



Opwall Schools' Booklet
Portugal 2022

Contents

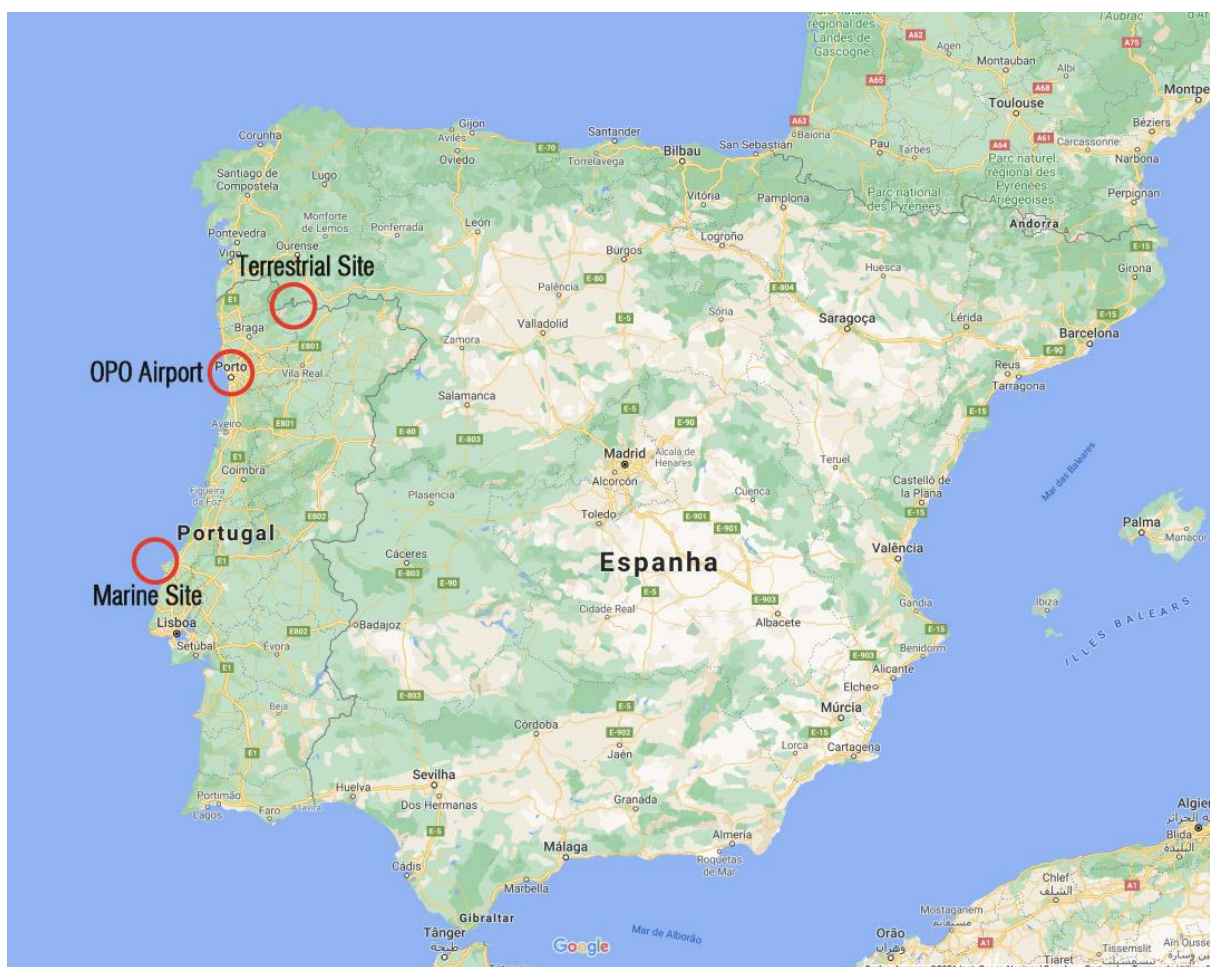
1. Terrestrial project overview and research objectives.....	2
Iberian Peninsula.....	2
Peneda Gerês National Park and Tourém.....	3
Peneda Gerês National Park Aims and Objectives	5
2. Week 1 Itinerary	6
3. Biodiversity Monitoring	7
4. Iberian Ecology and Conservation Course	10
5. Learning Outcomes from Week 1	11
6. Marine Project Overview	11
Berlengas Biosphere Reserve	11
7. Week 2 Itinerary	12
8. Berlengas Marine Ecology Course.....	13
9. PADI Open Water Diver Course	14
10. PADI Open Water Referral Course	15
11. Links to A levels and UCAS points	16
12. IRPs or Individual Research Projects	19
References and Suggested Reading	19
Electronic media	Error! Bookmark not defined.

