Co-funded by the
Erasmus+ Programme
of the European Union

Involve schools in the conservation of birds and their habitats

SPEA - Portuguese Society for the Study of Birds

INDEX

ABOUT OWL - ONE WORLD LEARNING 3

ABOUT SPEA 4

ENVIRONMENTAL EDUCATION IN SPEA 5

WHY THIS GUIDE? 6

STRUCTURE OF THE GUIDE 8

THE BIRDS: CHARACTERISTICS AND IDENTIFICATION 10

ACTIVITIES 16

..... 16

MEET THE BIRDS 16

- Activity 1. The feathers of birds 21
- Activity 2. The sounds of birds 24
- Activity 3. Feathers and beaks, adaptations aside 27
- Activity 4: Birds in my school: construction of feeders 31
- Activity 5: Nest box construction 38

SEABIRDS 39

Seabirds of the Azores and Madeira 40

- Activity 6: Azores: Seabirds and light pollution 43
- Activity 7: Discover Madeira's seabirds 46

Berlengas Birds 48

- Activity 8. Berlengas: looking for balance! 52

Portuguese and Continental Coast Birds 53

- Activity 9: Field trip: discover the animals on the beach! 59

TERRESTRIAL BIRDS 60

Birds of the Azores 61

- Activity 10. Pictionary of Birds 63

Birds of the Small Lagoon 64

- Activity 11. Waterfowl Peddy-paper 67

Birds of the Douro Cliffs 69

- Activity 12. The Britango and his neighbors! .....

ABOUT ONE WORLD LEARNING

OWL - One World Learning is a European environmental education project, funded by the Erasmus+ Programme. It aims to develop an environmental education programme for the promotion of diversity, citizenship, language learning, integrated science, teamwork and development of critical thinking in an environmental context. The project is aimed at children, young people and adults.

The general objective of this project, developed between 2017 and 2019, is to encourage behavioral changes, forming more involved and empowered communities, which are socially inclusive and environmentally responsible.

The OWL project combines good practice, innovation, research and experience from five European environmental non-governmental organisations (BirdLife Malta, OTOP, LTL - Learning Through Landscapes, BirdLife Europe and SPEA) and the Maltese Ministry of Education and Employment.

The objectives of this project are:

1. Strengthen partnerships and networks among European countries in the area of environmental education;
2. Develop an international environmental education programme, based on best practices developed at European level;
3. Promote environmentally correct behaviors and develop a sense of citizenship, critical thinking and the capacity for innovation in children and youth;
4. Contribute to the professional development, in the area of environmental education, of teachers and other environmental professionals;
5. Promote intercultural diversity and exchanges through language teaching to children and young people;
6. Promote interest in science by promoting the practice of outdoor activities;
7. Promote awareness at an international level of the benefits of learning in contact with the natural environment for education and health promotion;
8. Demonstrate the relationship between outdoor learning and social inclusion.

This project responds to the need to promote active citizenship, critical thinking and intercultural exchange between European communities.

By understanding that we all have a role in protecting the environment, and by providing children, young people and adults with the tools to fulfil this role, we encourage participants to be more active citizens, to think critically about how they can improve their environment at the local level, and to learn and share knowledge and experiences with other individuals and communities from different cultures and countries.

ABOUT SPEA

SPEA - Sociedade Portuguesa para o Estudo das Aves (Portuguese Society for the Study of Birds) is a non-governmental non-profit environmental organization that promotes the study and conservation of birds and their habitats in Portugal.

It was founded in 1993 and, since 1999, has been the Portuguese partner of BirdLife International, an international network of environmental organizations operating in more than 100 countries. The organisation obtained recognition as a public benefit entity in 2012.

SPEA's mission is to work for the study and conservation of birds and their habitats, promoting development that guarantees the viability of the natural heritage for the enjoyment of future generations. Environmental awareness and the promotion of bird watching are also other priorities.

The main objectives of SPEA are:

- Promote, stimulate and disseminate the study of bird biology and develop the scientific and technical basis for the application of management and conservation measures;
- To promote the conservation of the populations of wild birds and their habitats, particularly in the Portuguese territory;
- Contribute to the valorization and promotion of Ornithology, in its various aspects, through the elaboration and dissemination of guiding principles of this discipline;
- Contribute to the training of the general population and specific groups on birdlife, ornithology and other activities related to bird watching, and to highlight the importance of bird conservation.

Since, in order to achieve the conservation of birds and the sustainability of their habitats, the participation of all is essential, environmental education becomes a fundamental part of the work that SPEA develops. It is for this reason that this manual was developed.

ENVIRONMENTAL EDUCATION IN SPEA

Environmental education and awareness are components present in all SPEA projects, being inseparable from conservation actions, and cover specific target audiences according to the objectives of each project and the themes in question.

There are several examples of education programs developed by SPEA:

- The Priolo Environmental Centre (São Miguel) is coordinated by SPEA - Azores in partnership with the Regional Secretariat for the Environment and the Sea (SRAM) and the Regional Directorate of Forest Resources (DRRF). This centre, through the various LIFE projects for the conservation of the priolo, offers a programme aimed at schools on the island, with activities aimed at raising awareness of this bird and other native species of the Azores, and drawing attention to their conservation (http://centropriolo.spea.pt/pt/o-centro/quem-somos/).
- The Interpretative Centre of Lagoa Pequena (Sesimbra) is promoted by SPEA within the framework of a partnership established with the Municipality of Sesimbra. From the offer to the visitors, it includes an educational program that takes place throughout the school year, with actions in the lagoon, to make the birds and this habitat known, and with actions in schools in the municipality (http://www.cm-sesimbra.pt/lagoapequena/).
- SPEA - Madeira has an annual program of Environmental Education with several activities aimed at schools, on themes related to the species and habitats of this archipelago. The initiatives of the LuMiAves project (http://www.spea.pt/fotos/editor2/programaluminavesspea.pdf) and the LIFE Fura-bardos project (http://www.spea.pt/fotos/editor2/spea_programa2017_2018.pdf) stand out.
- The educational programme of the LIFE Berlengas project was developed with the aim of raising awareness of the importance of preserving the rich natural heritage of the archipelago. Several activities were promoted with the school community and didactic contents were developed to be used even after the end of the project (http://www.berlengas.eu/pt/sensibilizacao).
- The educational programme of the LIFE Rupis Project addresses the theme of conservation of threatened birds of prey (namely the Britango and the Bonelli's eagle), and nature in general, and promotes the participation of students and teachers in the conservation of the project's target species (http://www.rupis.pt/pt/educacao-ambiental/).

In addition to this integration of environmental education in conservation projects, SPEA also develops other initiatives, which are mainly aimed at young people and families, which can be integrated in a school context. While focusing on birds, many of these initiatives focus on other interlinked issues such as biodiversity, ecosystems, climate change, environmental impacts, citizenship, etc.

WHY THIS GUIDE?

This guide responds to a need that exists at national level to provide pedagogical information to teachers and other professionals in the educational area. We aim to enable educators so that they can teach the themes of science, biodiversity and environmental issues related to the species and habitats present within the national territories.

There is still a gap in information on the biodiversity of our country in school curricula and, therefore, accessibility for teachers and educators. Many school textbooks also use examples of species from other countries to work on topics related to nature, animals and plants. The potential of our native fauna and flora is often overlooked as a viable source of knowledge for environmantal education.

This lack of information and knowledge about the nature of our region is felt even more in the cities, where children and young people live in a more artificial context. Often, the only contact these children have with the countryside is in parks and gardens which, despite having a great value as spaces for leisure and maintenance of urban biodiversity, have mainly exotic species, and therefore do not reflect our natural habitats.

It is therefore important to produce educational materials that can complement school textbooks, providing information on national biodiversity.

It is in this sense that this guide may be useful to teachers and educators, by providing in-depth knowledge related to the wild birds of Portugal, their habitats, main threats and conservation projects.

This guide was prepared based on SPEA's experience in environmental education, within the framework of conservation projects that are being implemented by the association. New content was also developed with the intention to deepen knowledge on the theme of birds.

In addition to providing information on species and habitats, this guide provides a set of resources that can be used by teachers and students, allowing them to deepen their knowledge of local biodiversity. They also have access to online resources with information on birds in Portugal and get to know the conservation and monitoring projects for species that are taking place in Portugal.

The aim of this guide is also, through the acquisition of knowledge and skills, to empower education professionals to act at a local level. This could be either by participating in training and building the environmental awareness of their students, or by actively participating, as members of the community, in the conservation and monitoring of birds and their habitats.

In addition, this guide is expected to provide an enhanced connection to nature within the educational community, since people will only value, love and protect what they know, and it aims to promote active citizenship and more critical thinking in the participants.

It is also hoped that this guide will contribute to the practice of Curriculum Flexibility. Providing school with an option to manage the curriculum and include activities from this guide as an alternative.

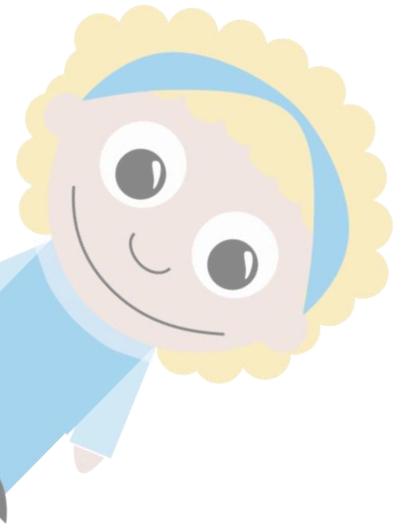
The activities proposed in this Guide allow for the interdisciplinary nature of the curriculum, favouring the projects that mobilise learning from the various disciplines, promoting scientific knowledge, intellectual curiosity, critical and intervening spirit, creativity and collaborative teamwork; it is based on the National Strategy of Education for Citizenship, which aims to develop skills for a culture of democracy and learning with an impact on individual civic attitude, interpersonal relationships and social and intercultural relationships, through the component Citizenship and Development.

This Guide understands the importance of a commited educator/teacher and the value of engaged students. It does this by providing significant learning situations, through practical activities, adaptable to the school environment, as well as to the group of students.

In short, with this guide it is expected:

- Increase the **connection to nature** of teachers and students, through knowledge of the natural areas that exist in your region;
- Provide information to teachers and students, allowing them to develop **critical thinking** on environmental issues, so that they feel empowered to actively participate in improving the environment of their area of residence / school / region;
- Provide **materials and resources** that can be used in schools or other educational contexts, contributing to the increase of scientific skills and developing their taste for learning about environmental issues;
- To provide a more comprehensive and realistic view on how to do research and monitoring in the area of **ornithology**, and how to accomplish **nature conservation** in Portugal.

Figure 1. Visit to Berlenga Island (Francisco Félix)



GUIDE STRUCTURE

Chapters

This guide is organized into chapters to facilitate learning about birds and their habitats.

The first chapter - **Birds: characteristics and identification** - is an introductory chapter, including an initial approach to birds and basic knowledge about this group of animals (definition, diagnostic characteristics and conservation significance), which will facilitate the understanding of the following chapters.

The second chapter - **Activities** - is quite extensive, constituting practically all the content of this guide. It is divided into 3 subchapters with the themes: getting to know birds, seabirds and land birds.

The first subchapter - **Getting to know the birds** - contains five general activities on birds, which aim to introduce students to the general characteristics of this group. This subchapter works on themes such as feathers, songs and differences between the groups of birds. It also includes activities aimed at contributing to the conservation of species, aiming to provide students with contact with the school's birds, through the construction of feeders and nest boxes.

The second sub-chapter - **Seabirds** - includes an introduction on seabirds and four activities, each related to a place where SPEA works with these birds. Namely the Azores, Madeira and the Berlengas. It also includes a proposal for a field trip to take students to explore the Portuguese mainland coast.

The third sub-chapter - **Land birds** - includes three activities, each one related to a habitat or region where SPEA works with land birds, namely the Azores, the Small Lagoon and the Douro Cliffs.

Before each activity, an introduction is included about the geographical location of the activity and a description of the specific bird life of that region/ habitat, as well as the associated conservation issues.

Activity sheets

At the beginning of each activity there is a short description of the activity. This includes information such as the type of activity, target audience, where the activity should be held, suggested number of sessions, duration and time of the year recommended. In addition to the description of the activity, the objectives to be worked on and the material needed to carry them out are also mentioned. This information is also provided in the annex.

A list of suggested bibliography is provided at the end, which includes; various documents (bird guides and others) and websites on the avifauna of Portugal, specific aspects of biology and

bird ecology. This bibliography should be consulted to complement the knowledge of the teacher and students on the topics addressed.

Each activity also includes a set of annexes consisting of teaching resources, including; PowerPoint presentations on species and habitats, game pieces and boards, print media, species cards, monitoring cards, instructions, etc., which can be used directly by the teacher in their activities, without the need for adaptation, thus being very practical.

It is also linked to the yearly curriculum goals for which each activity is intended to satisfy, so that the teacher can work these activities into the curriculum.

Many of the suggested activities are related to the specific bird life of a given region and/or habitat of the country. However this does not mean that they cannot be implemented in other regions, as the aim is to give students a broad perspective on existing birds at a national level.

Additional resources

Although not the main purpose of this guide, it is useful and rewarding to take students to the countryside in order to provide them with direct contact with the natural environment. Thus, it is suggested that when using this guide with your students, try to go with them into nature, leading them to explore the natural resources locally available. In addition to the field trips proposed in this guide, we suggest that you take your students to other natural locations where they can explore and get to know the wild fauna and flora, preferably with the support of specialized technicians.

In terms of resources of this type, at SPEA there is the possibility of visiting the **Priolo Environmental Center**, on São Miguel Island and the **Lagoa Pequena Interpretative Space**, in Sesimbra, both providing a set of outdoor activities on the birds of these regions. There are also other environmental education centres in the country, and many municipalities have been working to provide nature contact activities in their regions. You can also contact SPEA and request a field trip with your students, as long as it is possible to fit it in the calendar of activities of the association.

Figure 2: Field trip to the Douro Cliffs (LIFE Rupis Project) (Palombar)

Figure 3: Visit to the Lagoa Pequena Interpretative Space (Paula Lopes)

THE AVES: CHARACTERISTICS AND IDENTIFICATION

According to BirdLife International, there are 11,122 species of birds in the world. With so much diversity, it seems difficult to define the concept of a bird and to characterize this diverse group.

However, these animals share certain characteristics that make them unique.

What characterizes a bird?

According to the classification system of Lineu, which is still used today, although having undergone some changes, the birds are classified as belonging to the Kingdom Animalia, Filo Chordata, Sub-Filo Vertebrata and Class Aves. The Class Birds is in turn divided into Orders, which are divided into Families, within each of which there are various Genera and Species.

This group (Class Aves), has a set of common characteristics that make it unique.

- Birds are **vertebrate** animals, that is, they have a spinal column, which puts them in the Filo Chordata. However, the skeleton of birds is different from other vertebrates, because their bones have a more porous structure, with spaces inside, which makes them lighter, allowing greater ease in flight.
- **Wings** are one of the most striking characteristics of birds. Even non-flying birds have vestigial wings that are sometimes used for swimming or exhibition during mating rituals. There is a huge diversity of shapes and sizes of wings, which vary greatly from one group of birds to another.
- All birds have **feathers**, which are structures composed of keratin and other proteins, which contain light reflecting pigments, which have various functions such as thermal insulation, flight aids and ornamental.
- The **beak**, another characteristic structure of the class Birds, is a bone structure, covered with keratin that constitutes the mouth of the bird. Variations in the shape and size of birds' beaks generally reflect the way they are fed. The beak is also used by birds as a tool to manipulate objects, to produce sounds (e.g. drum), to make holes for food (e.g. woodpecker), to smooth and clean feathers, among other tasks. Some birds even use the beak as a weapon, to help regulate body temperature (thermoregulation) or, as in the case of seabirds, to excrete salt through their nostrils (osmoregulation).

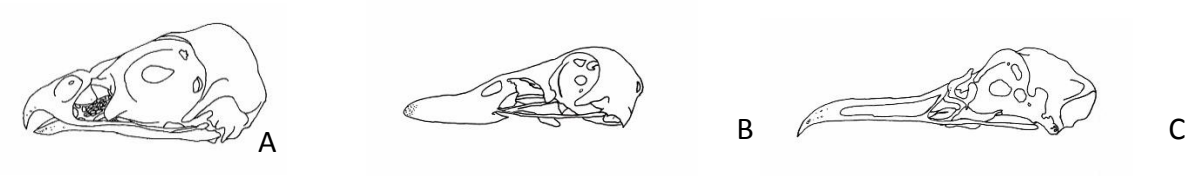


Figure 4. bird skulls 1A) Round-winged eagle, 1B) Yellow-footed gull, 1C) Duck gull (Ana Mendonça's illustrations)

- Birds are warm-blooded, i.e. **endothermic**, which means they can maintain body temperature regardless of variations in external temperature. Despite this, some birds, such as the white-faced cormorant (*Phalacrocorax carbo),* are exposed to the sun to dry out and/or help regulate their body temperature.

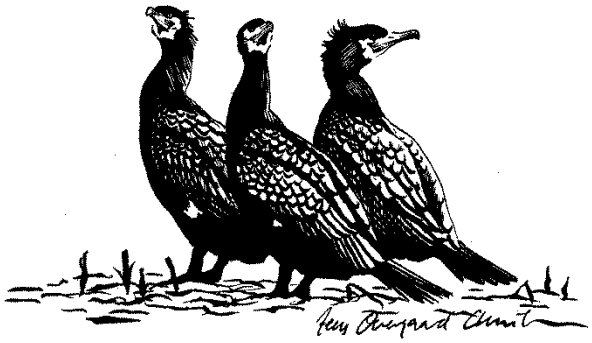


Figure 5: White-faced cormorant *Phalacrororax carbo* (BirdLife)

- Birds have a **high metabolism**, quickly transforming food into available energy. The fact that they have a heart with four cavities and a high rate of breathing helps them to be efficient and agile flyers, as well as to maintain high body temperatures.
- Birds are **bipedal**, that is, they have two legs that they use for various purposes (walking, perching, jumping, running, etc.). The size and shape of the birds' legs reflects their ecology. For example, waterfowl have long legs to walk in the mud (e.g. white heron), or with interdigital membranes to help with swimming (e.g. mallard duck). Birds of prey, on the other hand, have shorter and stronger legs, with claws, adapted to the capture of prey.

