, so far, with more predicted. Obviously, due to this and our lack of foresight, this pile of logs has been soaked through thoroughly. And thus, the subject of my focus this time appeared — fungi. From miniscule bonnets (*Mycena* sp.) to large clumps of golden-ear (*Naematelia aurantia*), the variety on this one small pile of wood has been surprising me again and again.

And to think, this is only a tiny representation of some of the fungi we could find, mostly specialised, in this case, in growing on dead wood. Even though fungi is not my forte and identifying them to the species can be very difficult, I was able to pick out at least 10 different species in this locations alone. They were varied in shape too — from fuzzy cobalt blue mould to the typical stem-and-cap shape we often think of (commonly called mushrooms), this little log pile had them all. I found myself, quite entranced, checking

in on the pile each day with renewed attention, eager to see if another species might pop up, one that maybe tended to fruit later into the season.

Although in certain areas it may be harder to find such variety, if you have an outdoor area or garden, perhaps have a search around for fungi this year, as the season can extend well into next year if we are lucky. If you don't have such an area, I think it's a perfect time to go for a walk in a local forest or field, and see if you can't spot some there. Each habitat type may present different species!

1. Hairy curtain crust
   Stereum hirsutum
2. Splitgill mushroom
   Schizophyllum commune
3. Bonnet
   Mycena sp.
4. Wood ear fungi
   Auricularia sp.
5. Variable oysterling
   Crepidotus variabilis
6. Cobalt crust
   Terana coerulea
7. Bonnet
   Mycena sp.
8. Bonnet
   Mycena sp.
9. Golden ear
   Naematelia aurantia
10. Inkcap
    Coprinopsis sp.

ID

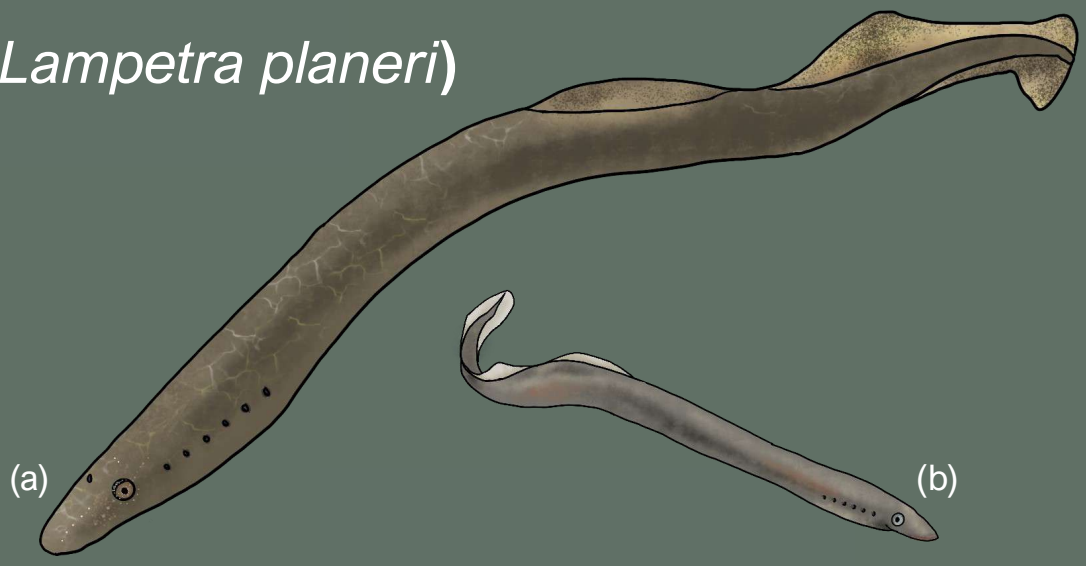
EUROPEAN RIVER LAMPREY [a]

(*Lampetra fluviatilis*)

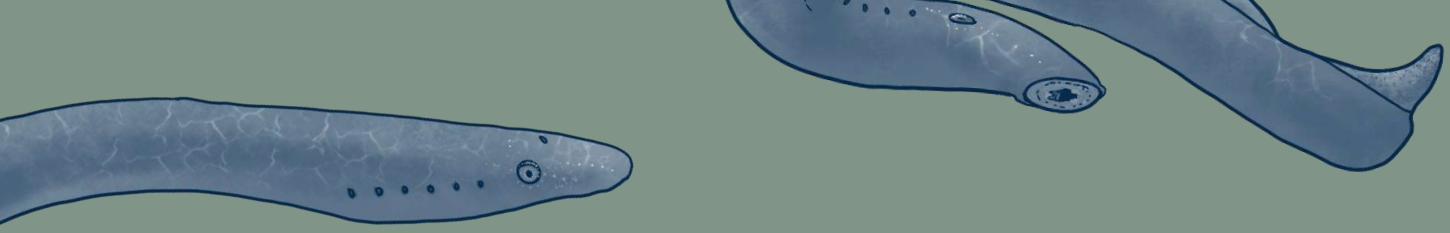
and

EUROPEAN BROOK LAMPREY [b]

(*Lampetra planeri*)