1. Terrestrial project overview and research objectives

Iberian Peninsula

The Iberian Peninsula is an area of great biodiversity and with a large diversity of habitats, rich in biodiversity with a significant level of endemism. In recent decades the appeal of a more urban lifestyle and of modernisation has led to the abandonment of rural areas and of traditional cultural and agricultural practices, many of which are essential to maintaining the habitat types and biodiversity of this region. Nonetheless, more recently, there has been a growing interest, both local and foreign, in promoting the conservation of such habitats, cultural practices and, in general, in the protection or rehabilitation of the Iberian ecosystems.

Figure 1. Map of the Iberian Peninsula



Peneda Gerês National Park and Tourém

The Parque Nacional da Peneda-Gerês (hereafter referred to as Gerês) is the only national park in Portugal and it spans over an area of over 70 000 hectares of mountainous landscape in the North of Portugal spilling over to Spain where it is known as the Gerês-Xurés Transboundary Biosphere Reserve. This is an UNESCO recognized site due to its cultural and biological significance hosting diverse range of fauna (Iberian breed of wild horse, Iberian ibex, Iberian wolf, a range of raptors, endemic herpetofauna, etc) and flora (range of medicinal herbs, oaks) some of which endemic. This large biodiversity is, to some extent attributed to the traditional low intensity agricultural and pasture exploitation of the natural resources which have allowed for a healthy balance between human activity and natural environment to be established.

This cultural heritage, such as the traditional agricultural and herding practices, are something that the park authorities are keen to preserve as it has proven to be a major tool in maintaining the rich biodiversity of the ecosystem. However, the demographic vacuum being experienced throughout most of this region as a result of the inevitable attraction of life in a city, means that preserving this heritage has become increasingly difficult and hence it has become increasingly important to rethink the way this land is managed by looking for other ways to bring attention and resources to the area, allowing the maintenance of this region's biodiversity.

Gerês falls within the transitional zone between the Atlantic and Mediterranean climate, with hot, relatively dry summers and cold, very wet and snowy winters. It's rugged landscape along with its climate allow for a range of microclimates to be observed throughout the area. Hence, the park hosts a large variation of vegetation characteristic of Mediterranean, Euro-Siberian (Atlantic) and alpine environments, making this an area of particular phytogeographic importance. The dramatic elevation changes observed throughout the park also mean that these different habitats can easily be identified (much like in Cusuco National Park, in Honduras).

The Operation Wallacea base in the park will be in a small rural village with approximately 150 inhabitants called Tourém. Tourém is located at the Mourela Plateau which is part of the buffer zone of the Gerês National Park. This idyllic location provides access to multiple habitat sites for surveys and is an excellent location to learn more about the traditional way of life in this region of Portugal.