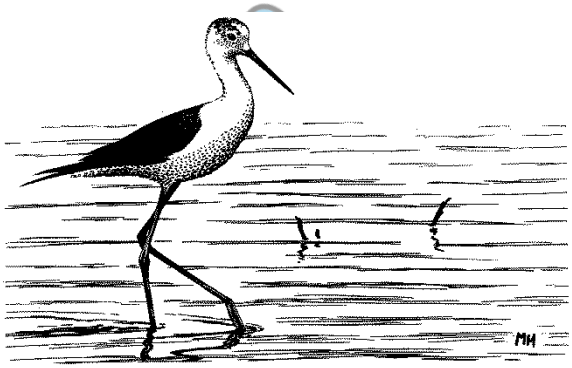


Figure 6. Black winged stilt *Himantopus himantopus* (BirdLife)

- Birds have a forked bone, which is a fork-shaped bone in the breast area. This bone protects the chest cavity during the flight, protecting the organs from excessive pressure as the wings are flapping and the bird is gaining altitude.
- Birds are **oviparous**, i.e. they lay eggs as part of their reproductive cycle, which have a hard shell and need to be incubated for the young to develop inside until hatching. Eggs vary in colour and size, depending on the species, and have different incubation times.
- The communication in the birds is done through **singing and other vocalizations**. Some species have elaborate songs, others are simpler and others produce mechanical sounds from beak beating or their wings. The sounds produced by the birds are used in mating rituals, land marking, communication with the chicks, among others. There are also other forms of communication between birds such as the colouring of feathers, and for some species the "intensity" of colouring is an indicator of fitness.
- The birds have a great capacity for **navigation**, being able to orient themselves in the airspace. In the case of migratory birds, this capacity allows them to travel for thousands of kilometres and to return to the same sites year after year. These birds are guided by geographical features, the stars and terrestrial magnetism.

How to identify birds?

Like humans and other animals, birds have a specific anatomy, with different parts of the body (wings, tail, head, beak, etc.).

The body of the birds is, as we all know, covered with feathers, but the feathers are not evenly distributed, but are grouped into areas of the body that are common to almost all birds. Together with the bare parts (beak and legs), these groups of feathers form what is called the topography of the birds. The main areas of the bird's body are described in the following figure.

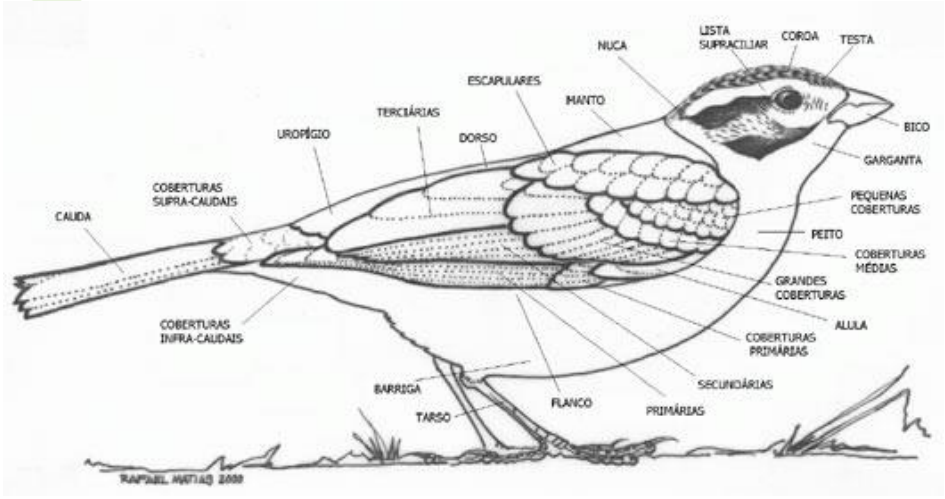


Figure 7. Topography of a bird (Rafael Matias)

In order to identify a bird in the field, a task that is not always easy, it is important to know its **topography** and also to pay special attention to some particular aspects.

Size — Correctly assessing the size of a bird is the first step in identifying it. A good way to do this is to use other birds known as comparators.

Color — The general colouring of the bird is one of the most important aspects to take into account. Please note that the colours may vary depending on the light!

Shape and silhouette — The shape and silhouette of the birds are good characteristics to help identify them. Each group (Order) of birds generally has its own characteristics that distinguish them from the others, being very related to the silhouette.

Behavior — Many species of birds behave in a characteristic way, which is a good indication for their identification.

Singing and calling — Each species of bird emits a specific song and call, which allows us to distinguish it from the others, making it possible to identify it even without observing it.

Flight — It is often only possible to observe birds in flight. The type of flight (planned or shaken, for example) and the shape of the wings are also very important in identifying the species.

Plumages — In many species, juveniles and immature birds have different feathers than adult birds and males have different plumage than females. In addition, many species change their appearance depending on the time of year, with more showy plumage during the breeding season and a more discreet appearance during the rest of the year.

Figure 8. Birdwatching (Paulo Alves)

For bird watching in natural spaces, or even in gardens, it is advisable to have some essential materials available. Since birds are wild animals and are easily frightened by the presence of man, their observation usually has to be done at a certain distance, so a pair of binoculars and a good field guide (see the guides that appear in the bibliography) are essential materials for their observation.

We must also take account of certain rules of conduct, such as not making too much noise, so as not to disturb the animals and so that they are not frightened, making it impossible for them to observe them. And, of course, always respect the spaces visited, leaving everything exactly as it was, not collecting animals or plants and not leaving garbage.

Why conserve the birds?

Birds, like all living things on Earth, play an important role in ecosystems, contributing to their balance.

Depending on the group and species of birds to which we refer, their functions can be very varied:

- Pest control: birds control insect pests in the case of insectivorous birds and mice in the case of birds of prey, as they feed on their prey in large quantities;
- Pollination: some species are pollinators, as is the case of hummingbirds; in our country we also have pollinating birds such as some felines and toutinegras, namely the common chiffchaff (*Phylloscopus collibyta*), which is often observed with pollen on the beak.

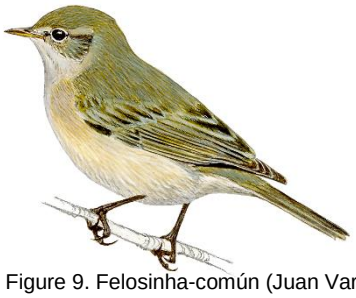


Figure 9. Felosinha-común (Juan Varela)

- Necrophagous birds cleanse the nature of the remains of dead animals, which would otherwise take much longer to decompose;
- Birds of prey control the populations of prey (rats, rabbits, partridges, other birds, etc.) functioning as a factor in maintaining their health, since they hunt the weakest or sickest individuals;
- Some birds spread plant species. For example, the *Taxus bacata* yew, is a species that depends entirely on birds for its dispersion. Its fruit is eaten by a bird, and the seed has to pass through the bird's intestine to germinate. Another example is the case of the rays (*Garrulus glandarius*), which disperse the holm-oaks and cork oaks when they bury their acorns, which they feed on, in order to save them for later. Many of these acorns are forgotten and end up germinating!

In addition to these functions, the presence of birds in the environment is spectacular and beautiful. They fill the air with their colors, and huge biodiversity. Being present in all types of habitats, even in the center of large cities.

GENERAL BIBLIOGRAPHY ON BIRDS

Catry, P. & Campos, A. R. (2010). *Guia das Aves Comuns de Portugal* (2nd edition). Lisbon: Portuguese Society for the Study of Birds.

Costa, H., de Juana, E. Varela, J. (2011). *Birds of Portugal. Including the archipelagos of the Azores, Madeira and the Selvagens*. Barcelona: Lynx Editions.

Svensson, L., Mullarney, K., Zetterström, D. (2017). *Birds Guide - Birds of Portugal and Europe Field Guide* (2nd ed.). Lisbon: Assírio and Alvim.

Aves de Portugal - Portal dos Observadores de Aves (2008). Available at: http://avesdeportugal.info/

SPEA - Portuguese Society for the Study of Birds (2010). *Our birds: how to identify*. Available at: http://www.spea.pt/pt/observar-aves/as-nossas-aves/como-identificar/

The Cornell Lab Bird Academy (2018). *All About Feathers – What is unique to birds?* Disponível em: https://academy.allaboutbirds.org/features/all-about-feathers/#what-is-unique-to-birds.php

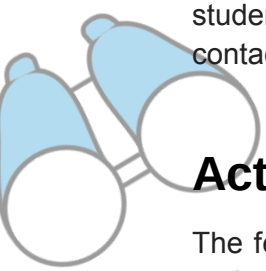
ACTIVITIES

The Chapter of Activities is divided into 3 subchapters: Knowing Birds, Seabirds and Terrestrial Birds, which include various activities. The last two subchapters are divided by region of the country.

GETTING TO KNOW BIRDS

This subchapter includes a series of activities that lead students to discover more about birds, their general characteristics, different types of birds, vocalizations, among other specialisms of this group of animals.

It also includes activities for the construction of feeding troughs and nest boxes, which allow students not only to help in the conservation of the school's birds, but also to enjoy a closer contact with them.



Activity 1: The Feathers of Birds

The feathers, which cover the body of the birds, are impressive structures, made of a light and resistant material, keratin.

The feathers consist of different parts: rachis, beards and barbells. The barbells have hooks that allow them to attach themselves to each other, as if they were velcro. It is this microstructure that makes the feathers impermeable and allows them to be effective in flight.

The birds are always cleaning their feathers to keep that microstructure firm. By cleaning the feathers, the birds also protect them by spreading an oil produced by the pineal gland, a gland that is located in the bird's uropygium (near the base of the back). It is this oil that makes the feathers of ducks and other waterfowl water-resistant.

Birds have different types of feathers, with different functions:

- **Flying feathers**: they are bigger and more rigid than the others and give the birds the ability to fly, together with the wings. These feathers are located on the wings and called **rémiges.** On the tail they are called **retrizes**. Remygos, in turn, are classified as primary, secondary and tertiary, depending on their location on the wing and size.
- **Covering feathers**: they are softer and coat the bird's body, helping it to maintain its temperature and body insulation. Inside these are the outer covering feathers - **tectrizes** - that cover the body and provide an aerodynamic contour, and the others below them, the **feathers or plumage**, which are smaller and more delicate feathers that form the fluff that covers and isolates the body of the bird.

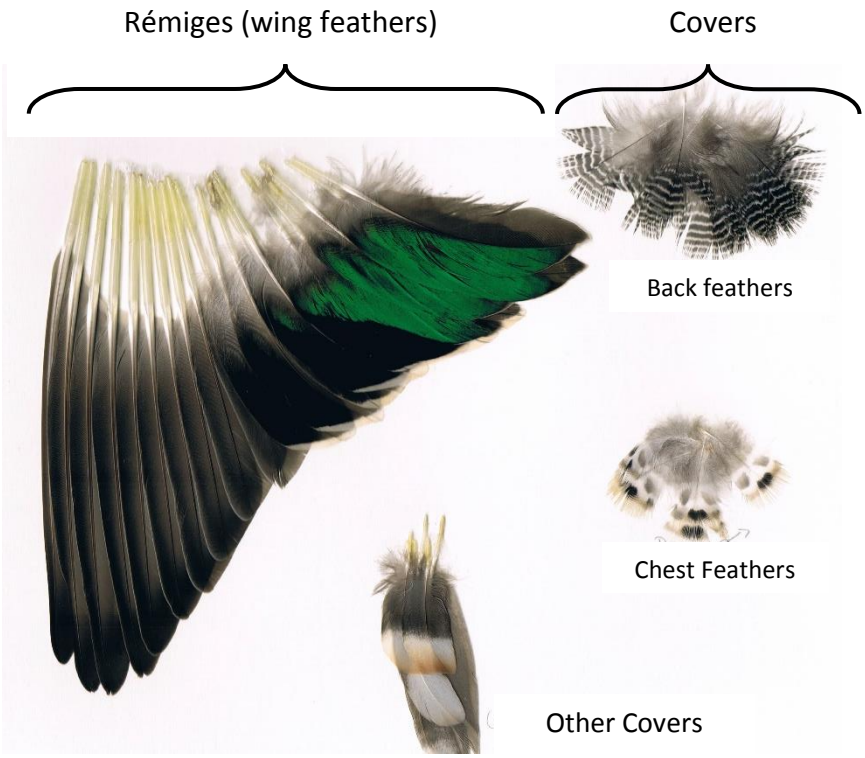


Figure 10. Feathers of the Eurasian teal (*Anas crecca*) (Joaquim Teodósio)

In addition to these functions, the feathers also have functions related to their color, which can be camouflage or display, as is the case of the breeding plumage of some species.

The feathers wear out over time and use, so they have to be replaced periodically. This process is called a **moult** and usually occurs once a year. The moult represents a major energy drain for the bird and can leave it vulnerable, especially when changing flight feathers. For this reason, the birds carry out moulting at times that do not hinder their main activities such as reproduction or migration.

Some birds have a winter plumage and a summer plumage, the summer plumage being generally more conspicuous and flashy and the winter plumage more discreet.

Through this activity you can explore with students the characteristics and diversity of feathers. This activity can be used to create a poster to put in school or in the classroom. By including an artistic element to the lesson you can impose upon the students a sense wonder at the variety of bird feathers and the colours and sizes that they can come in.

Figure 11. Tawny Owl *Strix aluco* (Juan Varela)

DID YOU KNOW THAT...

...the feathers of owls are softer than those of day birds?
These feathers are densely braided, which allows these birds to make no noise during take off.

Why is this important?
Owls are nocturnal birds that hunt at night when everything is silent. The fact that they do not make noise when taking off, allows them to surprise their prey (usually rats and other small mammals), increasing their chances of successfully hunting them.

TYPE OF ACTIVITY: Creative

TARGET PUBLIC: Pre-school and Primary School

PLACE: Classroom

NUMBER OF SESSIONS: 1

DURATION: 45 minutes

PROPOSED DATE: All year round

OBJECTIVES

- Learn what a bird is and what its main characteristics are
- Know the feathers of birds (their morphology, functions, etc.).
- Promote creativity and develop teamwork by involving the whole class

MATERIAL

- Real bird feathers (if possible)
- Paper feathers (one per student) (Appendix 1)
- Cardboard
- Bird silhouette (Annex 2 - in three different formats)
- Paints or coloured pencils
- Colored paper
- Scissors
- Glue
- Natural elements collected in the playground (optional)

DESCRIPTION

- In the first part of the activity, explain what a bird is and its main morphological characteristics: feathers, beak, flight, legs, etc.
- Next, go into the issue of feather specialisms (in the case of older students), focusing

on the parts of the feathers, functions and types of feathers (more information at https://academy.allaboutbirds.org/features/all-about-feathers/#what-feathers-do.php).

- If possible, bring some bird feathers to class and observe them with the students. In this way they will be able to explore the characteristics of feathers such as their consistency and composition, the fact that they are impermeable (water droplets slide down the feather), their resistance to the wind (shaking the feather with force), the colours and shapes, observe different types of feathers, etc. Depending on the age of the students, this exploratory part may be more or less developed.
- After learning these concepts, each student receives a drawing on paper of a feather that should cut and coloured.
- Depending on the age of the students, drawings with or without messages can be used. In the latter case, students can write an environmental message of their own, which makes this activity more creative.
- Students should then, with the help of the teacher, cut out and assemble the silhouette of the bird on cardboard (see Annex 2).
- In Annex 2 you will find the silhouette of an eagle, which you can use for this activity. Take the opportunity to tell students that the eagle is a bird of prey that flies at high altitudes and often hunts from the sky, so it is usually observed in flight.
- The silhouette is in three formats: Large, so you can print on a "Plotter" and use it like this; cut into 3 parts, so you can print each part and mount on a card or large card; Whole in A4, which you can print on acetate paper and, with the help of an overhead projector, project it on a card or scenery paper, and the students draw the outline of the silhouette.
- Finally, when the silhouette is assembled, complete it by sticking the feathers painted by the students. Use different sized feathers for different parts of the bird's body and complete with some small feathers, designed by the students themselves, to cover the bird's chest and belly area.
- The feathers with the environmental messages should be placed on the outside of the wing so that the messages can be read.

Figure 12. Example of colored feather, with message

SUGGESTIONS

To make this activity more creative and add an exploratory component and connection to nature, you can make an exploration of the outer space of the school with the students, during which they look for traces of birds (feathers, nests, footprints, etc.). Even if they don't, they can collect natural elements that remind them of feathers, beaks and other parts of the bird, with which they can complement and embellish the poster of the bird they are building.

LINK TO CURRICULUM GOALS

Study Cycle	Content Areas	Contents	Apprenticeships
Pre-School Education	3. World Knowledge Area	- Knowledge of the physical and natural world	Understand and identify distinctive features of living things and recognize differences and similarities between animals and plants.