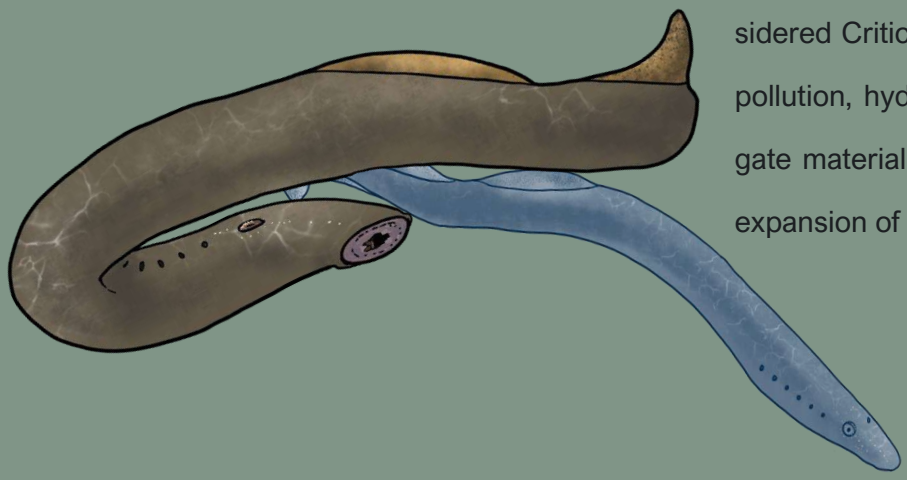


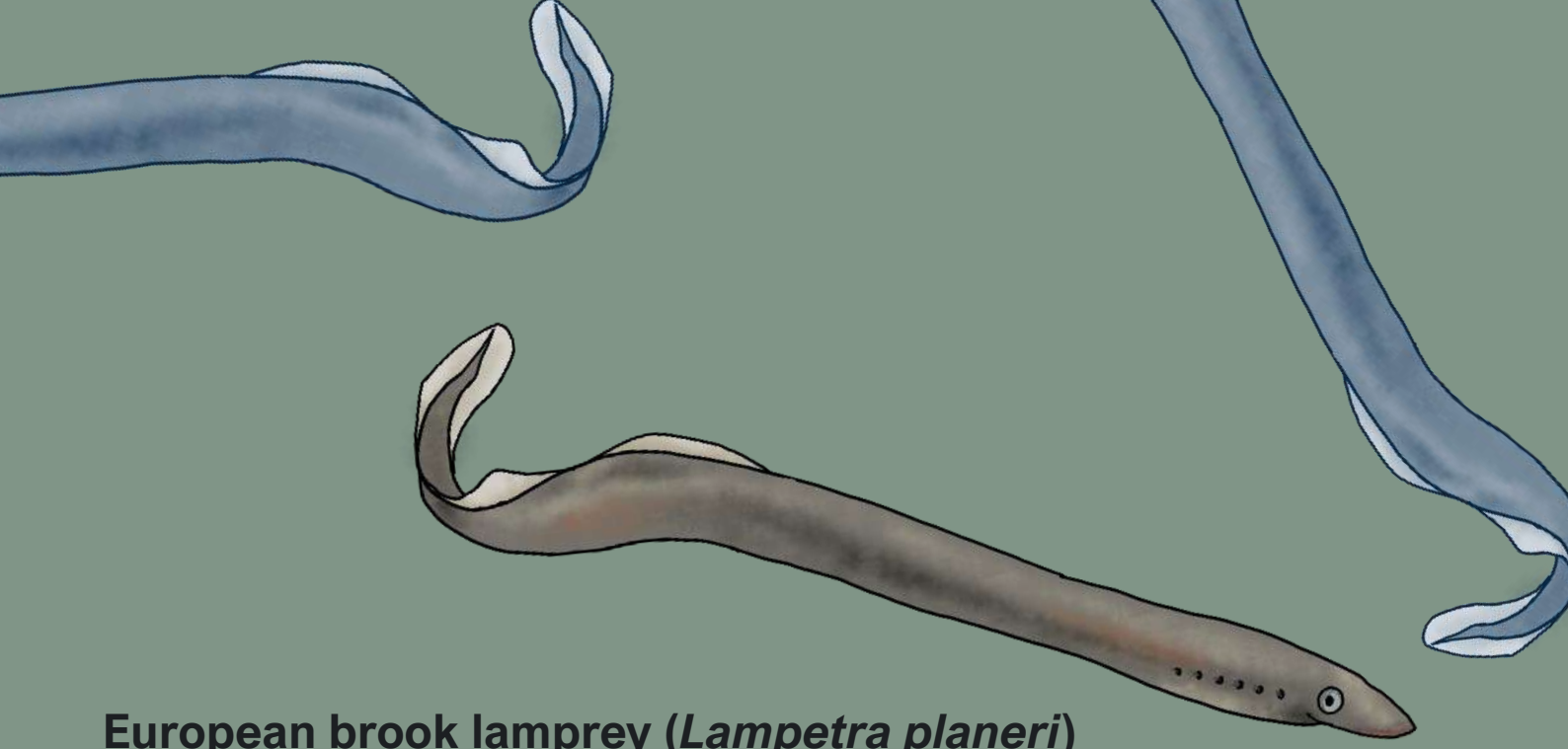
Kingdom	Animalia
Phylum	Chordata
Subphylum	Vertebrata
Class	Petromyzonti
Order	Petromyzontiformes
Family	Petromyzontidae
Genus	*Lampetra*
Species	*Lampetra fluviatilis* & *Lampetra planeri*



European river lamprey (*Lampetra fluviatilis*)

This is a medium-sized species (max. 40cm) that occurs in various countries in Europe. It is in the Tagus basin that it is at the southernmost range of its distribution, and it is also the only location in Portugal that adults have been found. It is an anadromous species, were the adults, who live in the sea, swim upstream in rivers to spawn in areas of pebble or sand riverbeds. Their larvae remain up to 5 years buried within the substrate of the rivers and rivulets, where they feed by filtering the water. After completing their metamorphosis, they make their way to the sea, where they will continue to grow, fixing themselves to other fish with their sucker-like mouth and feeding off their blood. It is a species with no commercial value and is protected under the annexes II and V of the Habitat Directive, annex III of the Bern Convention and by the Inland Waters Fishing Law (Law nº2097, from the 6th of June 1959). In Portugal, their populations are considered Critically Endangered due to threats such as pollution, hydrological barriers, extraction of aggregate material, alterations in the river course and the expansion of exotic species.