Figure 2. Map of The Peneda Gerês National Park

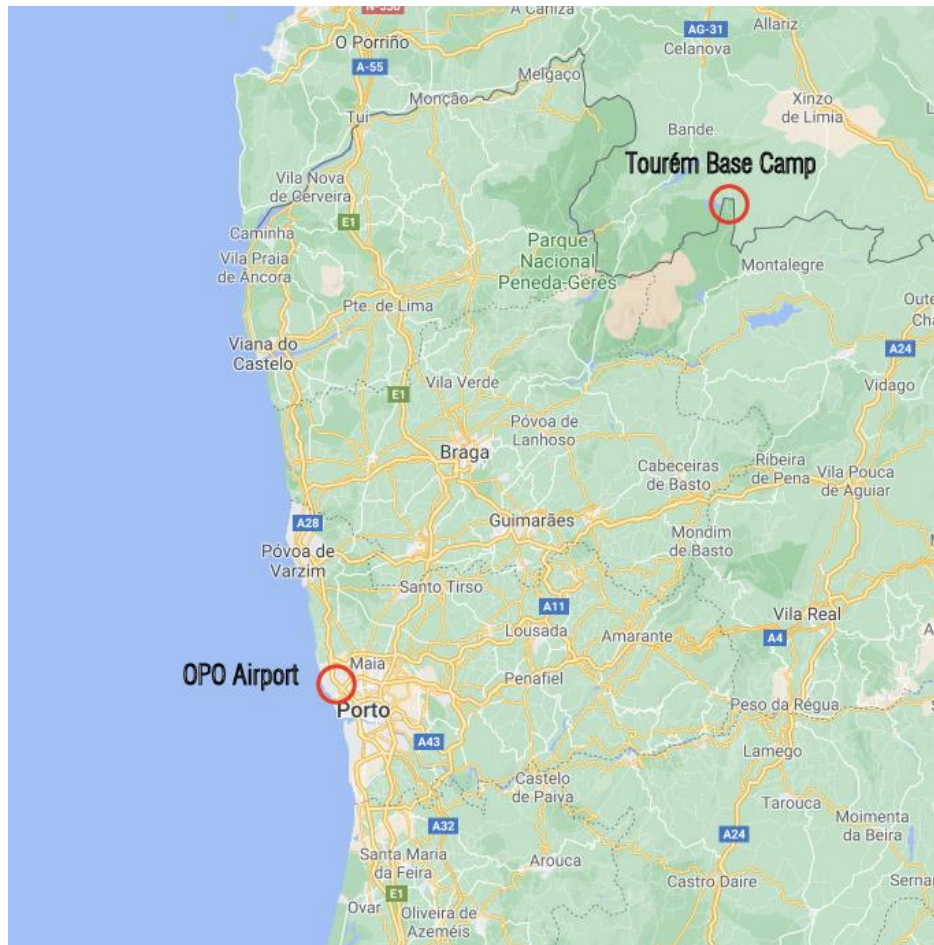
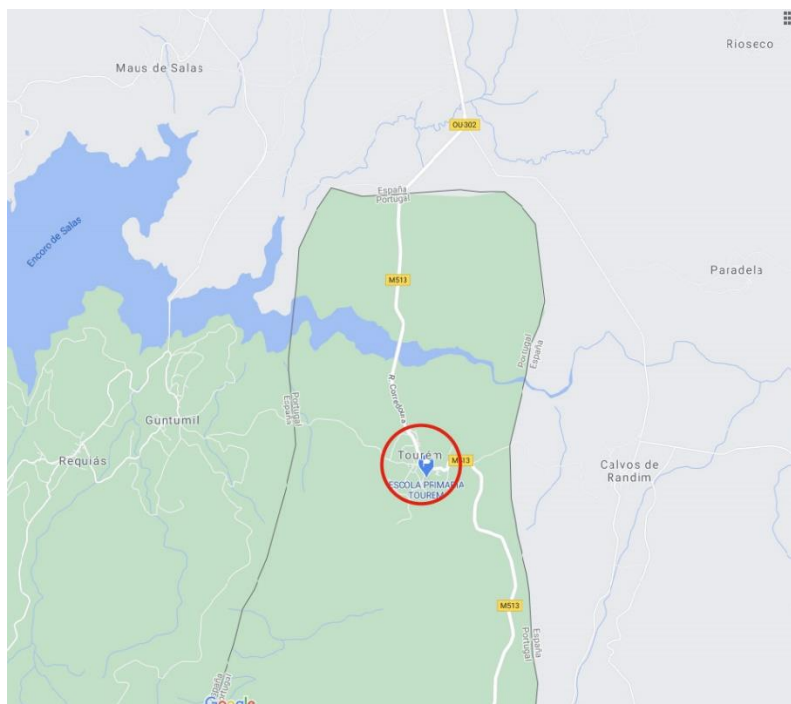


Figure 3. Map of Tourém Terrestrial Base Camp



Peneda Gerês National Park Aims and Objectives

Our terrestrial site, located at the village of Tourém, is just a few kilometres from the border between Portugal and Spain in the valley of the Salas river, upstream from the reservoir created by the Salas dam. Within a radius of 5-10km from the village several distinct habitats can be accessed, these include: oak forest, agricultural habitat, river floodplain, highland plateau shrubland and the river itself. Within a larger radius (10-15km), even more habitats can be reached both within Portugal and in Spain. These include pine forest and bogs.