Study Cycle	Year	Area	Block	Contents
1st Cycle	1st, 2nd and 3rd year	Environmental Study	3 - Discovering the natural environment	- The Living Beings of Your Environment / Near Environment
			5 - Discovering materials and objects	- Handling objects in concrete situations
		Artistic and Physical-Motor Expressions	3 - Exploration of various techniques of expression	- Cutting, gluing, folding

BIBLIOGRAPHY

The Cornell Lab Bird Academy (2018). *All About Feathers – What feathers do?* Disponível em: https://academy.allaboutbirds.org/features/all-about-feathers/#what-feathers-do.php

RSPB - Royal Society for the Protection of Birds. *How do feathers work?* Disponível em: https://www.rspb.org.uk/birds-and-wildlife/natures-home-magazine/birds-and-wildlife-articles/how-do-birds-survive/adapted-for-flight/how-do-feathers-work/

ANNEXES

Annex 1. Feather Drawings

Annex 2. Bird silhouette (There are 3 PDF files, because the silhouette is in 3 different formats)

Activity 2: The Sounds of Birds

In spring, the fields and the cities are filled with sounds and colours from the birds that live there.

Birds emit sounds of various kinds, including social communication, mating calls and alarm sounds, among others, which vary according to the activity they are performing.

Singing is a sound characteristic of each species, thus allowing for the species identification. It is very useful to know the different songs because it allows the detection and identification of bird species that are elusive, difficult to observe or that have nocturnal habits.

Birds sing more during the breeding season, and the singing is used especially by the males to mark the territory.

Although all birds have vocalizations, the most characteristic and elaborate songs are found mainly in the group of birds (Order Passeriformes), so it is suggested that this activity is more directed to this group of birds. You can also explore the nocturnal birds' calls, as many children, especially from rural areas, can hear them singing at night.

In this activity, it is suggested that you explore some bird songs with the students, drawing their attention to the importance of sound in nature, and letting them know some bird vocalizations.

DID YOU KNOW THAT...

The territory is the area that a bird needs to satisfy its basic needs (in terms of food, shelter, etc.) and those of its young during the breeding season.

The defence of this area is therefore of extreme importance for the survival of the bird. The birds mark the territory by singing, which is why they sing profusely in spring and part of summer. The better the bird sings, the more guarantees they have to obtain a good territory, and consequently ensure food for the offspring, thus guaranteeing their offsprings survival. The male is generally the bird that you will hear singing!

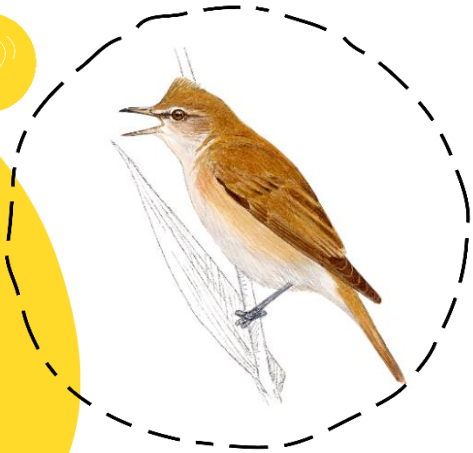


Figure 13. Great reed warbler, *Acrocephalus arundinaceus,* singing
(Juan Varela)

TYPE OF ACTIVITY: Game

TARGET AUDIENCE: 1st and 2nd Cycles

PLACE: Classroom

NUMBER OF SESSIONS: 1

DURATION: 1h30

PROPOSED DATE: Preferably in spring, because it is the time when the birds are more active and singing, because they are marking territories.

OBJECTIVES

- Learn the importance of singing in birds
- Learn to identify some species by their singing
- Raise students' awareness of the importance of sounds in nature

MATERIAL

- Computer with speakers and internet access
- Recorder or mobile phone with sound recording application
- Images of common birds in the region

DESCRIPTION

- Start the activity in the classroom with a first introduction to the common birds that can be observed in the region, making them known to students through their image and singing.
- On the website Aves de Portugal, on the tab "Where to Watch" (http://avesdeportugal.info/locais.html) you will find a list of the most common birds that can be observed by region, in mainland Portugal. This website allows you to have access to photos of the species and the song, most of them, so it is very useful to explore it with the students.
- Explain the importance of singing for birds (marking the territory) and the fact that they emit other vocalizations, such as alarm sounds, songs, sounds when the chicks are hungry and want to be fed, etc.
- Next, play a game with the students in which they try to match the sound of each bird with its image, so that they can practice what they learned initially.
- In a second phase, divide the students into groups.
- Each group chooses a bird, without the other groups knowing what it is, and one group at a time tries to imitate its song. The remaining students should guess which bird the group is imitating.
- The teacher can record the songs of each group and at the end compare them to the real sound of the bird in question.

SUGGESTIONS

You can also do an activity in the outside of the school space, in which students will be attentive to the calls of the birds that exist in the playground, trying to find some of the species they have learned to identify in class. To do this, ask them to close their eyes and be quiet, paying attention to all the sounds that surround them. At the end of a brief period, ask them how many different sounds they heard and whether they recognized any of the birds they heard in class. Even if they don't recognize it, which they probably do, it's okay. Explain that identifying birds by singing is a difficult task and requires extensive training. But being attentive to the sounds is already a good first step towards realising the diversity of birds that exist, even in a space as small as the school playground.

LINK TO CURRICULUM GOALS

Study Cycle	Year	Area	Block	Contents
1st Cycle	1st Year	Environmental Study	3. Discovering the natural environment	- The Living Beings of Your Environment - Identify colors, sounds and smells of nature
	2nd year	Environmental Study	3. Discovering the natural environment	- The Living Beings of Your Environment
	3rd year	Environmental Study	3. Discovering the natural environment	- The Living Beings of the Near Environment

Study Cycle	Domain	Subdomains	Objectives
2nd Cycle (5th year)	Diversity of Living Beings and Their Interactions with the Environment	Diversity in animals	7. Interpret the characteristics of organisms according to the environments in which they live 9. Understand the diversity of reproductive processes of animals

BIBLIOGRAPHY

Aves de Portugal - Portal dos Observadores de Aves (2008). Available at: http://avesdeportugal.info/

Xeno-Canto Foundation - Sharing the sounds of birds from all over the world (2005). Europe Available at: https://www.xeno-canto.org/collection/area/europe

Activity 3. Feathers and beaks, adaptations!

Within the Bird Class there is an enormous diversity of species, which are divided into large groups, with common characteristics between them: morphological adaptations, way of life, food, habitat, etc..

Through a game students will get to know better the characteristics of four large groups of birds: seabirds, waders, passerines and birds of prey, as well as some of the species belonging to these groups.

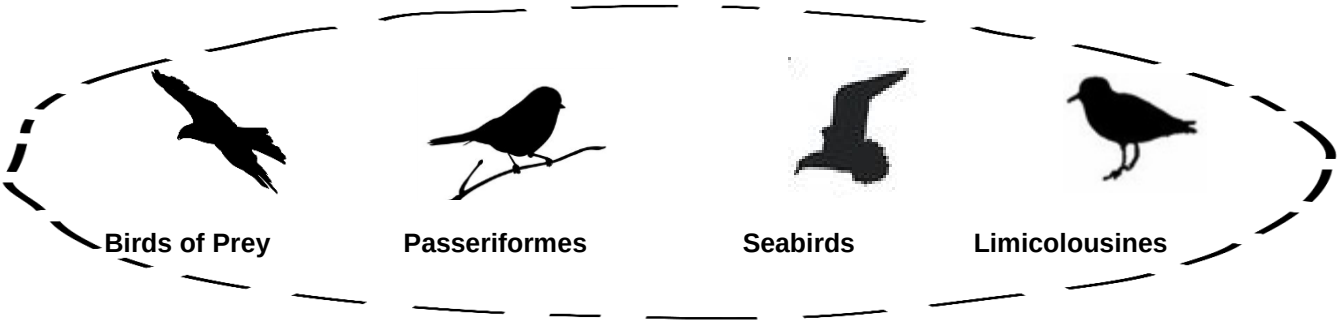


Figure 14. Some groups of Birds

TYPE OF ACTIVITY: Game

PÚBLICO-ALVO: 2nd Cycle (5th year)

LOCAL: Classroom

NO. SESSIONS: 1

DURATION: 1h00

PROPOSED DATE: All year round.

OBJECTIVES

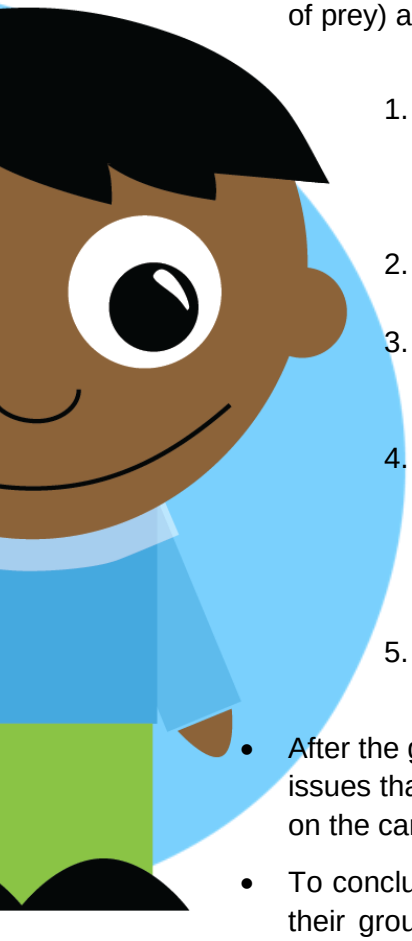
- Know the main characteristics of different groups of birds
- Identify morphological adaptations and different life forms of birds, relating them to their habitat.
- Fostering research and scientific knowledge

MATERIAL

- Computer with internet access
- Presentation "Groups of Birds and Main Characteristics" (Annex 3)
- Game Cards: "Feathers and beaks, adaptations aside!" (Annex 4)

DESCRIPTION

- In the first part of the activity, make a brief presentation on the 4 groups of birds included in this game: seabirds, waders, passerines and birds of prey, highlighting their main characteristics, feeding habits and morphological adaptations, based on the presentation found in Annex 3.
- In the second part of the activity, play "Feathers and beaks, adaptations aside" with your students.
- Prior to the game, print the "Feathers and beak, adaptations on the side" (side A - front and side B - back) cards (Appendix 4), placing them on a table with side A facing up, so that it is not possible for students to see the information on side B (you can use a hard card to print the cards or to glue the two sides of each card);
- Divide the class into four groups, each corresponding to one of the groups of birds in the game (group 1: seabirds; group 2: passerines; group 3: waders and group 4: birds of prey) and explain how the game works:



1. To encourage research, in addition to the presentation, each team can research the main characteristics of the birds that belong to their group for 10 minutes (see recommended sites at the end of this activity (Bibliography). Only then does the game begin;
2. A member of group 1 must select a card with a characteristic that corresponds to the birds in his group, in this case seabirds;
3. A group 2 element must select a card with a characteristic corresponding to the passerines, and so on. The removed cards should stay with the students until the end of the game;
4. When removing a card, the student should read aloud the text written on the back of the card, which will indicate whether he or she has chosen it correctly (i.e. whether he or she has chosen a card corresponding to their group of birds) and what the advantage of adapting it is. If you hit, keep the card, if you make a mistake, the card is out of the game;
5. The team that selects the most cards with correct adaptations, corresponding to their group, wins.

- After the game, promote a small discussion among the students about the doubts and issues that arose during the game, talking with them about the information they found on the cards.
- To conclude the activity, each team should briefly explain the main characteristics of their group, using the information on the cards and giving examples of species of birds belonging to that group.

LINK TO CURRICULUM GOALS

Study Cycle	Domain	Subdomains	Objectives
2nd Cycle (5th year)	Diversity of Living Beings and Their Interactions with the Environment	Diversity in animals	7 Interpret the characteristics of organisms according to the environments in which they live 8. Understand the diversity of diets of animals taking into account their habitat 9. Understand the diversity of reproductive processes of animals

BIBLIOGRAPHY

Meirinho A, Barros N, Oliveira N, Catry P, Lecoq M, Paiva V, Geraldes P, Granadeiro JP, Ramírez, I & Andrade, J. (2014). *Atlas of Portuguese Seabirds*. Lisbon: Portuguese Society for the Study of Birds. Available at: http://www.atlasavesmarinhas.pt/

Environmental Education at A Rocha (2013, 16 May). *Waders.* Available at: http://educacaoambientalnarocha.blogspot.com/2013/05/limicolas.html

Environmental Education at A Rocha (2013, 9 July). *Seabirds.* Available at: http://educacaoambientalnarocha.blogspot.com/2013/07/aves-marinhas.html

Environmental Education at A Rocha (2013, 7 October). *Diurnal birds of prey I.* Available at: http://educacaoambientalnarocha.blogspot.com/2013/10/aves-rapinas.html

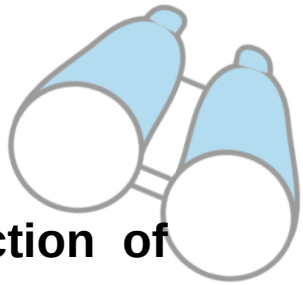
Environmental Education at A Rocha (2013, 22 May). *Night raptors.* Available at : http://educacaoambientalnarocha.blogspot.com/2013/05/rapinas-noturnas.html

Environmental Education at A Rocha (2013, 22 May). *Adaptation of Birds III - the legs and legs.* Available at: http://educacaoambientalnarocha.blogspot.com/2016/11/adaptacao-das-aves-iii-pernas-e-patas.html

Environmental Education at A Rocha (2013, 25 November). *A to Z - Characteristics of birds.* Available at: http://educacaoambientalnarocha.blogspot.com/2016/11/a-z-carateristicas-das-aves.html

ANNEXES

Annex 3. Presentation "Groups of Birds and Main Characteristics"
Annex 4. Game Cards: "Feathers and beaks, adaptations aside!" (with solutions)



Activity 4. birds from my school: Construction of feeders

Bird feeders can be useful in helping some species survive at times of the year when food is scarce in nature, for example during winter. This situation is most evident in northern European countries, where many regions are covered in snow in autumn and winter, which greatly affects the food available for birds.

In our country the winters are milder so birds almost always have food available all year round. However, the construction of a feeder can be a good recreational activity that, in addition to helping birds, allows students to increase their knowledge of the most common species in their region and have greater contact with them.

The use of feeding troughs also enhances the observation of bird species in the school playground and the responsibility and involvement of the participants in their conservation, thus being a good tool for the practice of Environmental Education.

TYPE OF ACTIVITY: Construction

TARGET AUDIENCE: 1st and 2nd Cycles

VENUE: Classroom and Outer School Space

NUMBER OF SESSIONS: 2

DURATION: Construction and placement of the feeder - 1h00| Observation sessions of the feeder - 15 minutes.

PROPOSED DATE: autumn and winter

OBJECTIVES

- Getting to know the school's birds
- Foster interest in bird watching in students and teachers
- Create simple feeder models that can be replicated by students in their homes
- Promote the protection of animal biodiversity
- Promote the reuse of materials

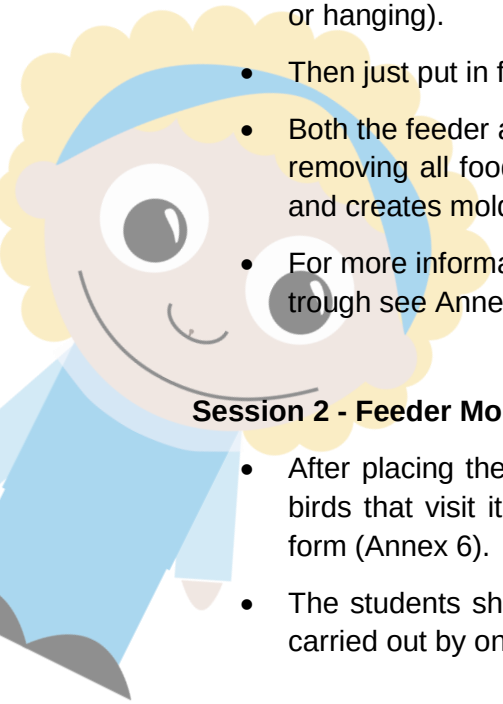
MATERIAL

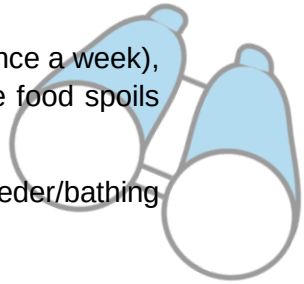
- Milk Packs
- Strong cord
- Scissors or X-ato
- Oranges, thick needle and wool yarn
- Poultry feeders: construction and maintenance (Annex 5)
- Feeder monitoring data sheet (Annex 6)
- Food suitable for birds (see Annex 5)

DESCRIPTION

Session 1 - Construction and placement of the feeder

- Before carrying out the activity, it is recommended to make an introduction on the most common birds that can be observed in the region and that use feeders. To do so, consult the bibliography recommended in this activity.
- Then start building the feeder with the students. In Annex 5 you will find indications on the construction of two types of feeders, one made with reused material (tetra-pack boxes) and the other with organic materials (oranges). However, you will find many different ideas on the internet that you can also build with your students.
- Each student must build his own feeder.
- Demonstrate the construction of the feeder step by step, as each student builds his own. In the end, they can personalise it, decorating it with leaves, trunks, string and other elements, in order to give it a more natural look, so that it is camoflaged with the environment where it will be placed.
- Two or three more feeding troughs should be built for the school playground.
- After construction, place the feeder in the school playground with the students.
- The feeder must be placed in a visible area where the structure can be seen, cleaned and fed. It is preferable to place it in trees that are in less frequented areas of the school playground, always ensuring that it is out of reach of possible predators that can attack the birds that visit it.
- It is suggested that a drinker for the birds should also be placed near the feeders. Some birds love to drink water and sometimes in cities they do not have access to places where they can do so, especially in summer. In this case, just put a bowl of clay or other material (as long as it is not too light not to fly off or be moved by the wind), also in a place high and inaccessible to predators (such as the branch of a tree or hanging).
- Then just put in food and water and wait for the birds to visit!
- Both the feeder and the drinker should be cleaned regularly (preferably once a week), removing all food remains and washing (only with water), because if the food spoils and creates mold it can be harmful to the birds.
- For more information on suitable feed for birds and maintenance of the feeder/bathing trough see Annex 5 and the bibliography sites.