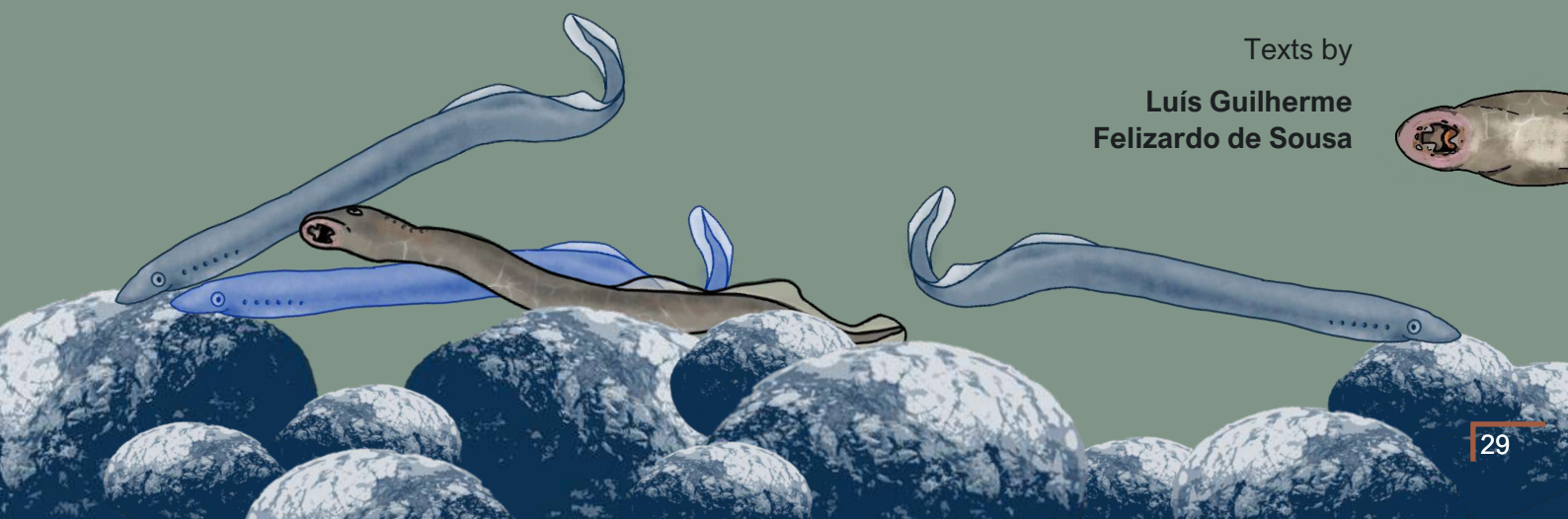


European brook lamprey (*Lampetra planeri*)

The European brook lamprey is a small species (max. 17cm). It has a slightly broader distribution than the European river lamprey and occurs in more basins within Portugal, being found in the rivers Douro, Mondego, Lis e Tagus and the Western rivulets. It isn't an anadromous species, remaining in the rivers throughout its entire life. After reaching sexual maturity, it makes small journeys upriver to spawn. Just like the river lamprey, its larvae remain in the substrate of the rivers, feeding via filtration. It is a species without commercial value, protected by Annex II of the Habitats Directive, Annex III of the Bern Convention and Inland Waters Fishing Law (Law nº2097, from the 6th of June 1959). In Portugal its population are considered Endangered, due to similar threats as those of the river lamprey, although it is less affected by barriers such as dams, but being more susceptible to alterations in the river's course, such as destruction of riparian vegetation.