Session 2 - Feeder Monitoring

- After placing the feeder in the school, carry out a first session of observation of the birds that visit it with their students, demonstrating how to complete the monitoring form (Annex 6).
- The students should be divided into small groups and the observation of the feeder carried out by one group at a time, so as not to scare away the birds that use it.

- Before beginning observations, it is important to explain to students how to proceed:
    - Make observations from a place relatively far away from the feeder, so as not to disturb or frighten off the birds;
    - Stay silent, so they can make their observations;
    - Use binoculars, if possible;
    - Conduct observation periods of 10 to 15 minutes and write down everything you observe on the feeder's monitoring form;
    - Try to identify the species with the support of a bird guide.

Figure 15. Poultry feeder (Alicia Salido)

- After this first session, make others with your students on a weekly or fortnightly basis, and at different times of the day to analyze the differences.
- A new monitoring form shall be completed for each observation period.
- For the identification of the observed bird species, we suggest the use of the guides indicated in the bibliography and the consultation of the website Aves de Portugal (http://avesdeportugal.info/index.html), where you can find information on numerous species including descriptions, photographs and places where they occur.
- In addition to recording the species observed on the monitoring form, additional work can be carried out such as bird drawing, photographic recording, among others.
- At the end, students can do a work on the species that visit the feeder, gathering the data collected in various sessions and treating them mathematically, or making graphs of occurrence of each species, the number of species, abundance, etc.. This analysis will allow conclusions to be drawn on the number of birds at each time of day, the diversity of species over time, preferred bird food, etc.

RECOMMENDATIONS

Feeding troughs can be used during the autumn, the time of year that coincides with the time of migration of the birds and when they need to accumulate fat to be able to make this long trip, and winter, because the availability of food in nature is lower. However, its use should be avoided in spring and summer, since at that time there is a greater abundance of natural foods. On the other hand, many young birds, which are born in spring, should preferably be fed with insects for the sake of their health and good development, so the provision of other food can be harmful to them. Drinking troughs can be used all year round, but are especially useful in summer.

LINK TO CURRICULUM TARGETS

Study Cycle	Year	Area	Block	Contents
1st Cycle	1st, 2nd and 3rd year	Environmental Study	3 - Discovering the natural environment	- The Living Beings of Your Environment / Near Environment
			5 - Discovering materials and objects	- Handling objects in complex situations
		Artistic and Physical-Motor Expressions	3 - Exploration of various techniques of expression	- Cutting, gluing, folding

Study Cycle	Domain	Subdomains	Objectives
2nd Cycle (5th year)	Diversity of Living Beings and Their Interactions with the Environment	Diversity in animals	7. Interpret the characteristics of organisms according to the environments in which they live 8. Understand the diversity of diets of animals taking into account their habitat 11. Understand the importance of protecting animal biodiversity

BIBLIOGRAPHY

Catry, P. & Campos, A. R. (2010). *Guia das Aves Comuns de Portugal* (2nd edition). Lisbon: Portuguese Society for the Study of Birds.

Costa, H., de Juana, E. Varela, J. (2011). *Birds of Portugal. Including the archipelagos of the Azores, Madeira and the Selvagens*. Barcelona: Lynx Editions.

Aves de Portugal - Portal dos Observadores de Aves (2008). Available at: http://avesdeportugal.info/

Spring Alive (2010). *Feed the birds in times of food shortage.* Available at: http://www.springalive.net/pt-pt/springalive/feeding-birds-25

ANNEXES

Annex 5. Poultry feeders: construction and maintenance.
Annex 6. Monitoring sheet for a bird feeder.

Activity 5: Nest Box Construction

The construction of nest boxes aims to provide a greater number of nesting sites for birds that nest in cavities. In nature, these birds use natural cavities, for example, in trees. However, these cavities occur mainly in old trees and usually with thick trunks, which due to management practices that promote their frequent felling, are currently scarce in cities and even in villages and some natural habitats.

Thus, for these species, the construction and placement of nest boxes allows to increase their nesting possibilities.

In addition to being an advantage for birds, the placement of nest boxes is also beneficial for humans because, by increasing the availability of nesting sites, increases the number of species and individuals that exist in a given location. Birds consume large amounts of insects, especially during the breeding season - one bird can consume 2.5kg of insects per year - helping to control the pests that cause so much damage.

Through this activity, students will not only be able to develop their manual skills, learning how to build nest boxes, but also learn a little more about the school's birds, contributing to their conservation.

TYPE OF ACTIVITY: Being a Builder - Project

TARGET AUDIENCE: 2nd and 3rd Cycles

VENUE: Classroom and Outer School Space

NO. OF SESSIONS: 3 (Construction of nest boxes; Placement of nest boxes; Cleaning and Monitoring of nest boxes)

DURATION: Construction of nest boxes - 2h00; Placement of nest boxes - 1h00.

PROPOSED DATE FOR REALIZATION: Autumn. The nest boxes should be placed in the autumn so that the birds can get used to them and start using them in the spring.

OBJECTIVES

- To introduce some of the school's birds, which nest in cavities
- Increase the number of nesting sites available for school birds
- Contribute to the conservation of birds and understand their important ecological role
- Promote the protection of biodiversity

MATERIAL

- Brochure "How to make a nest box?" (Annex 7)
- Wooden board (120 x 15 cm, preferably 15mm thick), nails, piece of rubber for hinges;
- Tools: saw, drill, circular saw, hammer
- Ruler or tape measure, square, charcoal pencil
- Stepladder
- Wire, rubber, twine or other (see Annex 7)

DESCRIPTION

- Before carrying out the activity, explain to students the importance of nest boxes for the conservation of wild birds, since they increase the availability of nesting sites in cities, where there are not always natural cavities.

- Also let the students know the species for which the nest box they are going to build is intended and suggest that they do some research on the Internet about these species: tits, sparrows, etc.

- You can also explore with them the theme of different nesting sites, explaining why some species of birds that occur at school never use this type of nest box, since they do not nest in cavities.

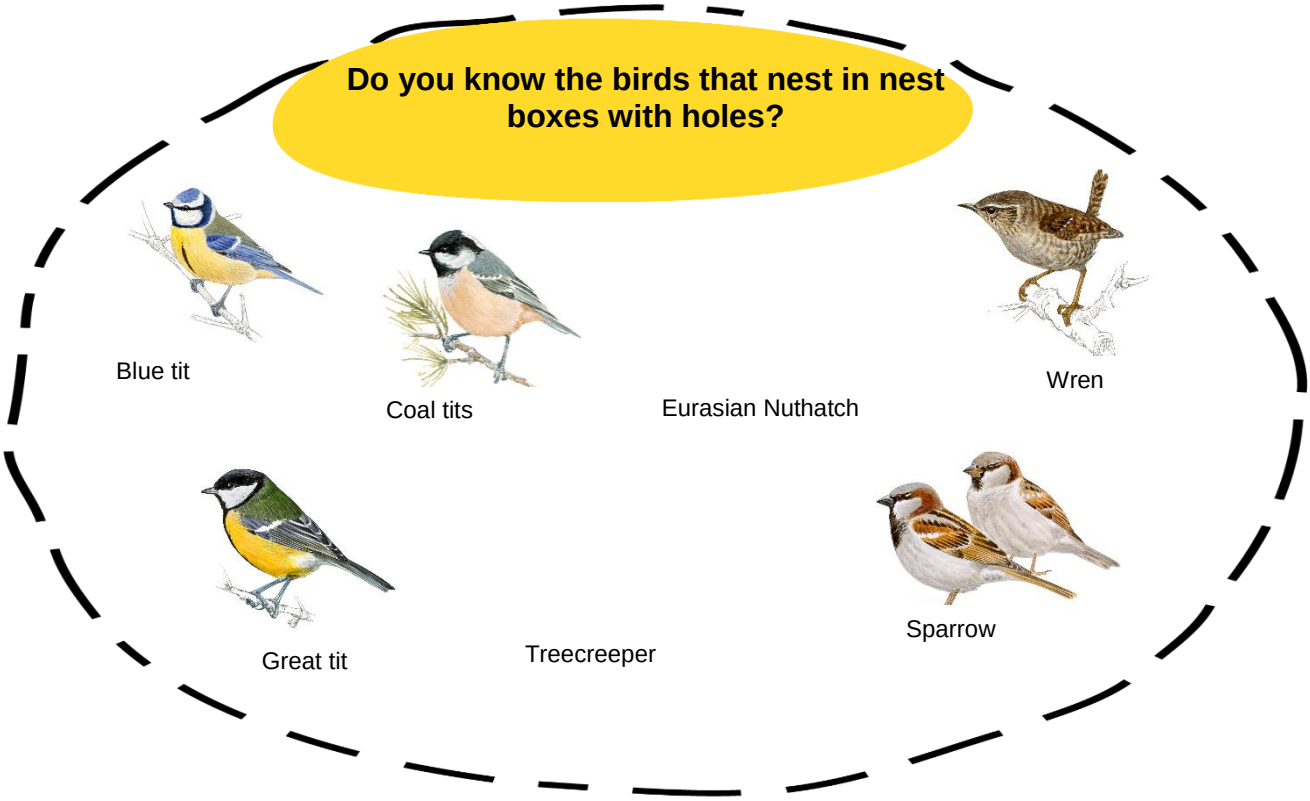


Figure 16. Birds that nest in nest boxes with holes (Illustrations Juan varela)

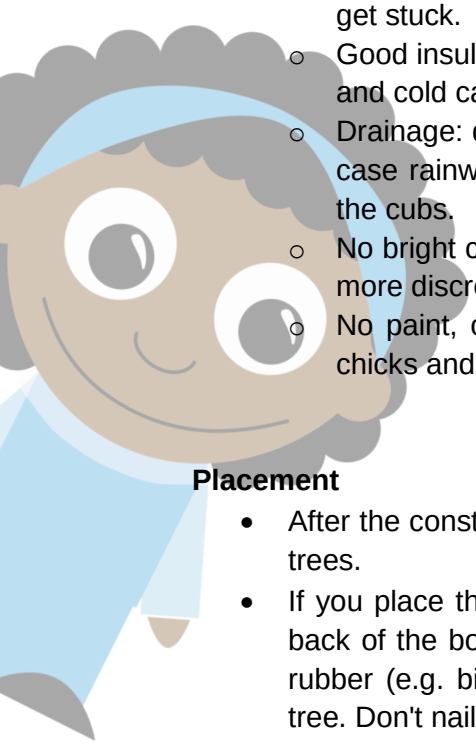
Construction

- Then start building the nest box with the students (see procedure in Annex 7). In annex 7 we give indications for the construction of a nest box type, but other models can be constructed. You will find several models of nest boxes on the internet and in the recommended bibliography at the end of this activity, for various species of birds including swallows, owls, etc.
- The nest box should be built with the support of a technological education teacher and in the classroom, since its construction requires the use of tools and consequently, some care must be taken.
- Depending on the age of the students and the time available to build the nest box, you can choose to have the wooden planks pre-cut to the right dimensions before starting the activity.

- In the construction of the nest box, attention should be paid to several aspects, in particular:
  - Size of the entrance hole: The size of the entrance hole conditions the type of species that can occupy the nest box. Annex 7 shows the correspondence between different hole sizes and the species using them. If you build a larger hole it is most likely that the nest box will only be used by sparrows which are a more general species, and smaller birds will be excluded. Therefore, if you want to ensure that the box is used by other species, it is advisable to reduce the size of the entrance hole. If you build several nest boxes to put in school, it will be

interesting to have several sizes of holes to compare your occupation.

- Resistance: it is advisable to use a wood that is not very thin, so that the birds do not die of cold or heat. Thicker wood is also stronger and more resistant and will not be easily destroyed by rain or sun.
- Safety: the nails or screws must be well placed so that the box does not run the risk of being disassembled while it is being used by the birds. You should confirm that there are no protruding nails, sharp corners or cracks where the birds may get stuck.
- Good insulation: it is important not to leave cracks between the woods so that rain and cold cannot enter.
- Drainage: drill a small hole in the base of the nest box, which serves as a drain, in case rainwater enters the inside of it, it does not flood and does not harm or kill the cubs.
- No bright colors: a good nest box should not attract the attention of predators; the more discreet, the better.
- No paint, or at least no synthetic paint, whose smell can be toxic to the young chicks and keep birds away.



Placement

- After the construction of the nest boxes, place them outside the school, preferably on trees.
- If you place the box on a tree trunk, simply make two holes in the upper and lower back of the box, through which a string or wire can pass. If you use wire, wrap it in rubber (e.g. bicycle air chamber or other rubber residue) so as not to damage the tree. Don't nail the nest box to the tree, it will damage the tree.
- The cover of the nest box should have a small hook on the side so that it can be secured by keeping it closed. This is to prevent it from opening in windy or other situations, which would be extremely damaging to birds, especially with young or eggs.
- There are other ways to place the nest box, for example by hanging it on a horizontal trunk with a hook. For more information consult the website https://www.seo.org/2018/03/13/mesdelosnidos-el-reto-de-construir-una-casa-en-el-jardin-2/ and others found in the bibliography.
- When placing the nest box, it is important to pay attention to several aspects, which are listed below.

Some care to be taken in the placement of the nest boxes:

- They should not be placed in a place that is too hot or too cold to guarantee the success of the litter;
- They should be placed as far away from the wind as possible;
- Preferably, place in a relatively sheltered place from rain, to protect the nest box and the birds that use it;
- They must be in the shade;
- Place in a quiet place (not crowded) in the school;
- In our region, it is preferable to place the nest boxes with NE or SE orientation, so that they do not get too much sun or wind.
- They shall be inaccessible to cats and other predators (rats and small carnivores). Therefore, it is preferable to be placed at a height of more than 3 metres.
- Birds prefer if the nest box has a perch at or near the entrance, as they can land there first before entering.
- The nest boxes should be placed between 75-100 m from each other, preferably, since most of the birds that occupy them are territorial during the nesting season.

Figure 17. Nest box with perch (SPEA)

- If several nest boxes are placed in the school it is important to give them a number or code and write down for each one: place where it was placed (tree, wall, etc.), tree species (if applicable), orientation (N, S, E, O), height in relation to the ground, etc. In this way, they will keep a record of each nest box placed and will be able to identify it later.

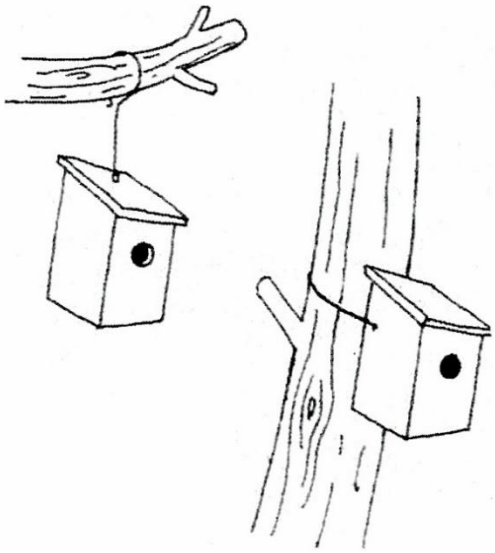


Figure 18. Placement of nest boxes (Juan Varela)

Cleaning and maintenance

- Nest boxes should be cleaned every year, preferably in winter, between October and January, when they are certainly not being occupied.
- Cleaning is important, because inside the nest boxes garbage (remains of previous nests, dead birds, remains of eggs, etc.) can accumulate where parasites can develop (e.g. mites), which could harm the litters that come to settle there.
- For this reason, they should always have a part that can be opened (usually the roof) to allow cleaning.
- The nest box should never be visited during the breeding season, because even if you don't see birds coming in and out, it may be busy and a visit to it at that time causes a great disturbance to the birds.
- The cleaning of the nest boxes also serves to confirm whether or not they have been occupied. If there are traces of nests, egg shells, eggs that have not hatched or others, we can at least know that the boxes have been occupied and the following year, be more attentive at the beginning of spring, to try to understand if there is a new occupation.
- For a deeper cleaning of the nest box, hot water can be used, but never detergents or other such products, as they can be toxic to birds. If the box is cleaned with water, it should be removed from the tree and left to dry open and then put back on again.

Nest Box Monitoring

- After placing the nest boxes, observation periods can be done with the students to try to understand if there are movements in and out of the box, in order to understand if it is being used by the birds.
- Observations should always be made at a certain distance from the nest box so as not to disturb birds that may be using it.
- If you can see a bird entering and leaving, the date and, if possible, the observed species should be noted (for species identification see guides referred to in the

bibliography of the initial chapter 'Birds: Characteristics and Identification').

- If the nest box is occupied, periods of observation can be made, preferably early in the morning or late in the afternoon, which is when the birds are more active and feeding their young.
- If the nest boxes are placed for a year or more in the school, you can do a job with your students based on the monitoring and cleaning visits to each nest box and the observations that the students make during them.
- It may be interesting to compile the information collected in an Excel file, in which you can write down the visits made to each nest box, the date and time and what was observed, so that at the end you can analyze what happened in different seasons of the year, if there were changes in the occupation of the nest box from one year to the next, if the box was occupied and there was predation, etc.. This allows not only a study to be carried out on the occupancy rate of nest boxes placed in the school, but also changes to their placement, for example, if deemed necessary.

RECOMMENDATIONS

The nest boxes should be placed in the autumn so that the birds can get used to them and start using them the following spring.

If the nest box is not occupied in the year it was placed, it should not be immediately removed from the site, because sometimes the birds take some time to adapt to that object and consider it useful for nesting. On the other hand, the nest box may not be occupied as a nest, but may serve as a refuge for birds in adverse conditions or at night. In this case, it should not be removed, as it is still useful for the birds.

LINK TO CURRICULUM TARGETS

Study Cycle	Year	Area	Block	Contents
1st Cycle	1st, 2nd and 3rd year	Environmental Study	3 - Discovering the natural environment	- The Living Beings of the Near Environment
			5 - Discovering materials and objects	- Handling objects in complex situations
		Artistic and Physical-Motor Expressions	1- Discovery and Progressive Organization of Volumes	- Construction

Study Cycle	Domain	Subdomains	Objectives

2nd Cycle (5th year)	Diversity of Living Beings and Their Interactions with the Environment	Diversity in animals	7. Interpret the characteristics of organisms according to the environments in which they live 8. Understand the diversity of diets of animals taking into account their habitat 11. Understand the importance of protecting animal biodiversity

BIBLIOGRAPHY

Geraldes, H. (2016). The 10 things to know to install ideal nest boxes. *Wilder*. Available at: https://www.wilder.pt/seja-um-naturalista/as-10-coisas-a-saber-para-instalar-caixas-ninho-ideais/

GN Environment & Environmental Volunteering. (s.d.) *Guide for the manufacture and placement of nest boxes*. Available at: http://www.advecologica.org/wp-content/uploads/2011/05/Gu%C3%ADa-fabricaci%C3%B3n-Cajas-Nido.pdf

Noblet, J.F. (1996). *The nest house. Shelters for wildlife in our home.* Porto: FAPAS - Fundo para a Proteção dos Animais Selvagens.

SEO BirdLife. (s.d.) *#Mesdelosnidos: the challenge of building a house in the garden*. Available at: https://www.seo.org/2018/03/13/mesdelosnidos-el-reto-de-construir-una-casa-en-el-jardin-2/

BirdLife SEO. (n.d.) *#Mesdelosnidos: how to care for and maintain a nidus chamber*. Available at: https://www.seo.org/2018/03/28/mesdelosnidos-cuidados-y-mantenimiento-de-la-caja-nido/

Spring Alive (2010). *Nest boxes*. Available at: http://www.springalive.net/pt-pt/springalive/nest-boxes-25

ANNEXES

Annex 7. Brochure "How to make a nest box?"

SEABIRDS

Seabirds are fully adapted to the marine environment, which is their habitat and source of food.

These birds are divided into coastal seabirds, which are usually found near the continents, and oceanic or pelagic seabirds, which live practically all their lives on the high seas, coming ashore only to nest.

Seabirds have a number of adaptations to life at sea, which include more feathers than land birds; long, narrow and flexible wings; salt excretory glands; and interdigital membrane legs. They also have a specific type of flight, because they generally move by sliding over the waves, following the wind. This way they can fly long distances without wasting too much energy.

They feed on fish, crustaceans and cephalopods, exploring bioluminescent prey, because they have nocturnal activity.

Due to all their particularities and way of life, and because they are closely associated with islands and islets, these birds are subject to a number of specific threats, which include light pollution, predation by introduced species (cats and rats, for example), and aspects related to fishing activity such as intensive fishing (which affects them indirectly by reducing their preferential prey - fish) and bycatch (incidental capture of birds and other marine animals in fishing gear).

This chapter on Seabirds includes the various regions of the country where SPEA works for the conservation of these birds and their habitats - Azores, Madeira and Berlengas - proposing an activity for each of them, which will lead students and teachers to discover a little more about these species and their threat factors.

This chapter also includes a proposal for a field trip, on our Portuguese mainland coast, to help students discover the biodiversity of coastal habitats - rocky and sandy beaches - and their importance not only for birds, but also for the entire community of fauna and flora that populates them.

General Bibliography on Seabirds

Meirinho A, Barros N, Oliveira N , Catry P, Lecoq M, Paiva V, Geraldes P, Granadeiro JP, Ramírez, I & Andrade, J (2014). *Atlas of Portuguese Seabirds.* Portuguese Society for the Study of Birds. Available at: http://www.atlasavesmarinhas.pt

Silva, A.L., Ferreira, B.P., Alves, F. Silva, J. V. (n.d.). *LIFE+ MARPRO, Conservation of Marine Protected Species in Continental Portugal - Pedagogical Dossier*. Available at: http://www.spea.pt/fotos/editor2/8_teacher_studentdossier.pdf

SEABIRDS OF THE AZORES AND MADEIRA

Seabirds of the *Procellariformes** order, spend all day at sea and only visit the colony at night, orienting themselves by the stars. Some of these birds feed on bioluminescent prey, so they tend to be attracted by artificial lights.

*Did you know ***Procella*** means storm in Latin?

Light pollution is poorly recognized by most citizens, but if street lighting is too intense or poorly targeted it can have a major impact on these species of birds.

One of the reasons why this happens is that the lighting of streets and cities often ends up "hiding" the stars, causing the disorientation of seabirds, which end up being dazzled by the light and may collide with infrastructure. These collisions are sometimes fatal, resulting in the death of the bird, or may cause serious injury. Some birds may also fall to the ground, becoming disoriented and vulnerable to predation (by dogs and cats), road kill, hunger, dehydration and illegal capture. This situation is particularly relevant in colonies located close to urban centres.

There are some projects aimed at reducing the impact of light pollution on seabirds, such as the LuMinAves project, which works with the populations of Procellariiformes in the Macaronesian region of the Azores, Madeira and the Canary Islands. This project focuses on the conservation of seabird species threatened at regional, national and international scales, and also the nests on the islands and islets of the three archipelagos. Conservation efforts are aimed at both areas protected by the Natura 2000 Network and areas that need additional protection, namely tourist, residential or industrial centres with the greatest impact from light pollution. This project aims to assess the conservation status of seabirds, improve the system for the rescue and recovery of birds disoriented by the effects of light pollution and reduce the impact of light pollution on birds.

There is also the SOS Cagarro Campaign, promoted every year by the Government of the Azores since 1995, which aims to alert the Azorean population to the need to preserve this protected species (the *Calonectris borealis* shearwater) that nests in the Azores, with the main objective of involving the populations and entities in the rescue of the juvenile shearwater found along the roads and in their proximity (http://www.azores.gov.pt/Gra/dram-soscagarro/menus/principal/campanha/).

In Madeira, every year SPEA promotes the Save a Marine Bird Campaign which also aims to alert the population to the problem of light pollution, to the conservation of marine birds that nest in the archipelago and to organise patrol brigades to collect stranded birds (http://salvar-avemarinha.blogspot.com/p/campanha.html).

Luminous pollution is any adverse effect of artificial light, including the brightness of the sky skyglow - orange glow seen in urban areas, caused by light that is directed upwards, is refracted and scattered by particles of the atmosphere, thus reducing the visibility of the night sky.

Activity 6: Azores: Seabirds and light pollution

This activity aims to raise awareness among students and the entire school community about light pollution. It is also intended to increase the publics participation and in turn to reduce light pollution, in the area surrounding their school or area of residence. Thus contributing to the conservation of the species that are affected by this type of pollution, namely the Cagarro.

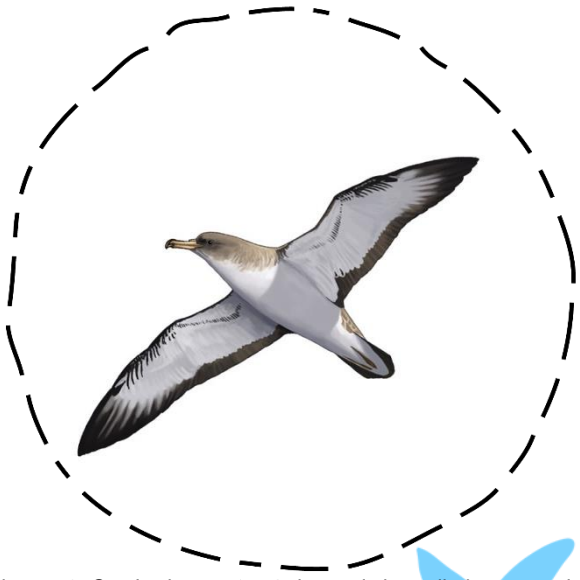


Figure 19. Cory's shearwater *Calonectris borealis* (Juan Varela)

TYPE OF ACTIVITY: Investigate | Project

TARGET AUDIENCE: 3rd Cycle (8th year)

VENUE: Classroom | School | Street or area around the school or house.

NUMBER OF SESSIONS: 1

DURATION: 1h00

PROPOSED DATE: Any period but preferably between October and November, the period in which the SOS Cagarro Campaign is carried out, due to the fall of youngsters dazzled by leaving the nest.

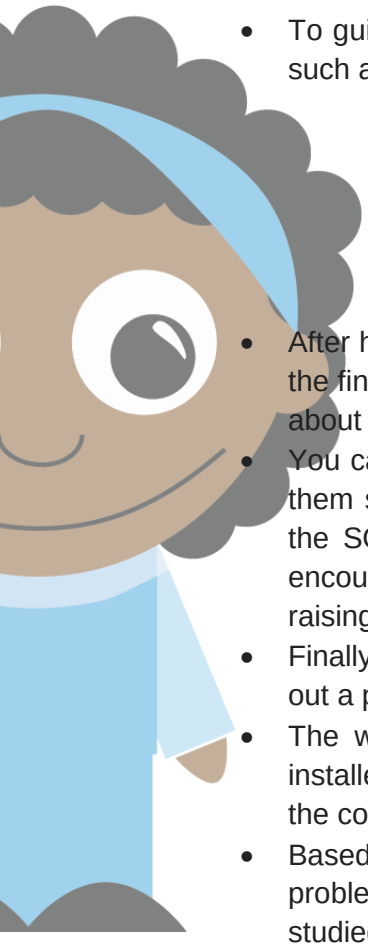
OBJECTIVES

- To make known the impacts of light pollution on seabird populations and how to mitigate this threat.
- To publicize nesting seabirds in the Azores
- Create a project to minimize the impacts of light pollution on seabirds

MATERIALS

- Computer with internet access and data-show
- Presentation "Seabirds of the Azores" (Annex 8)
- Materials for carrying out the project

DESCRIPTION



- Make a presentation about the seabirds of the Azores, to make these species known to students, highlighting their main characteristics (use the presentation in Annex 8).
- In this presentation you will find the various species of nesting seabirds in the Azores, their main characteristics and respective threat status. The presentation also includes general characteristics of seabirds, groups affected by light pollution and an explanation of the problem and how it affects birds.
- Before addressing the theme of light pollution, ask students to research it (through the websites in the bibliography).
- To guide students' research, you may want to ask them some questions to answer, such as:
    - What type of lighting is most harmful to seabirds?
    - Which species are most affected by light pollution?
    - What projects exist to minimize this problem?
    - What entities are working to resolve this situation?
    - What can we do to help?

- After having carried out the research and in order to systematize the information, use the final part of the presentation on seabirds in the Azores (Annex 8) that talks a little about the problem of light pollution and how it affects these birds.
- You can also research with them the websites referred to in the bibliography, giving them some projects that are already underway to try to solve this problem, namely the SOS Cagarro Campaign, which occurs every year in the Azores. If possible, encourage students to participate in some way in this campaign, even if only by raising awareness of the rest of the school community.
- Finally, focusing on the solutions we can find, propose to the students that they carry out a project work on the public lighting of their street/city.
- The work will consist of signalling the lights in your street/city that are correctly installed and have the right shape so as not to harm the seabirds and those that, on the contrary, are badly placed and can harm these birds.
- Based on this survey, students should do a final work in which they present this problem, explaining the threats that arise to birds, exposing the situation of the area studied and suggesting solutions. The work can be on any medium, can be exposed and presented at school, in order to raise awareness of the entire school community to this issue. For this presentation, some people from entities that are involved in the management/maintenance of public lighting may be invited, thus drawing their attention to this theme.
- At the end, propose to the students that they deliver the project to the competent authorities or present it to the Municipal Assembly, proposing concrete changes in public lighting and other measures to minimize impacts on seabirds.
- Whatever the result, the goal is to encourage students to intervene in the local community, participating through a proposal for concrete action for the conservation of birds and their habitats.

LINK TO CURRICULUM GOALS

Study Cycle	Domain	Subdomains	Objectives
3rd Cycle (8th year)	Sustainability on Earth	Ecosystems	5. Analyze the existing dynamics of interaction between living beings and the environment 12. Synthesize ecosystem protection measures

BIBLIOGRAPHY

Almeida, G. (2010). *Luminous pollution: the useless waste of energy resources*. Physics and Society. v.35, p.20-22.

Gaston, K. J. *et al*. (2014). *Benefits and costs of artificial night time lighting of the environment.* Environ. Rev., v.22, n.1.

Meirinho, A, Pitta Groz, M, Silva, A G, & Bolton, M. (2003). *Proposal for a Management Plan for the Special Protection Zone Ilhéu da Vila.* Horta: Department of Oceanography and Fisheries of the University of the Azores.

Government of the Azores (2004-2018) *S.O.S. Cagarro* Project. Available at: http://www.azores.gov.pt/gra/dram-soscagarro

IDA - International Dark-Sky Association (s.d.) *Light pollution effects on Wildlife and Ecosystems*. Disponível em: http://darksky.org/light-pollution/wildlife/

LIFE Corvo - Marine Birds Sanctuary Islands (n.d.). Available at: http://life-corvo.spea.pt/pt/

LuMinAves - Light pollution and conservation in the Macaronesian archipelagos: reducing the harmful effects of artificial light on seabird populations (2018). Available at: http://www.luminaves.com/index.php/es/

SPEA Azores. Available at: http://speaacores.blogspot.com/

ANNEXES

Annex 8. Presentation: Azores Seabirds

Activity 7: Discover Madeira Seabirds

Through a game, the aim is to introduce students to the seabirds of the Madeira Archipelago, as well as some of the main threats to their conservation.

Figure 20. Wood nun (*Pterodroma wood*), Madeira endemic bird (Juan Varela)

TYPE OF ACTIVITY: Game

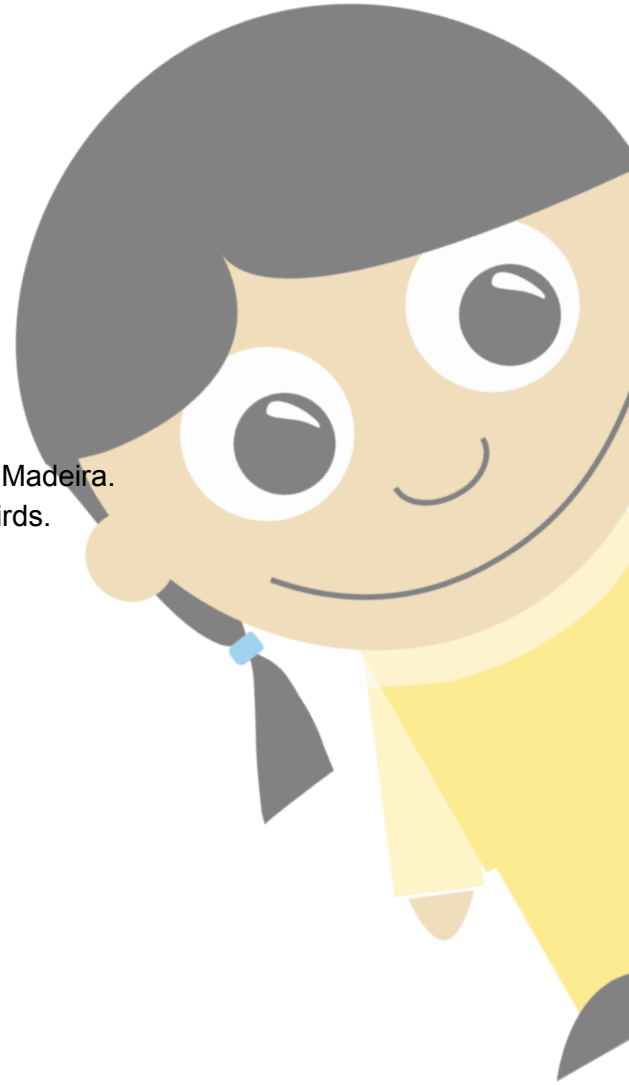
TARGET AUDIENCE: 2nd and 3rd Cycles

PLACE: Classroom

NUMBER OF SESSIONS: 1

DURATION: 1h30

PROPOSED DATE: All year round



OBJECTIVES

- To know the different species of nesting seabirds in Madeira.
- Learn a little about the ecology and feeding of seabirds.
- Identify the main threats to these birds.

MATERIAL

- Presentation "Madeira seabirds" (Annex 9)
- Computer and data-show
- Game Board (Appendix 10)
- Question Cards (Annex 11)
- Game Instructions and Solutions (Appendix 12)
- Data
- Scissors

DESCRIPTION

Before starting the game, give a presentation on the seabirds nesting in Madeira, talking about their characteristics and ecology, as well as the threats that these species face. Use the attached presentation on these birds for this purpose (Annex 9).

This introduction is important as it will provide students with the information they need to get the game done.

Then move on to the board game.

- To play the game follow these steps:

1. Print the game board, preferably in A3, to make it easier for everyone to play simultaneously (Appendix 10). To make it stronger and more durable, glue it to a piece of cardboard.
2. Divide the group into 4 teams with the same number of players. Each team will be represented by one piece which will be its counter. Students should cut out the pieces of the game, which are in Appendix 11, and stick them on a card to make them stronger.
3. Print and cut out the question cards, with the help of the students, and place them face down on a pile (Appendix 11 - Question Cards). To make the cards stronger, you can glue them onto cardboard or cardboard.
4. Get a dice.
5. Then the game itself begins. The four teams throw the dice and the team that gets the highest number starts the game.
6. Each team must roll the dice in turn to know the number of squares to advance.
7. To proceed, the team must correctly answer one of the questions on the cards. The response should be discussed among all team members. If the team gets the question right, it can advance, if it doesn't get it right, it will stay in the same place. The teacher will validate the answer (see Instructions and Solutions - Appendix 12).
8. To find out what happens in the special boxes (drawings), follow the instruction sheet (Appendix 12).
9. The game ends when one of the teams reaches the 60th House ("The Ocean").