Texts by

Luís Guilherme
Felizardo de Sousa

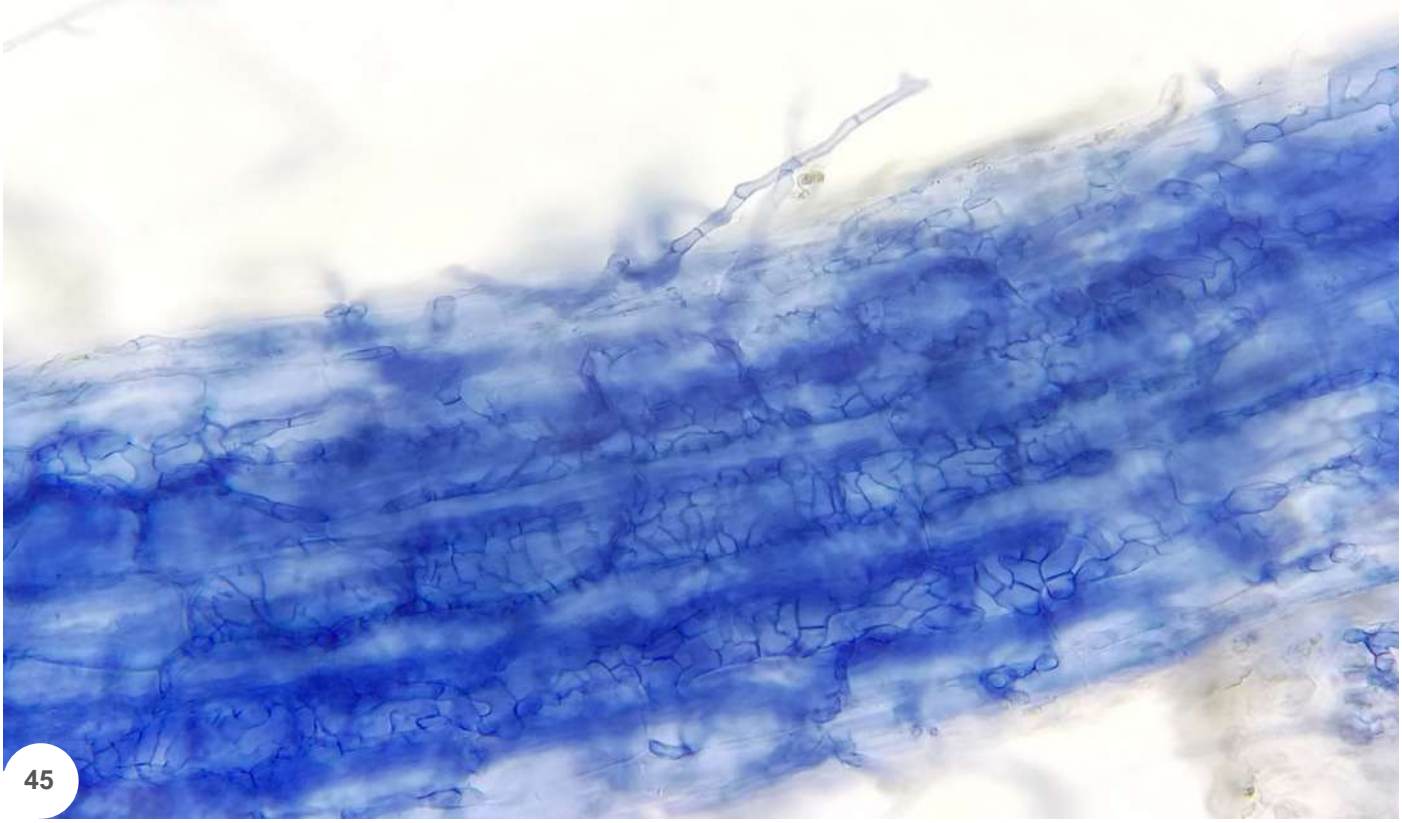


SUSTAINABILITY

of, relating to, or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged

PRODUCING DESERT TRUFFLES

A LONG STORY WITH A HAPPY ENDING



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Desert truffles are subterranean mushrooms, a type of "fruit" produced by fungi after sexual reproduction, and as such desert truffles aren't available year-round. These are highly sought-after in the Mediterranean Basin, where they occur naturally. The growing interest in desert truffles — due to their neutraceutical (nutritional and medicinal) properties, high protein content (often used as a meat substitute in a vegetarian or vegan diet), and positive impact on the environment (enhancing plant growth and soil protection) — has caused a greater demand, leading to an increased interest in its large-scale production.

However, the fungi that produce truffles are mycorrhizal, which means they establish long-term relationships with plant species, and depend on them to survive. The plant also benefits from this relationship, receiving water, nutrients, and protection against pathogens. In summary, the plant nurtures the fungi, and the fungi allows the plant to thrive even in harsh environments.

In this context, to produce desert truffles, it is necessary to connect the Moroccan desert truffle fungus (*Terfezia arenaria*) with the roots of its host plant, the spotted rock-rose (*Tuberaria guttata,* Family *Cistaceae*). However, the spotted rock-rose is an annual plant (it completes its lifecycle in 12 months), and as such is not adequate when aiming to initiate continued production of these truffles, which requires the installation of these inoculated plants in field plantations.

Thus came the breakthrough question: why not inoculate a perennial (lives more than two years) shrub from the same plant family — *Cistaceae*? It was in this sense that the project **Micorrização de *Cistus spp*.**

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com *Terfezia arenaria* (Moris) Trappe e sua aplicação na produção de túberas (ALT20-03-0145-FEDER-000006) came to be. This project was coordinated by the author of this article and counted with the invaluable help of Dr. Rogério Louro and Dr. Tânia Nobre, who worked tirelessly throughout years to obtain shrubs that had been inoculated with the mycorrhizal fungi that produces desert truffles. The mycorrhizal synthesis (the binding of the fungus' hyphae with the plant's roots) was done with mycelium (set of hyphae that form the body of the fungus) from *Terfezia arenaria* on sage-leaved rock-rose (*Cistus salviifolius*) and gum rock-rose (*Cistus ladanifer*), all produced in a lab from Portuguese sample material. The most complex and laborious process was the production of the *Terfezia* (European Patent Application n. 19204730.6 – 1118) mycelium, which wouldn't grow in an artificial growing medium.

In the final phase, the mycorrhizal material was described, the plants were acclimated (process of gradual adaptation to outdoor conditions, through several periods in acclimated and non-acclimated greenhouses), and then finally, installed in the field. Two to four years later, desert truffles began being produced in the experimental plots.

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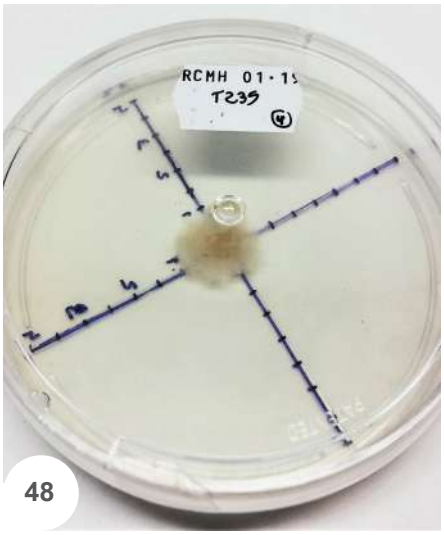

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Presently, we are working on inoculating trees and shrubs with different mycorrhizal fungi for varying purposes: mushroom production, enhancing inoculated (in which mycorrhizal synthesis was performed) plant's health, recovery of degraded areas, and more.

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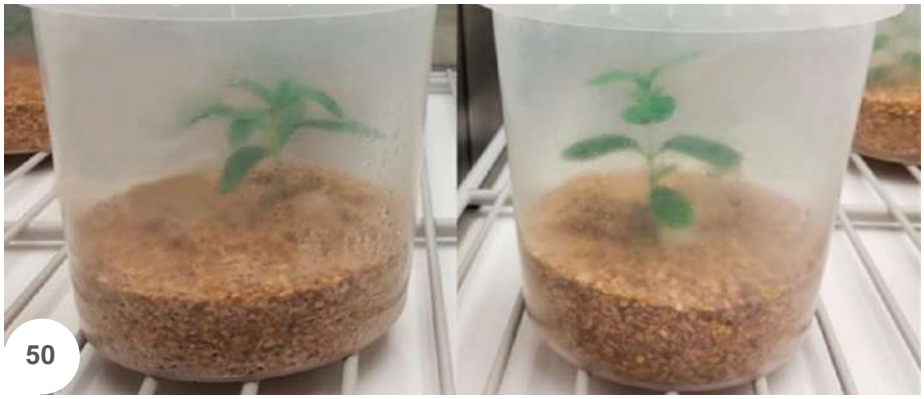

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Celeste Santos e Silva

Lecturer from the Department of Biology, ECT, University of Évora

Head of the Macromycology Laboratory, MED&CHANGE (https://www.facebook.com/macrofungos/)

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The Macromycology Laboratory of Évora University provides services within the scope of mycological resources, in different aspects (education, investigation, guidance, management). Currently, the business Mycoplanet Lda, run by Dr. Rogério Louro, offers plants inoculated with mycorrhizal fungi, for those that wish to manage and further the potential of their mycological resources.

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CREATING A SUSTAINABLE GARDEN

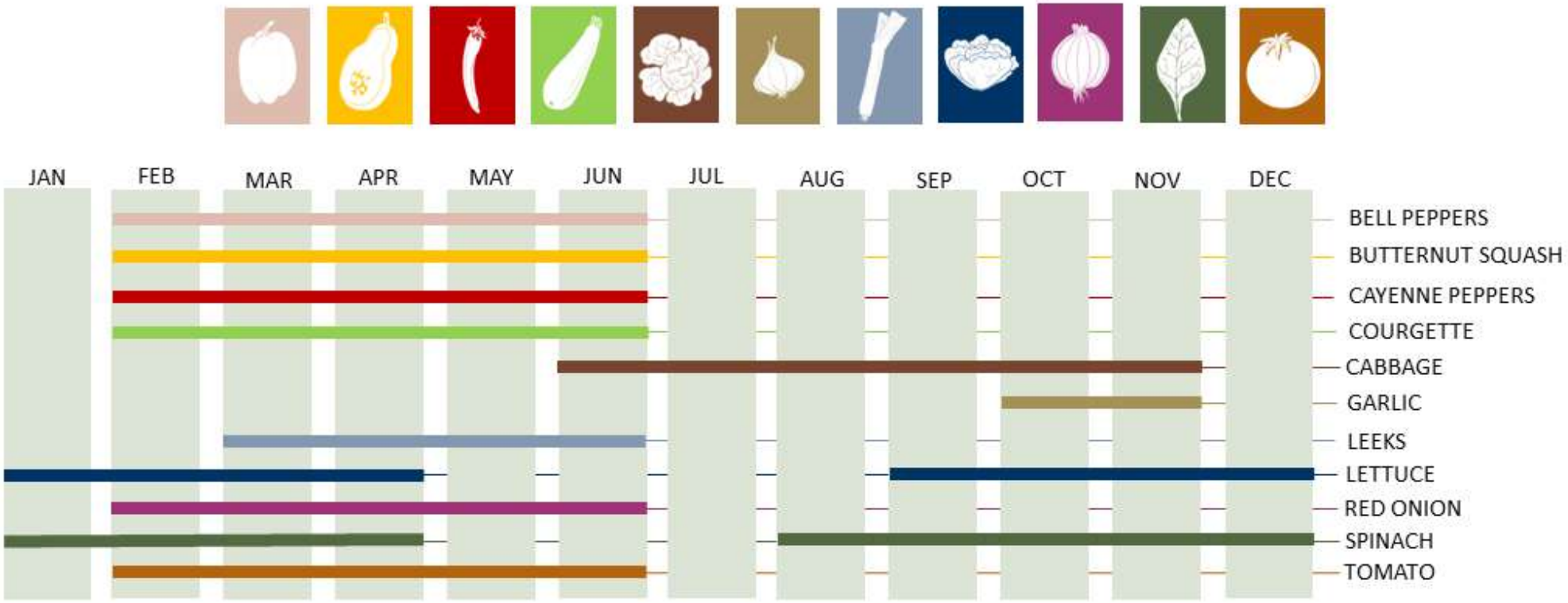
The way we eat is less and less sustainable. Convenience items and technological advances have allowed us to have access to fruits and vegetables out of season, often shipped to us from half a planet away. Mass production has allowed items such as meat, fish, and dairy (all items that have a heavy impact on our resources such as water and land availability) to be affordable enough that people consume it every day, sometimes for every meal. Eating a diet that is mostly plant-based, seasonal, and locally sourced, are the best ways to make an impact on our diet's sustainability.

Seeing as we've made a few suggestions in the past of sustainable recipes to try, we've made a garden calendar of the vegetables included in those recipes, so that you can start your own sustainable garden, or simply have more knowledge around when these vegetables should be planted and when they might be in season.

A big part of sustainable gardening is the use of companion planting methods, to help repel pests and aid growth, so that pesticides and chemical fertilizers can become a thing of the past. We've included a graphic of which of the vegetables can or should be planted together for these benefits, but a lot of flowers and herbs can be huge help as companion plants too. Something to look up!