At the end of the game, you can clarify any doubts that may have arisen during the game by using the attached presentation or through research on the Internet about the species and their conservation problems.

LINK TO CURRICULUM GOALS

Study Cycle	Domain	Subdomains	Objectives
2nd Cycle (5th year)	Diversity of Living Beings and Their Interactions with the Environment	Diversity in animals	7. Interpret the characteristics of organisms according to the environments in which they live 8. Understand the diversity of diets of animals taking into account their habitat 9. Understand the diversity of reproductive processes of animals 10. Understand the influence of abiotic factors on morphological and behavioral adaptations of animals 11. Understand the importance of protecting animal biodiversity
3rd Cycle (8th year)	Sustainability on Earth	Ecosystems	5. Analyze the existing dynamics of interaction between living beings and the environment 12. Synthesize ecosystem protection measures

BIBLIOGRAPHY

Atlas of Birds of the Madeira Archipelago (2009). Available at: http://www.atlasdasaves.netmadeira.com/

Madeira Electricity, ESRE, SPEA (2009-2011). *Diagnosis and minimization of the impact of public lighting on seabirds.* Available at: http://www.erse.pt/pt/desempenhoambiental/ppda/seminariosppda/Documents/Sem.PPDA2010_05_EEM.pdf

IDA - International Dark-Sky Association (s.d.) *Light pollution effects on Wildlife and Ecosystems*. Disponível em: http://darksky.org/light-pollution/wildlife/

Meirinho A, Barros N, Oliveira N , Catry P, Lecoq M, Paiva V, Geraldes P, Granadeiro JP, Ramírez, I & Andrade, J (2014). *Atlas of Portuguese Seabirds.* Portuguese Society for the Study of Birds. Available at: http://www.atlasavesmarinhas.pt

ANNEXES

ANNEX 9 Presentation: Pelagic Seabirds of Madeira
ANNEX 10 Discover Seabirds - Game Board
ANNEX 11. Discover Seabirds - Question Cards
ANNEX 12: Discover Seabirds - Instructions and Solutions

Berlengas Birds

The Berlengas archipelago, due to its location, has typical characteristics of the Mediterranean and Atlantic climates, which make these islands a very rich place in biodiversity:

- Habitat for more than 100 species of flora of which 3 are endemic to the Berlengas;
- Point of passage and stop for several species of birds in their migration routes;
- Approximately a dozen birds (marine and terrestrial) are nesting on the island.

In this archipelago, seabirds, such as the shearwater and the castro rock, find an ideal place to rest and shelter, having in the surrounding marine area a great place to eat. These birds have mainly pelagic habits (with the exception of the yellow-legged gull and the sand eel) and feed mainly on fish, cephalopods and crustaceans.

However, a number of threats have been identified that affect these islands, putting at risk the viability of their habitats and, consequently, fauna, as well as the sustainability of the resources that feed the two sectors of the local economy - fisheries and tourism.

The interaction with invasive species such as the black rat (*Rattus rattus*), the rabbit (*Oryctolagus cuniculus*) and the weeper, which can compete for space or even prey on the island, stands out. In order to minimise their negative impacts, the LIFE Berlengas project has made it possible to carry out extensive work to control and remove these invasive species.

Fishing can have a positive or negative impact. On the one hand, birds and fishermen can be great allies; birds signal the location of shoals of fish by flying over the areas where they occur and fishermen contribute to their diet with the discards of fish thrown into the sea. But this alliance is not always favourable to both parties. Birds can be trapped in different fishing gears, both in nets and hooks, which can damage them.

Figure 21. Birds and fishing gear (Nuno Barros)

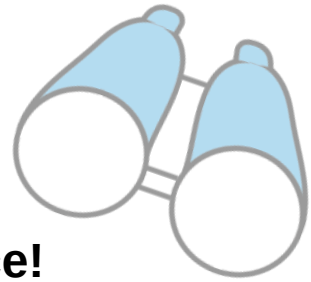
In this archipelago, it is only possible to visit the Berlenga, and the trips intensify in the summer season. This increase in the number of people visiting the island causes an

increase in human pressure on plant and animal species, which can have negative impacts on their long-term survival.

The population of yellow-legged seagulls (generalist and opportunistic species) has grown exponentially in recent decades, due to the increased availability of food found in open-air dumps, vessels and fishing ports. In the 1990s, more than 40000 individuals were registered in the Berlengas, and it was necessary to implement population control measures, with the annual removal of some nests.

This high concentration of yellow-legged seagulls has caused nitrification of the soil, leading to the destruction of vegetation, especially endemic plants such as the Berlengas Army. The population control programme continues to be implemented and has had an impact on the management of this once 'overabundant' species. According to the 2016 counts, 6500 breeding pairs were 'only' registered.

Figure 22. Yellow-Legged Gull *Larus michahellis* (SPEA)



Activity 8: Berlengas: In Search of Balance!

With this game it will be possible to get to know better the Berlengas archipelago, its natural values and how the introduced species have affected the balance of this ecosystem.

The aim is for students to understand the dynamics of interaction between living beings (interspecific relations and learn about trophic relations), as well as the influence that fishing and tourism have on this process. Students will have the opportunity to address the different issues that threaten the biodiversity of the Berlengas and will be able to learn about the different mitigation and conservation measures that the LIFE Berlengas project has implemented to protect these habitats.

PÚBLICO-ALVO: 3rd Cycle (8th year)

TYPE OF ACTIVITY: Game

LOCAL: Classroom

NO. SESSIONS: 1

DURATION: 1h30

PROPOSED DATE: All year round.

OBJECTIVES

- Showcase some of the most emblematic native species of the Berlengas Archipelago;
- Know some threats to these species and realize the impact of human activities on biological resources;
- Understand the complexity of the relationships between living beings and between them and Man.

MATERIAL

- Large map of the Berlengas archipelago (Annex 13)
- 1 data
- 22 Game Cards: "Species" (in blue), "Threats" (in red) and "Mitigation Measures" (in green) (Annex 14)
- 2 Correspondence Keys (Appendix 15) (Key 1: Measures *vs.* Threats; Key 2: Species *vs.* Threats)
- *Post-it* to display on the map, preferably in two colors

DESCRIPTION

Game preparation

Before starting the game, you must prepare the materials:

- The Berlengas map is divided into 4 parts, which fit together like a puzzle. Each part of the map should be printed on A3 and the parts should be fitted together to build the map.
- Place the map on a wall or frame, where it is possible to display the elements in a visible way.
- The letters shall be printed on an A4 sheet, which shall then be cut out into four parts. The file is ready to print on both sides, with the front of the letter being the part with the contents and the back, the part with a single color that has the logos. The colours correspond to the different groups of cards - Blue: Berlenga native species; Red: Threats to Berlenga species and habitats; Green: Mitigation measures (i.e. measures implemented to combat the threats).
- Prepare 14 post-its where you should write the name of each of the blue and red cards. These will be used to symbolize each of the card elements on the map.

Also in the preparation of the game, make an introduction on the theme and the place where the game takes place and prepare the students by reading and exploring the content they find in the cards.

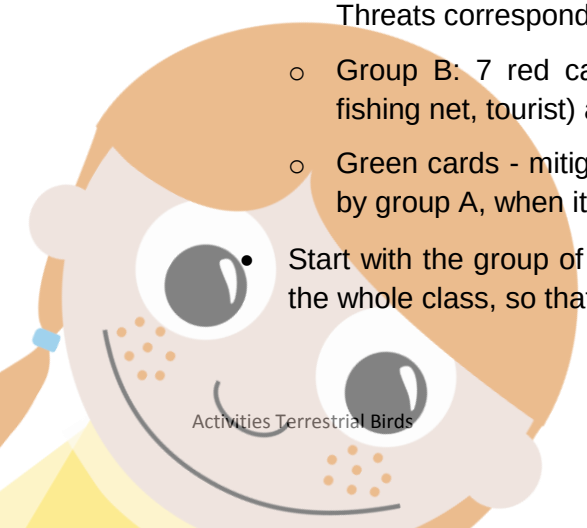
Let the students know about the Berlengas Archipelago through the map, explaining where it is located, the distance it is from the coast and the islands that compose it: Berlengas, Lighthouses and Stelae.

Then explore with them the cards of the game. Students should read all the cards before starting the game, so that it is easier to play.

Divide the class into two groups and suggest that each group carefully read their letters and explain them to the rest of the class. Each group should have a set of cards and a matching key.

- Group A: 7 blue cards (shearwater, spotted woodcock, castro rocket, balled pulicary, balled herniary and balled armory) and one key for Measures *vs.* Threats correspondence.
- Group B: 7 red cards (2 yellow-footed gulls, weeping gulls, black rat, rabbit, fishing net, tourist) and a matching key Threats vs Species.
- Green cards - mitigation measures - are stacked on a pile and can only be used by group A, when it takes the value 6 out of the die.

Start with the group of native Berlenga species (blue cards), making them known to the whole class, so that everyone knows what they are (it is important to explain what



are native and exotic species, so that students are not surprised by the fact that many threats are also species).

- You can then explore the threats to these species (red cards), explaining what the problem is caused by each one and how these threats affect different species.
- Finally, explore mitigation measures (green cards), explaining what they are and what their effects are on the threats and conservation of native species.
- At the end of this exploratory part of the contents of the game, students should know how to answer the questions:
    - "What is the flora and fauna on the island?"
    - "What animals and plants were introduced by man?"
    - "What are the human activities that take place in the surrounding marine area and how can they harm the existing fauna and flora?

Game Objectives

- Group A must be able to place all species of birds and plants on the island.
- Group B will try to prevent or remove the cards from group A using the 'correct' threat(s).

The winner is the group that, after 20 minutes of play, has more cards on the map.
NOTE: When a card comes off the map, it returns to the players' hand. The respective post-it should be saved, as it may be necessary to use it more than once throughout the game.

How to play

Each group rolls the dice in turn and can only place cards in play depending on the number they leave.

- <u>Group A (only played when leaving 2, 4 or 6):</u>

- If you leave 2 or 4: the group puts a card on the map; if there are already letters from group B on the map, you have to choose a species that is not affected by the threat cards that are already there.
- If you exit 6: the group can draw a green 'Mitigation Measure' card by lot and save it. You can use it, without having to throw the dice, in a next move to remove the correct threat from the game. To do so, you should consult the matching key and explain how this measure eliminates the respective threat. In this move, you do not place any green cards on the map. The threat card is deleted from the game and cannot be put back on the map.
- The group may not be able to place cards on the map. If after three attempts no cards from group A have been entered, the group A must search for a green card (or use one it already has) and match the respective threat. If you get it right, the threat letter comes out and the species that would be affected by it enters.

- Group B (only plays when 1, 3 or 5 comes out)

- If you exit 1 or 3: you can place a card on the map. If there are already letters from group A, you can draw 1 of these letters, according to the matching key, explaining how the threat affects that species. Only with two seagulls can the respective species be removed.
- If you exit 5: you can take any card from group A on the map, but you do not put any of your cards on the map.

LINKING TO CURRICULUM GOALS

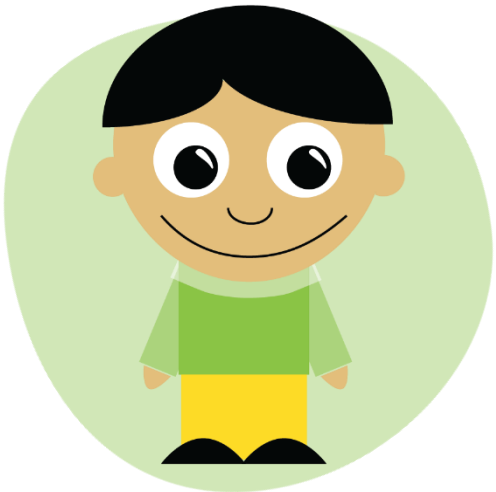
Study Cycle	Domain	Subdomains	Objectives
3rd Cycle (8th year)	Sustainability on Earth	Ecosystems	4. Understand the levels of biological organization of ecosystems To explore the dynamics of existing interaction among living beings 9. Relate the dynamic balance of ecosystems with the sustainability of planet Earth

BIBLIOGRAPHY

SPEA - Portuguese Society for the Study of Birds (2015). *LIFE Berlengas Project*. Available at: http://www.berlengas.eu/

ANNEXES

Annex 13: Large map of the Berlengas archipelago
Appendix 14: Berlengas Game Letters and Correspondence Keys



Portuguese Continental Coast Birds

Portugal, with its extensive coastline, is privileged to have so many stimulating locations for environmental education activities that promote direct contact with coastal ecosystems, allowing the observation of the fauna richness of these environments.

Coastal and marine ecosystems provide a set of essential services to society and, in Portugal, have a strong historical and social value, due to their vast area. It is therefore important to invest in greater awareness of the intrinsic values of the oceans, recalling that Portugal has the third largest Exclusive Economic Zone (EEZ) in Europe and, therefore, an inherent responsibility to inform and train future generations.

Coastal zones, transitional habitats between the marine and terrestrial environment, are under the influence of human pressures of various kinds. Being widely diverse environments, but quite fragile, they are subject to strong threats such as pollution, habitat degradation, climate change and natural factors such as natural erosion and siltation.

The ocean is a major regulator of the climate and provides numerous services that feed various sectors of the economy. However, it is also under strong human pressure to exploit its resources and to increase its various polluting sources.

These ecosystems are populated by countless species, and assume a very relevant role in the migratory routes of several seabirds, which use continental waters as a place of feeding and rest. They are very rich habitats with a large biodiversity, so it is important to maintain them in good ecological status.

In this sense, many coastal and marine areas are protected by certain protection statutes, which make it possible to reconcile the conservation and enhancement of this extensive heritage with economic activities.

In the national marine environment there are about 65 species of seabirds, some of them nesting on our coast and islands, others just migratory. But they are all subject to the same kind of pressures, such as accidental catches in fishing gear, the presence of marine litter, the destruction of island habitats by the presence of invasive species, etc. In order to protect these birds, conservation actions have been initiated through various institutions, including the SPEA, to safeguard their populations and the maintenance of their habitats.

In addition to the legal forms of protection, there is also a growing concern to increase literacy about the oceans and their habitats, in order to raise awareness among citizens. In order to train future generations, it is important for them to be aware of these issues, so that they can develop critical thinking and actively contribute to the conservation and sustainability of the oceans.

Activity 9. Field trip: discover the animals on the beach!

Our beaches and coastal areas are not only excellent places for recreation, but also home to a diversity of life forms that depend on them.

The area of the coast influenced by tidal flows is called the tidal or intertidal zone. In this area, it is the tides that condition life, forcing living beings to an enormous capacity to adapt to environmental conditions. These beings are subject to sudden variations that condition their lives throughout the day. During high tide, they are subject to strong wave impact, while at low tide they may sometimes have to withstand long periods of desiccation, caused by exposure to air.

For this reason, it is possible to observe in the fauna and flora that inhabits these places, several adaptations to this inhospitable and irregular environment.

There is also a succession of species in the intertidal zones, which vary from the area of the Infra-litoral (lower area, which is almost always covered with sea water), to the Supra-litoral (upper area of the coast, which is rarely submerged but receives drops of water from the waves) (for more information on this subject see https://www.cascais.pt/sites/default/files/anexos/gerais/new/guia_ziba.pdf).

This activity aims to take students on a field trip in order to study the intertidal zone, thus providing them with a different lesson, in contact with the natural elements and a new look at this space, so associated with summer holidays, which is also the "home" (or habitat) of countless living beings that depend on it.

This activity was developed in the Peniche area, having been designed for the route between Papoa and Baleal. However, it can be adapted to any beach that has a rocky and sandy intertidal zone, which is accessible at low tide. Going through these spaces, it is intended that students are able to identify different types of habitats, relating the species that occur in them with the characteristics adaptive to these environments.

Figure 23. Baleal Beach (Joana Andrade)

TARGET PUBLIC: 1st Cycle (3rd and 4th years), 2nd Cycle (5th year) and 3rd Cycle (8th year).

ACTIVITY TYPE: Field Visit

PLACE: Beach with rocky areas, easy access during low tide.

NUMBER OF SESSIONS: 2 (Preparation class - optional; Field trip)

DURATION: Preparation class - 45 minutes, Field trip - 3 hours

PROPOSED DATE: Any time of year, during low tide.

OBJECTIVES

- Take students to the field, promoting contact with nature and providing learning opportunities through direct observation of natural elements
- Identify different groups and species of animals
- Establish relationships between species/groups and their adaptations to the habitats where they occur
- Make students aware of the biodiversity of the beaches in their region

MATERIAL

- Illustrated checklist (Annex 16)
- Field sheet (Annex 17)
- Bibliography (consult us)

DESCRIPTION

Preparation class

- To prepare for this activity, make a brief classroom presentation of the main groups that can be observed on the beach, according to the illustrated list (Annex 18) (see the bibliography indicated).
- Explain to the students the differences between the typical wildlife of each habitat, rocky and sandy, which they will observe at the field trip.
- Explain to them how to complete the field sheet during exit (Annex 19).
- To introduce the theme of birds that use the intertidal area to feed themselves, we propose to watch a short animated film of Pixar with its students (see bibliography) on a young pilrito, which must learn to feed without the help of their mother. From this film the students will understand how the waders feed and their relationship with the wave shuttle in the intertidal zone.