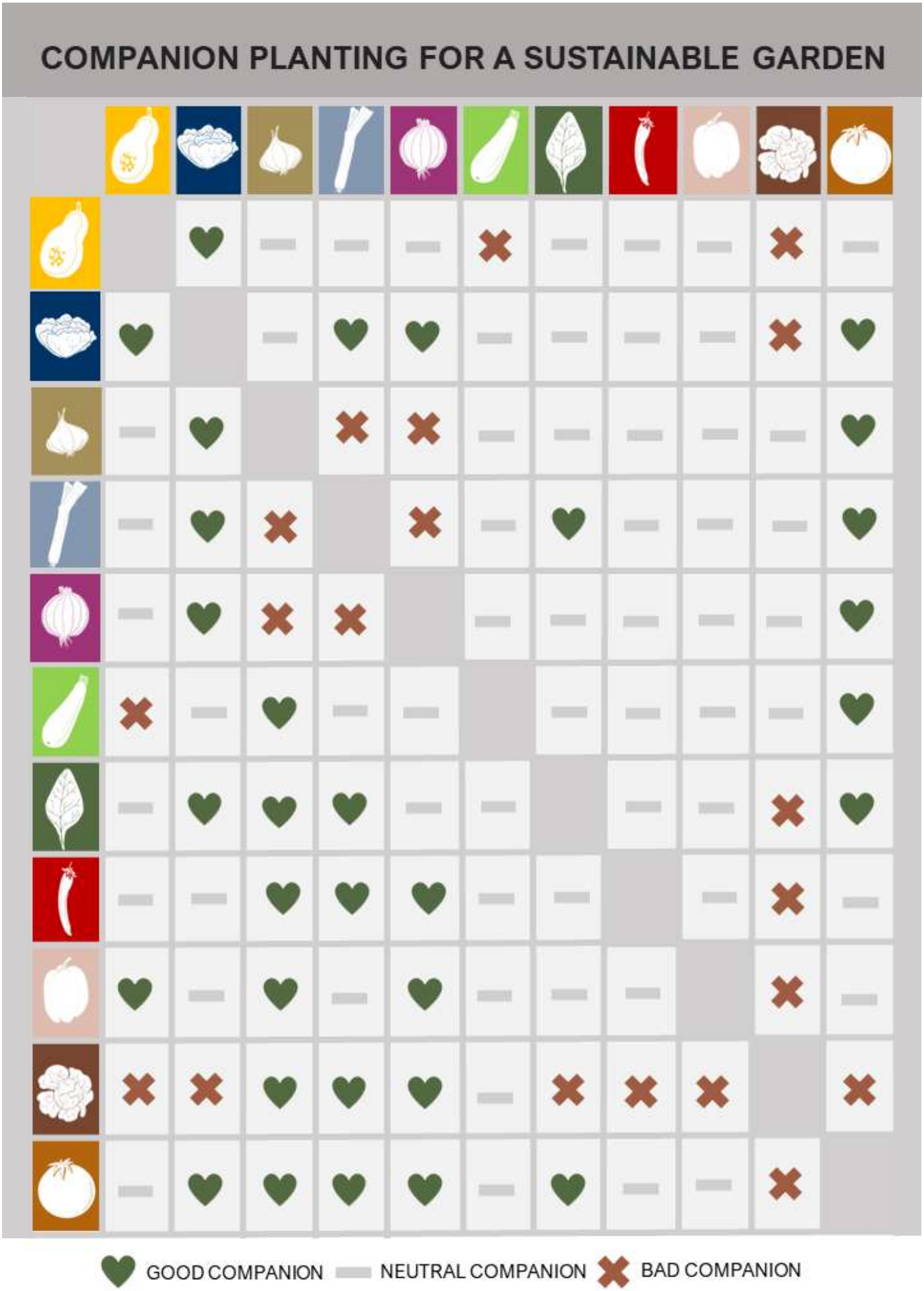
SUSTAINABLE GARDEN CALENDAR

PLANTING TIMES

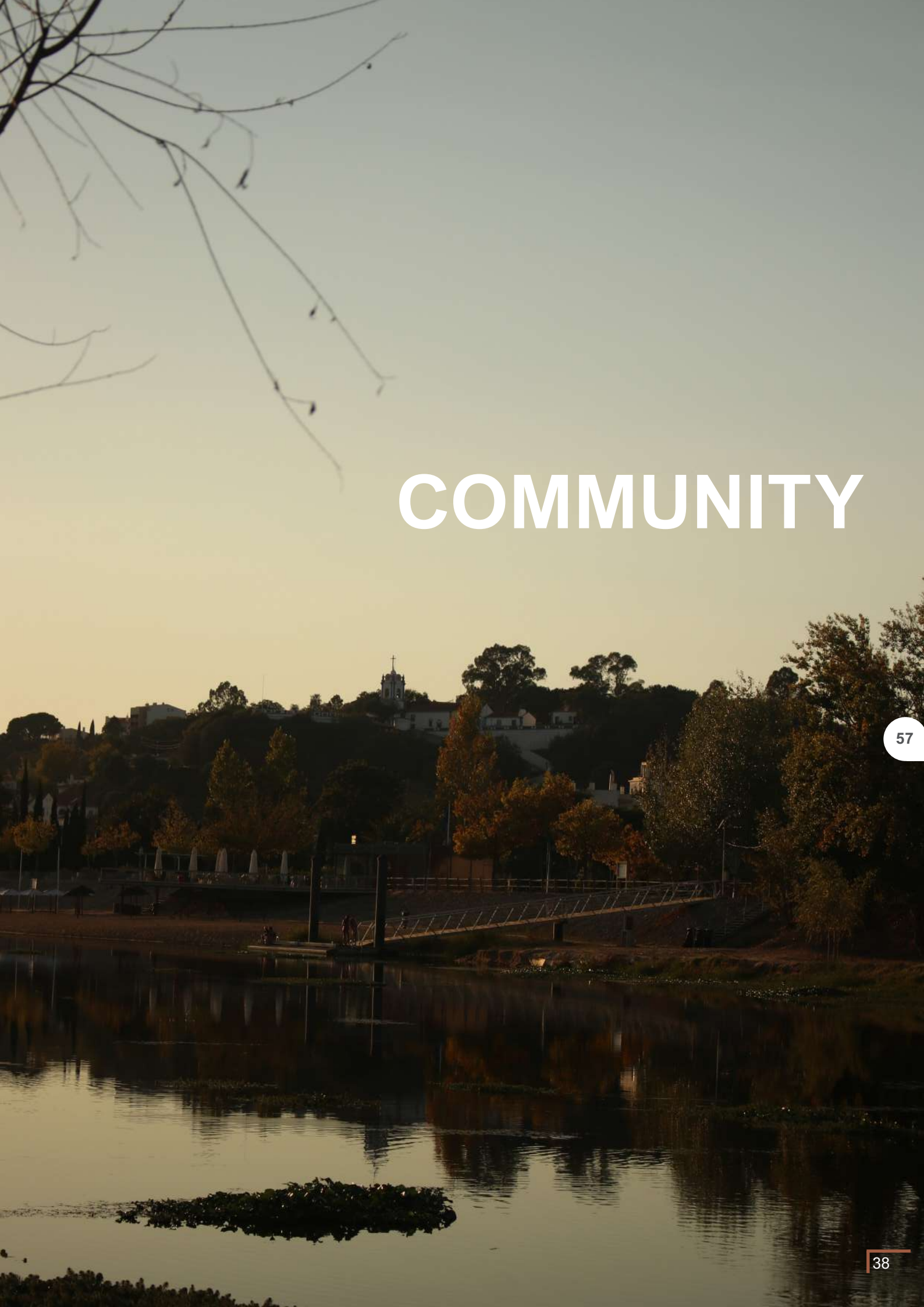


AVAILABLE FOR DOWNLOAD ON OUR SITE!

COMPANION PLANTING FOR A SUSTAINABLE GARDEN



GOOD COMPANION NEUTRAL COMPANION BAD COMPANION



COMMUNITY

Our cause "Polinizadores Felizes" ("Happy Pollinators") was selected to go to community vote for the "Bairro Feliz" initiative hosted by Pingo Doce, in 2023. There are less and less pollinators to help plants reproduce. As such, our cause aimed to introduce pollinator friendly gardens to the schools of Coruche, through the creation of a seed kit composed of native seeds, that are resistant to drought. The community's support of our idea weighed 21,5 kg, and we thank them for every gram!

However, the winning cause was from the Associação dos Amigos dos Animais de Coruche. The prize Money was used to buy animal food and to fund medical care for stray animals, mainly cats and dogs, that the association takes in in Coruche. In this article, you can get to know a little more about their work.

AMIGOS DOS ANIMAIS DE CORUCHE

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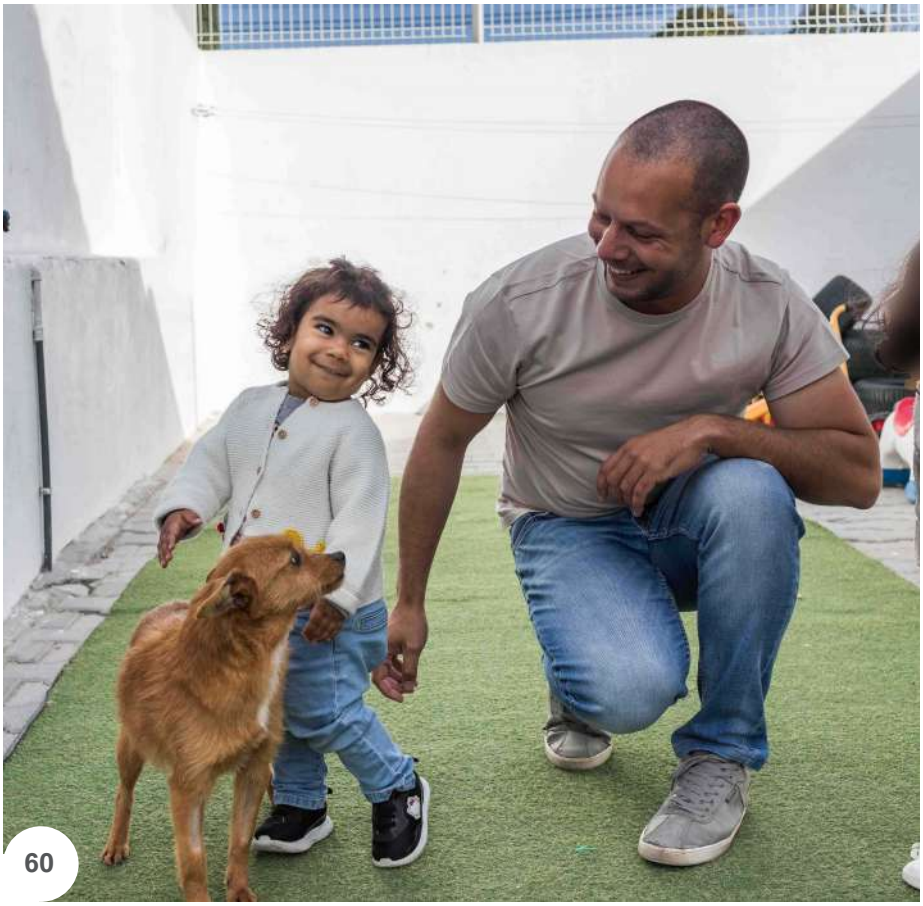
Amigos dos Animais de Coruche (which translates to Friends of the Animals of Coruche) is a not-for-profit association for the protection of animals, operating in the county of Coruche since 2002. It counts on the help of various backers and volunteers, acting according to the current needs, aiming to respond to a diverse range of situations.

Legally registered as "Associação dos Amigos dos Animais de Coruche", it was funded on the 9th of April of 2002, as a not-for-profit association for the protection of animals, and since then has cooperated in varying capacity with other entities competent in animal care and wellbeing within the county.