Figure 24. Black-breasted Sandpiper *Calidris alpina* (Juan Varela)

- Before leaving with the students, it is proposed that they make a previous visit to the site, in order to identify the habitats that will be visited, rocky intertidal and sandy areas, and some of the species that occur there.
- It is also suggested to consult the website "Aves de Portugal" where you can find information about the species of birds that occur in each region of the country, which can help to prepare students for the diversity that can be found on the beach.
- Before performing a field trip, it is always advisable to give some recommendations to the students about what to take and what is the correct behaviour to adopt in the field, namely:
    - cause as little disturbance as possible by not tearing anything up or damaging the premises.
    - Do not kill animals or plants.
    - Do not leave rubbish in place and, if possible, collect the rubbish found on the beach.
    - Wear suitable footwear, water, hat, small snack and, depending on the time of year, waterproof.

Field Exit

- Take a walk along the beach with your students, taking them to observe sandy and rocky areas.
- The trail should be done at low tide, so that students can observe the different animal communities in the intertidal (or intertidal) area.
- At the beginning students should record the date and time and along the way students should record their observations on the field sheet.
- In the sandy area the diversity and abundance of the species will be less, but it may be possible to observe some waders that feed by the sea, following the movement of the waves. These birds usually feed on small invertebrates (e.g. molluscs) that are buried in the sand, catching them with their long, thin beaks.
- In the rocky areas you will find a great diversity of species and sometimes also great abundance of each. Encourage students to explore the rocky area, observing both the fauna fixed in the rock and the fauna living in the water puddles, and try to identify the species they observe as well as the places where they meet with the help of the illustrated checklist and field guides, if possible (namely the ZIBA Field Guide, found in the bibliography).
- Also draw the students' attention to the behaviour of the different species, namely birds, most of which are likely to be feeding, which should also be recorded on the field sheet.
- Students can also make an outline of what they observe in the different habitats, for example, by drawing a profile of the rocky zone, indicating which species they find in each location (from the infralittoral to the supralittoral). They can also draw some of the species observed, which they consider most emblematic of each of the habitats observed, sand and rock.

- At the end of the course, promote a discussion with the students about the observations made by all, namely about the adaptations of the different species observed to the habitat where they were found. Some things you can discuss with students:
    - Places where there is greater diversity;
    - Places where one observes greater abundance of a given species;
    - Adaptation of species to the habitats where they live - forms of feeding, locomotion and fixation to the substrate;
    - Conditions that these animals have to withstand (temperature variation, salinity, submersion, etc.);
- Finally, in the classroom, you will be able to research with the students a little more about the ecology of the species they observed on the beach - what they eat, how they reproduce, how they adapt to the conditions in which they live, etc.

DID YOU KNOW THAT...

The limpets have a soft body covered with a cone-shaped shell to resist the shock of the waves. These animals attach themselves strongly to the rocks and dig a small cavity, to which they fit perfectly, resisting periods of exposure to air. When submerged, the limpet moves slowly, scraping the surface of the rocks to feed on the algae that cover them and leaving the characteristic marks in "zigzag".

SUGGESTIONS

This field trip is aimed at a very wide audience because, being an outdoor activity, each teacher can conduct the activity in the way he or she considers most convenient, depending on the age group of the students and the objectives of the curricular program of the year in which they are inserted. Therefore, it is suggested that you adapt the objectives and methodologies to the students in question.

If possible, carry out two field trips throughout the school year, in different seasons, because the bird species vary throughout the year. For example, in autumn it is possible to observe some migratory birds, which come to our country to spend the winter, and in spring/summer some birds are sometimes seen, such as the Interrupted collarbill and the chirp, which nest in areas of more secluded dunes.

Figure 25. Snowy plover *Charadrius alexandrinus* (Juan Varela)

LINK TO CURRICULUM GOALS

Study Cycle	Year	Area	Block	Contents
1st Cycle	3rd year	Environmental Study	3 - Discovering the natural environment	- The Living Beings of the Near Environment - Physical Aspects of the Local Environment
	4th year	Environmental Study	4 - Discovering the Inter-relationships between spaces	- The contact between the Earth and the Sea

Study Cycle	Domain	Subdomains	Objectives
2nd Cycle (5th year)	Diversity of Living Beings and Their Interactions with the Environment	Diversity in animals	7. Interpret the characteristics of organisms according to the environments in which they live 8. Understand the diversity of diets of animals taking into account their habitat 10. Know the influence of abiotic factors on morphological and behavioral adaptations of animals
3rd Cycle (8th year)	Sustainability on Earth	Ecosystems	4. Understand the levels of biological organization of ecosystems Analyze the dynamics of existing interaction between living beings and the environment To explore the dynamics of existing interaction among living beings Understand the importance of energy flows in the dynamics of ecosystems

BIBLIOGRAPHY

Aves de Portugal - Portal dos Observadores de Aves (2008). *Beach pile*. Available at: http://www.avesdeportugal.info/calalb.html

Barillaro, A. (Director). (2016). *Piper - Discovering the World* [Movie] PIXAR. Available at: https://www.youtube.com/watch?v=Rgw_j9UFVXw

Cascais Ambiente. (n.d.) *ZIBA - Coastal Guide.* Available at: https://www.cascais.pt/sites/default/files/anexos/gerais/new/guia_ziba.pdf

Cultural Commission of the Navy - Marine Knowledge Centre (2017). *Aquário Vasco da Gama - Living between tides*. Available at: https://ccm.marinha.pt/pt/aquariovgama_web/aprendermais_web/viverentremares_web/Paginas/homepage.aspx

ANNEXES

Annex 15 Illustrated list of Beach Fauna
Annex 16. Field Profile - Beach Fauna

LAND BIRDS

In this chapter on land birds, we include all the diversity of birds except seabirds.

Land birds include waterfowl, which live for example in coastal lagoons, birds from forest areas, such as birds from the Laurissilva forest of the Azores and birds from steep rocky areas, such as cliffs.

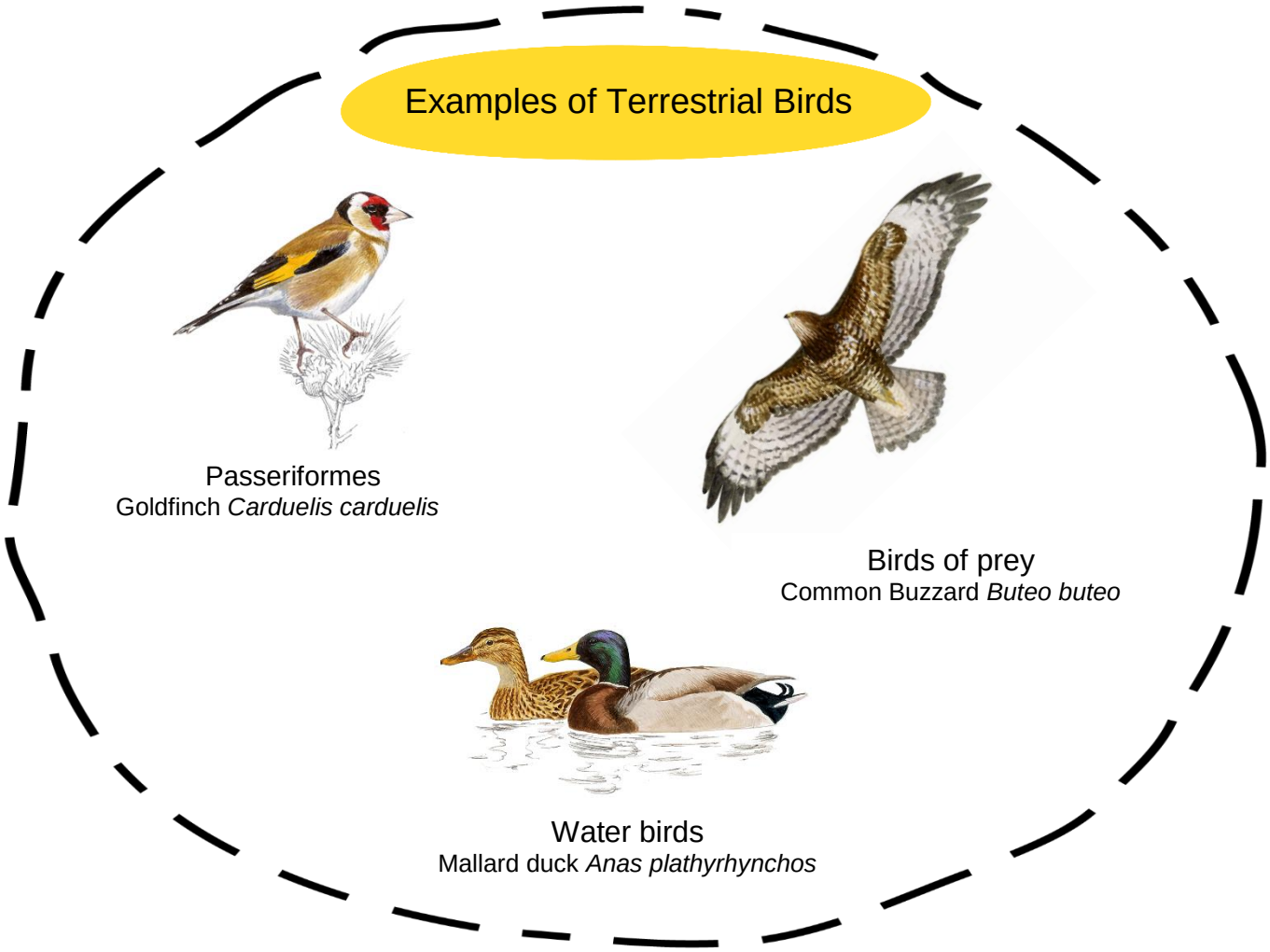


Figure 26. Terrestrial Bird Groups. Passeriformes, birds of prey and water birds. (Illustrations by Juan Varela)

This chapter includes three regions of the country in which the SPEA develops work for the conservation of terrestrial bird species and their habitats: Azores, Lagoa pequena (Sesimbra) and Arribas do Douro.

Azores Birds: S. Miguel

The archipelago of the Azores, situated in the centre of the North Atlantic Ocean, is composed of 9 islands of volcanic origin. These are located at a great distance from the continental masses, about 1500 km from the European continent and 3900 km from the American continent. Due to its location, the resident avifauna does not exceed 40 species, consisting of several subspecies of bird species found on the European continent, such as the São Miguel goldcrest *Regulus regulus azoricus*, capped warbler *Sylvia atricapilla gularis*, Azore wood pidgeon *Columba palumbus atlantis* and the Azorean buzzard *Buteo buteo rothschildi* (known in the Azores as kite or burnt).

It is also a nesting area for several endangered species or species of great conservation interest such as the Azores bullfinch *Pyrrhula murina*, the common snipe *Gallinago gallinago* and the woodcock *Scolopax rusticola*, or sea birds such as the Cory's shearwater *Calonectris borealis*, the Audubon's shearwater *Puffinus lherminieri*, the Manx shearwater *Puffinus puffinus* and the Monteiro's storm petrel *Hydrobates monteiroi*, the latter an endemic species of the Azores.

The archipelago is also visited by several seasonal more rare species, which find in the Azores a refuge during their migratory routes. Together with the reseident birds, these visiting species take the number of bird species in the Azores to 400.

São Miguel is the largest island of this archipelago, known as the green island for its beautiful landscapes and beautiful lagoons, including the Lagoa das Sete Cidades, Furnas and Fogo. São Miguel is home to the priolo (the Azores bullfinch),which inhabits the eastern part of the island. Once one of the most threatened passerine species in Europe it has seen its conservation status improved twice due to the conservation effort developed by SPEA in 3 LIFE projects over 15 years.

SPEA's work in the Azores is not only restricted to the conservation of the priolo, having already developed several projects aimed at the conservation of marine species.

Figure 29. Priolo or Azores Bullfinch *Pyrrhula murina* (Ruben Rabbit)

Activity 10: Pictionary of Azores Birds

The identification of birds is not an easy task, especially because we usually observe them in flight and only for a short of time. This means observations of birds often have to be taken quickly and this means accurate recordings take practice.

For this reason, prior knowledge of the anatomy of the species and their identifying characteristics can be extremely useful for those who want to get into bird watching. Prior knowledge helps the observer to be attentive to details and direct their attention to the parts of the bird that can effectively help identify it.

Through this activity, we intend to exercise this ability in students, helping them to better understand the anatomy of birds and to understand their identifying characteristics. It is also a good way to prepare them for any future bird watching, outside the school or in the field. It also allows them to enjoy bird species and knowledge of birds on a day to day basis. People will not protect what they do not care about and understanding can often lead to caring.

TYPE OF ACTIVITY: Game | Design | Observation

TARGET AUDIENCE: 1st Cycle

PLACE: Classroom

NUMBER OF SESSIONS: 1

DURATION: 1h30

PROPOSED DATE: All year round

OBJECTIVES

- Get to know the region's bird life
- Learn the bird's anatomy
- Identify birds by their colors and shapes
- Promote interest in bird watching in students and teachers

MATERIAL

- Computer
- Presentation "Birds of the Azores" (Annex 18)
- Internet access (optional)
- Coal pencils
- Color Pencil
- Paper

DESCRIPTION

- Using the presentation "The birds of the Azores" (Annex 18), introduce the students to the most common bird species that can be observed in the region, drawing the attention of students to the main characteristics of each species.
- During this introduction, bring the students' attention to important aspects in the identification of the birds such as body shape, silhouette, colour, size, particular marks on the plumage (wings, head, belly), etc. This information will be very useful

for the students to be able to draw a given species, focusing on its main identifying characteristics. For support on this part, please refer to the chapter "Birds - characteristics and identification" of this manual.

- Then, students, divided into groups, should do research on the species found in the presentation, exploring aspects such as the habitat in which they live, eating habits, reproduction, etc..
- After this initial phase, start the game with your students. This game is very similar to Pictionary:
    - Divide the students into groups;
    - Play one group at a time, to which a bird is assigned at random (you can make a bag of paper with the names of the birds in the presentation, which the students are taking without seeing);
    - One of the members of the group should take out a piece of paper with the name of a bird and try to draw it (without seeing the original image, just what he remembers). The rest of you have to guess what bird it's all about...
    - The design does not have to be very precise, the aim is to highlight the main characteristics of the species such as shape, color of the head or belly, marks on the wings, etc..;
    - The game will run until all groups have tried to draw at least two birds, or more, depending on how long they have to do this activity.

- In the end, the students' drawings should be compared with the original drawing of each species, so that they can see where they were mistaken and learn better the characteristics of the birds studied.

LINK TO CURRICULUM GOALS

Study Cycle	Year	Area	Block	Contents
1st Cycle	2nd and 3rd year	Environmental Study	3 - Discovering the natural environment	- The Living Beings of Your Environment / Near Environment

BIBLIOGRAPHY

Costa, H., de Juana, E. Varela, J. (2011). *Birds of Portugal. Including the archipelagos of the Azores, Madeira and the Selvagens*. Barcelona: Lynx Edicions.

Pereira, C. (2010). *Birds of the Azores.* SPEA, Portuguese Society for the Study of Birds. 128p.

ANNEXES

Annex 17. Presentation "Birds of the Azores"

Small Lake Birds

The Lagoa de Albufeira Interpretative Space makes one of the most important bird and nesting areas in Europe accessible to the public, including a Special Protection Area for Birds (SPA).

It is an area of approximately 68ha that is fenced off and comprises Lagoa Pequena and a wetland, called Lagoa da Estacada, the most ecologically sensitive area.

The fact that it is home to a great diversity of species, residents and migratory, thanks to the good conditions of shelter, feeding and nesting for aquatic birds, makes this lagoon a very important area for the conservation of birds in Portugal.

The management of this space is shared between the Municipality of Sesimbra (CMS) and the Instituto de Conservação da Natureza e das Florestas (ICNF), and since 2016 the SPEA has established a protocol with the CMS to collaborate in the promotion of the Interpretative Space of Lagoa Pequena, through the management of visits and activities throughout the year.

The visitation area includes two signposted routes and four observatories. Also part of the support infrastructure are the reception space for visitors, shop and toilet.

For more information visit the *website:* http://www.cm-sesimbra.pt/lagoapequena

Figure 30. Lagoa Pequena (Rui Correia)

Activity 11: Waterfowl Peddy-paper

This activity was created as part of the Educational Project for the Interpretative Space of Lagoa Pequena.

Tracks and questions will lead the participants to discover the details of the life of the aquatic birds, characteristic of this lagoon and the innermost part of the lagoon system of the Albufeira Lagoon.

The information included in the Bird Records of this activity is related to the Albufeira Lagoon, in Sesimbra. Some of the data presented for these species, such as their abundance and phenology, vary greatly from place to place, so these data cannot be generalised to all coastal lagoons or other wetlands in the country.

TARGET AUDIENCE: 2nd Cycle

TYPE OF ACTIVITY: Game

VENUE: School playground (or other outdoor space)

NUMBER OF SESSIONS: 1

DURATION: 1h30

PROPOSED DATE: All year round.

OBJECTIVES

- To make known the diversity of aquatic birds existing in the Small Lagoon and Albufeira Lagoon.
- Explore the different sources of food for the birds
- Relate the morphological and behavioral adaptations of the species with the way they feed on their food source.
- Explore useful concepts for understanding bird biology such as scientific name, phenology and sexual dimorphism

MATERIAL

- Factsheets on 14 waterfowl species (Annex 19)
- Peddy-Aves questionnaire (Annex 20)
- Questionnaire Solutions (Annex 21)
- Signs (to support the questionnaires)
- Coal pencils

DESCRIPTION

- Before the activity, spread out the bird signs over the space in which the activity will be held (e.g. school playground), diversifying the locations and hiding some of them

a little, to add a further challenge.