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The daily work is extensive, from identification and sheltering of lost or abandoned animals, assistance given to entities and individuals, reception and response to animal welfare complaints, and helping support stray colonies, working towards the essential goal of animal wellbeing, the preservation of species, and public health. There isn't an exact limit or rule that establishes which species the association aids, and as such, in the past two years alone, the association has aided swifts, bo-

vines (ruminants such as cows, goats and sheep), guinea pigs, equines (horses), swallows and martins, rabbits, mustelids (otters, weasels and badgers, for example), and, in the grand majority, dogs and cats.
Beyond these activities, the association also holds an active role in promoting awareness about animal welfare to multiple generations of the community, in the hopes that not only the current adult members, but also the future generations, are active agents in the protection of biodiversity.
Amigos dos Animais de Coruche is an association that functions completely through volunteer work that, beyond the intervention areas mentioned, also collaborate in the sanitization of the Centro de Recolha Oficial de Animais de Companhia de Coruche (CROACC) (Official Pet Shelter of Coruche).
Being as it is an association that works 24 hours a day, 7 days a week, it has an enormous impact on the life and day-to-day of the community and the animals of the county.

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Amigos dos Animais de Coruche is a not-for-profit association for the protection of animals that acts in the county of Coruche, with its headquarters within the county. Last year, we registered 108 adoptions, 321 assistances, 66 identifications and sheltered 160 animals. Public attendance is from Monday to Friday, from 09:00 to 16:00, through contacting 243 070 963 or 932 434 221. For emergencies, they are also contactable through WhatsApp, Instagram, and Messenger. Being a not-for-profit association, we are always open to receive any donations, as they are fundamental to allow the association to continue to work. Us, For Them.

PHOTO CAPTIONS

Front cover photo — Bumblebee (*Bombus sp.*) on French lavender (*Lavandula pedunculata*).

Inner cover photo — common wood pigeon (*Columba palumbus*).

1. Hawthorn (*Crataegus monogyna*).
2. Small copper (*Lycaena phlaeas*).
3. Book of British birds on a table.
4. Dried out flower stem.
5. The Milky Way.
6. Chaffinch (*Fringilla coelebs*).
7. Scarlet dragonfly (*Crocothemis erythraea*).
8. During our monitoring efforts, aquatic invertebrates are caught in nets and put in these small jars to allow time to identify them and take photos.
9. Painted lady (*Vanessa cardui*).
10. Plant from the mustard family (Brassicaceae).
11. Jimsonweed (*Datura stramonium*).
12. Siskin (*Spinus spinus*).
13. Stork-bill (*Erodium sp.*).
14. Eurasian otter (*Lutra lutra*) prints in the mud.
15. Red swamp crayfish (*Procambarus clarkii*).
16. Spotless starling (*Sturnus unicolor*).
17. Blue-winged olive (*Baetis sp.*).
18. Pin-tailed wydah (*Vidua macroura*).
19. Stretch-spider (*Tetragnatha extensa*).
20. Little ringed plover (*Charadrius dubius*) displaying in potential mating area.
21. Surface of the water of the Sorraia river.
22. Lamprey (*Lampetra sp.*) ammocoette (larval stage).
23. Lamprey (*Lampetra sp.*) ammocoette (larval stage).
24. Coruche and the Sorraia river.
25. Leaves in the sunlight.
26. Signage explaining the importance of the use of native plants in urban green areas.
27. Urban green area planted with native species.
28. Urban green area planted with native species.
29. Urban green area planted with native species.
30. Tree germander (*Teucrium fruticans*), a plant native to Portugal.
31. Shag (*Gulosus aristotelis*).
32. Seagulls (*Larus sp*.) in flight.
33. Observation of a shag (*Gulosus aristotelis*), through a telescope, during seabird counts.
34. Mariana Tomaz and another volunteer during the seabird census at Cape Carvoeiro.
35. Fishermen interview day, at the Nazaré Port.
36. Registering a washed up two-year old

PHOTO CAPTIONS

gannet (*Morus bassanus*).

37. Shag (*Gulosus aristotelis*).
38. Hygiene within the tanks was very important and cleaning was a regular occurrence.
39. Area where the turtle recovery tanks are kept.
40. One of the turtles in recovery in a tank.
41. Preparing food for the turtles.
42. Area where the turtle recovery tanks are kept.
43. Wavy ocean water surface.
44. Tomatoes that haven't ripened yet.
45. Mycorrhizae under the microscope.
46. Desert truffles (*Terfezia arenaria*).
47. Host plants (*Cistus sp.*) being acclimated.
48. Growth of *Terfezia* in a petri dish.
49. Host plants (*Cistus sp.*) being acclimated.
50. Mycorrhizal synthesis.
51. Spotted rock-rose (*Tuberaria guttata*) the natural host plant to the desert truffle (*Terfezia arenaria*).
52. Host plants (*Cistus sp.*) being acclimated in a greenhouse.
53. Host plants (*Cistus sp.*) being acclimated.
54. Host plants transplanted into a field.
55. Pea ready to be harvested.
56. Flowering pea plant.
57. Sorraia river and Coruche in the background.
58. Amigos dos Animais de Coruche accepting the prize from the 3rd edition of the "Bairro Feliz" competition.
59. One of the dogs this association has cared for.
60. The association is often visited by school kids to help socialise the animals and raise awareness.
61. The association is often visited by school kids to help socialise the animals and raise awareness.
62. The association depends on donations and prize winnings to function, as they are not-for-profit.
63. Raising awareness is also a big part of the association's activities.
64. One of the dogs this association has cared for.
65. Mushroom pushing up through the leaf litter.
66. Caterpillar of the Geometer moth family (*Geometridae*). Their catterpillars are often also referred to as inchworms due to the way they move.
67. A Eurasian nuthatch (*Sitta europaea*) being handled during a ringing session.

Rear cover photo — a collared dove (*Streptopelia decaocto*) poised on a broken tree stump.

AUTHORSHIP OF PHOTOS AND IMAGES

66

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Inês Almeida	37-41
Luís Guilherme Sousa	22-23
Mariana Tomaz	32-35
Shirley T. van der Horst	1-7, 24, 30, 31, 36, 43, 54-57, 65, 67

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