- Divide learners into groups of 3 or 4 and give each group a clipboard with a questionnaire and a charcoal pencil.
- Explain the dynamics of the activity to the students: each group has to fill in their questionnaire and, to do this, they have to look for the sheets of the birds scattered around the space and read the information contained in them, which will help them to answer the questions.
- There can only be one group at a time on each card. Point out that you will be penalized if you hide or take chips out of places.
- Give the starting signal and let the students look for the forms and fill in the questionnaires (30min).
- When the game time is up, check with them the number of correct answers for each group.
- The group that has the most correct answers will win, not the one that finishes the fastest.
- To encourage the discussion of ideas and critical sense, each group can correct the responses of the other and the teacher goes through the various groups and helps.
- At the end of the game, in order to make a systematization of the knowledge acquired, already in the classroom context, you can use the cards of birds, distributing them to students, so that everyone can read them more calmly and get to know the characteristics of each species, thus consolidating their knowledge about them.

SUGGESTIONS

It may be useful to add extra dynamics to the activity. For example, with groups that do not know each other well, you can tie the hands or feet of the participants so that they have to talk to each other and decide together where to look for the chips.

LINK TO CURRICULUM GOALS

Study Cycle	Domain	Subdomains	Objectives
2nd Cycle (5th year)	Diversity of Living Beings and Their Interactions with the Environment	Diversity in animals	7. Interpret the characteristics of organisms according to the environments in which they live 8. Understand the diversity of diets of animals taking into account their habitat

BIBLIOGRAPHY

Aves de Portugal - Portal dos Observadores de Aves (2008). *Beach pile*. Available at: http://www.avesdeportugal.info/

Catry P., Costa H., Elias G., Matias R. (2010). *Birds of Portugal - Ornithology of the continental territory*. Lisbon: Assírio & Alvim.

Svensson, L., Mullarney, K., Zetterström, D. (2017). *Birds Guide. Portuguese and European Birds Field Guide* (2nd ed.). Lisbon: Assírio and Alvim.

ANNEXES

Annex 18. Peddy-Poultry Chips
Annex 19. Peddy-Aves Questionnaire
Annex 20. Peddy-Aves Questionnaire Solutions

BIRDS OF THE DOURO CLIFFS

Figure 31. Map of the International Douro Natural Park

The territory of the Douro Cliffs, also known as the International Douro, comprises the deep and embedded valleys of the Douro and Águeda rivers, which in this region separate Portugal from Spain.

The region is protected on both sides of the border, including the rivers and their banks (where holm oaks, juniper forests, cork oaks and black oak patches predominate). Also the adjacent plateaus, characterized by agricultural areas, mudflats, woodlands and small torrent streams, with their riparian galleries (trees and vegetation along the banks of rivers of streams). On the Portuguese side, the Douro International Natural Park (inaugurated in 1998) has about 87,000 ha, covering four municipalities: Miranda do Douro, Mogadouro, Freixo de Espada à Cinta and Figueira de Castelo Rodrigo. On the Spanish side, the Arribes del Duero Natural Park covers an area of approximately 106 ha, west of Salamanca and Zamora.

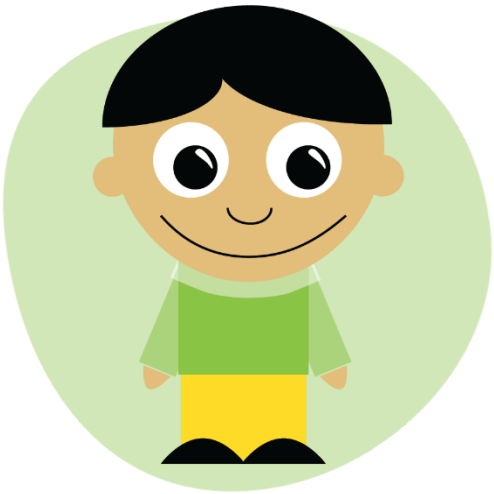
This cross-border region is crucial for the conservation of rupicolous birds, which nest on the steep cliffs (more than 20 species of nesting birds). It is especially important for endangered species such as the Egyptian vulture *Neophron percnopterus* and the Bonelli's Eagle *Aquila fasciata*, or the Golden Eagle *Aquila chrysaetos*, the black vulture (cinereous vulture) *Aegypius monachus*, the red-billed chough *Pyrrhocorax pyrrhocorax*, the black stork *Ciconia nigra* but also for other non-threatened species such as the griffon vulture *Gyps fulvus*, and also the red kite *Milvus milvus*, in a total of more than 150 species of birds observed in the region.

Among the main threat factors to these species are the disturbance of the nesting habitat, the lack of sufficient food with the introduction of extensive farming practices, as well as some other causes of unnatural mortality (electrocution by power lines, death by poisoning or direct persecution), combined with the challenges that some of the migratory species encounter along their migration routes and in countries where they winter (in Africa).

This region is one of the main "sanctuaries" for rupicolous (cliff) birds at national, Iberian and European level, and is also part of the Natura 2000 Network (classified under the Birds Directive and Habitats Directives as a Special Protection Area and Site of Community Importance, respectively) and recognised by BirdLife International as an Important Area for Birds and Biodiversity (IBA).

Figure 32. Egyptian vulture *Neophron percnopterus* (Ricardo Brandão)

Figure 33. Cliffs of the International Douro (Gilberto Neto)



Activity 12. The Britango and his neighbors!

There are about 150 species of birds in the cliffs of the International Douro, however, some are threatened with extinction. This is the case of some vultures such as the Egyptian vulture (*Neophron percnopterus*) and the black vulture (*Aegypius monachus*), large birds that are often seen in the region, together with another species of vulture, more abundant and less threatened, the griffon vulture (*Gyps fulvus*). Vultures feed mainly on animal carcasses, and therefore have an important ecological function, acting as a "cleaning brigade" for our fields and natural spaces.

This activity uses reusable materials,to create handicrafts and a performance by students. This will serve as an introduction to bird watching and a game to showcase some species of vultures and birds of prey from the Arribes of the Douro, such as the Bonellis' Eagle (*Aquila fasciata*) and the Red kite (*Milvus milvus*).

TYPE OF ACTIVITY: Be Creative | Game

TARGET AUDIENCE: 1st and 2nd Cycles

PLACE: Classroom

NUMBER OF SESSIONS: 1

DURATION: 45 to 60 minutes

PROPOSED DATE: All year round

OBJECTIVES

- Explore the concepts of a Natural Park (including basic notions of geography) and endangered species
- To draw attention to species of vultures and birds of prey from the cliffs, which are threatened with extinction.
- Make an introduction to bird watching with necessary equipment (e.g. binoculars)
- Stimulate the creativity of students
- Raise students' awareness of the importance of waste reduction, reuse and recycling

MATERIAL

- For the construction of binoculars (material per specimen): 2 rolls of toilet paper (strong cardboard), 1 cork stopper or bottle top, 1 toothpick, string of ca. 75 cm (Instructions - Annex 22)
- Map of Portugal in A3 (annex or other existing one)
- Photos of the 4 species in A4 (or A3) (Annex 23)
- Photos of the 4 species in small (1 set per student) (Annex 24)
- Field data sheet (1 per student) (Annex 25)
- Landscape images of the International Douro (if possible), to show students the type of habitat
- Duct tape, scissors, coloured pencils, charcoal pencils

DESCRIPTION

Before starting the activity, separate the specific materials for each manual work (cardboard binoculars, field notebooks, others), place the map of Portugal in the centre of the picture and spread the images of the 4 species of the project around the classroom or outside the school, in less obvious places. Under each image, place a container (e.g. paper box) with copies of the large images in small (1 per student).

Presentation

- Explain to the students that they will get to know some species of birds that live on the cliffs of the Douro, also known as Douro International, a region framed by the cross-border section of the Douro River (between Miranda do Douro and Freixo de Espada à Cinta).
- The Douro International is a Natural Park, and at a European level it is also part of the Natura 2000 Network, so you can also explore the concepts of protected and classified areas with your students, explaining to them what these spaces are for and why their conservation is important.
- To start, start with a little geography and challenge the students to locate the Arribas do Douro on the map of Portugal, comparing with the location of the school (you can appeal to the estimation of the distance between the two points). Also, show some images of this type of landscape, so that students become familiar with it.
- To introduce the construction of binoculars, explain to the students that scientists, in order to observe and monitor birds, spend a lot of time in the field, using binoculars and telescopes. These allow the scientists to see the birds from a distance without disturbing them. They also use 1 field notebook and/or field cards, such as the one to be supplied, bird guides, and other equipment.

Construction of binoculars

- Explain to the students how to construct the binoculars and what materials are needed, based on Appendix 22.
- Distribute a set of materials to each student.
- Support students as they build binoculars.

Game - Discovering the Cliff Birds

- After all students have some cardboard binoculars, ask them to try looking with both eyes and spotting various objects in the room;
- Then divide the students into four groups and challenge each group to find the four photos of the birds. Every time you find an image, you should keep a small copy of it. NOTE: This component can be performed outdoors, but for this, the images must be previously placed outdoors.
- The groups will then try to find out the name of each bird together.
- Give each group a field sheet (with the name and description of the four species and a space to glue together the image corresponding to each species) and tell them that they have 15 minutes to read the descriptions and choose the species that correspond to each image.
- Once each group has made their choice, ask them to read the description of one of the species they found aloud one at a time to see if they all agree that the species corresponds to that description.

- If the answer is correct, students can paste the correct image into the corresponding space on their field card.
- Finally, tell the students that they can pick up images of all species and give each student a form to complete, so that everyone has a completed game form.

Conclusion

- Conclude the activity by systematizing with the students the knowledge acquired about the bird species and the region studied, as well as the equipment used in bird watching.
- It can also complement this activity by explaining that these species are threatened with extinction and therefore it is important to know them and contribute to their conservation. If you want to explore with them the threat factors and some of the solutions that are being tested in conservation projects, see, for example, the LIFE Rupis project website (www.rupis.pt).

SUGGESTIONS

If there is more time, depending on the age and interest of the students, you can also build your field notebook with them.

A6 field notebook materials: cover and back cover - cereal box (or other reusable card), sketch sheets (to divide into A6 size), images of britango to stick on the cover, writing material to write "Field notebook" on the cover, string or stapler - to attach the notebook pages, scissors and glue.

BIBLIOGRAPHY

Domingues, J. (2016). Do you know the britango? It's the Bird of the Year 2016. *Pardela* n.º 52. Available at http://www.spea.pt/pt/publicacoes/pardela/

Ferreira, R. (2018). Bird of the Year 2018 - Pigeon Eagle or Bonelli's Eagle. *Pardela* n.º 56. Available at: http://www.spea.pt/pt/publicacoes/pardela/

Institute for Nature Conservation and Forests. Available at: www.icnf.pt

Monteiro, A. (2018). Douro International - Natural Park of birds and cliffs. *Pardela* n.º 56. Available at http://www.spea.pt/pt/publicacoes/pardela/

Natural EN (n.d.) Douro International Natural Park. Available at: http://www.natural.pt/portal/pt/AreaProtegida/Item/5

Life Rupis Project. Available at: www.rupis.pt

Theodosius, J. (2018). Life Rupis - Preserving eagles and vultures in the cliffs of Douro *Pardela* n.º 56. Available at: http://www.spea.pt/pt/publicacoes/pardela/

LINK TO CURRICULUM GOALS

Study Cycle	Year	Area	Block	Contents
1st Cycle	2nd and 3rd year	Environmental Study	3 - Discovering the natural environment 5 - Discovering materials and objects	- The Living Beings of Your Environment / Near Environment - Handling objects in concrete situations
		Artistic and Physical-Motor Expressions	3 - Exploration of various techniques of expression	- Cutting, gluing, folding
	4th year	Environmental Study	3 - Discovering the natural environment 5 - Discovering materials and objects 6 - Discovering the relationships between nature and society	- Physical Aspects of Portugal - Handling objects in concrete situations - The Quality of the Environment
		Artistic and Physical-Motor Expressions	3 - Exploration of various techniques of expression	- Cutting, gluing, folding

Study Cycle	Domain	Subdomains	Objectives
2nd Cycle (5th year)	Diversity of Living Beings and Their Interactions with the Environment	Diversity in animals	7. Interpret the characteristics of organisms according to the environments in which they live 8. Understand the diversity of diets of animals taking into account their habitat 11. Understand the importance of protecting animal biodiversity

ANNEXES

Annex 21. Instructions for building binoculars
Annex 22. Target species (for printing on A4 or A3)
Annex 23 Target species Small size (for printing)
Annex 24. Field Page Arribas do Douro_ Students
Annex 25. Field data sheet Arribas do Douro_ Professor

Technical Data

Suggested reference
SPEA. 2018. Activity manual to involve schools in the conservation of birds and their habitats. Lisbon, pp72.

Edition
SPEA - Portuguese Society for the Study of Birds
Columbano Bordalo Pinheiro, 87, 3º andar 1070-062 Lisboa

Project
One World Learning (2017-1-MT01-KA201-026967)

Coordination
Alexandra Lopes
Carolina Bloise

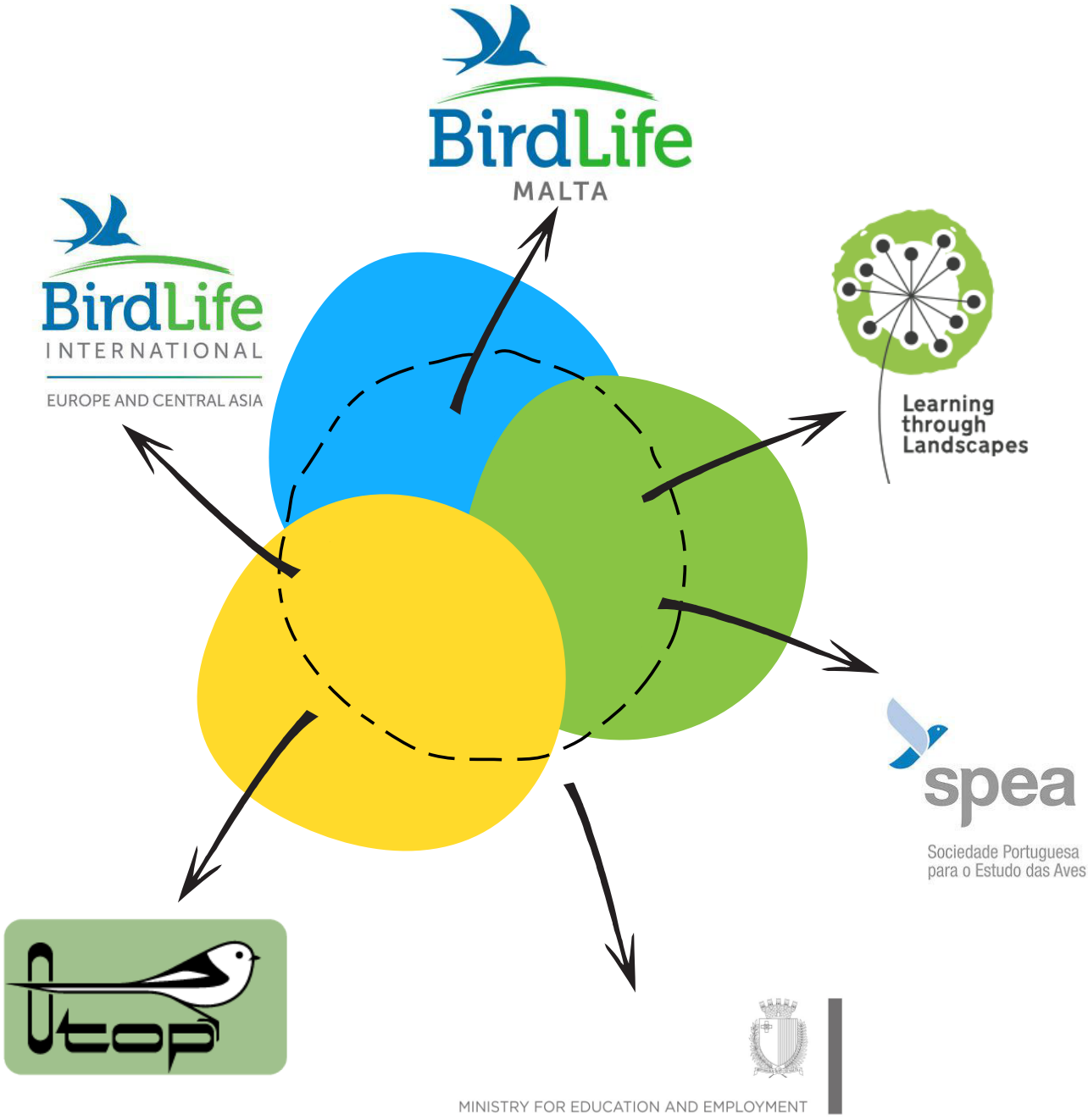
Content production/scientific review
Alicia Salido
Ana Mendonça
Azucena de la Cruz Martin
Carolina Bloise
Cátia Gouveia
Isabel Fagundes
Julieta Costa
Laura Castello
Mónica Costa
Paula Lopes
Rui Machado
Tânia Pipa
Vanessa Oliveira
Teresa Oliveira (Teacher in mobility - ENEA 2020)

Illustrations and images
Alicia Salido
Ana Mendonça
BirdLife International
Francisco Félix
Gilberto Neto
Joana Andrade
Joaquim Teodósio
Juan Varela
Nuno Barros
Palumbar
Paulo Alves
Paula Lopes
Rafael Matias
Ricardo Brandão
Rui Correia
Ruben Rabbit

Graphic design
BirdLife Malta

Date
November 2018

Co-funded by the
Erasmus+ Programme
of the European Union



One World Learning is an international environmental education initiative bringing together best practices in this field from five European countries and the wider BirdLife Europe partnership.