The goal for this first survey season is to establish 4 terrestrial transects and 1 river transect covering 5 different habitat types. These transects will be 1.2km long and would all be parallel to each other and at a distance of 1 to 1.5km away from the nearest each other or from the village of Tourém (base camp) thus ensuring data is independent. This would mean that all transects would sit within a 4 km radius of base camp making them accessible by foot.

Multiple constant effort bird ringing sites will also be established off-transect in the main habitats to be sampled. Additionally, the river transect would be utilised for the fish surveys and otter surveys. This transect will be run for a larger distance from border to border, around 2km, conducted from land or a boat.

The Portuguese site has similar habitats to that of our other projects in Croatia and Transylvania, with relatively similar niches available and similar problems, land abandonment and invasive species, but being in a more isolated region of Europe in the Iberian Peninsula with a high rate of endemism, a project on this site could provide interesting comparisons to the data collected at other European sites. Additionally, being a large area using large herbivores as vegetation control, it's very important to determine the available biomass for herbivores to help estimate the parks herbivore carrying capacity and/or determine how much biomass accumulates over the years, which could be a key aspect when managing fire-risk.

To start we will begin with many standard surveys such as bird point counts and mist nets, large and small mammal surveys, herpetofaunal surveys, bat mist netting and habitat surveyors. However there some site-specific surveys we will begin in this first year such as otter surveys, monitoring of the rabbit populations and human-wolf conflict.

Our main aim for this first year is to establish a research site which will provide valuable data which can be directly fed to the authorities managing this protected area and to bring some attention to the increasingly forgotten rural areas and practices which have for so long contributed to the maintenance of the unique biodiversity we have in the Iberian Peninsula. We also hope to develop long term relationships with the local community, the managing bodies and with the local universities who, despite their interest in the area, do not have resources to engage on such comprehensive long-term studies without the assistance of our students.

2. Week 1 Itinerary

The students on site will complete six days of training and research. These are divided into morning, afternoon and evening sessions. Students will arrive at the terrestrial site on Monday afternoon and will attend a welcome lecture and briefings on health and safety, camp orientation and the schedule for the week for each group. The rest of the afternoon will be spent settling into camp and then students may join the nocturnal surveys after dinner. Students will then spend 6 days and nights receiving lectures, conservation skills workshops and assisting with data collection. Accommodation at the camp will be in tents.

During the briefings on the first day, students will be divided into small groups of 4-8 students. Students will stay in these small group when participating in biodiversity surveys, but groups may join together again for lectures and meal times. An example weekly timetable is set out below (Table 1). Different groups of students will join different biodiversity surveys each day to ensure that all students get the chance to work with each of the different teams. The normal schedule will be a dawn start for the groups working with birds or mammals, around 8am for those working with herpetofauna or habitat and around 10am for those setting butterfly traps. These teams will then be back at camp mid to late morning with a bit of rest time before lunch. Straight after lunch there will be camp skills training and a lecture followed by late afternoon data collection (birds, butterflies, mammals and habitat). The teams return to camp for dinner and after dinner some students (those who are not scheduled to start early the next day) will be scheduled to participate in nocturnal surveys for herpetofauna, insects or bats. This schedule has been designed to avoid data collection in the heat of the middle of the day because physical activity at this time of day can be tiring and because animal activity is extremely low at this time.

Table 1. shows an example timetable school groups during week 1. Note there may be changes to this schedule depending on size of groups, fitness of students, weather conditions or operational problems.

Day	Group
Mon eve	Introduction to camp and safety rules
Tue am	Camera trapping/ Large Mammal Transect (game species/ wolf/ otter monitoring)
Tue pm	Camera trap (review/process footage) and mammal tracking workshop Lecture 1 - Iberian Wildlife and Conservation Course
Tue evening	Amphibian Survey (general or targeting <i>Chioglossa lusitanica</i> salamander)
Wed am	Bird mist netting (constant effort sites + opportunistic)
Wed pm	Monitoring rabbit latrines Lecture 2 - Iberian Wildlife and Conservation Course
Wed eve	Bat Transect/Trapping
Thu am	Fish Survey
Thu pm	Fish Lab (analysing stomach contents of invasive fish/ the analyse the contents of otter scat collected by mammal team)

	Lecture 3 - Iberian Wildlife and Conservation Course
Thu eve	Setting Small Mammal traps
Fri am	Bird point counts (general transect/ Quail & Snipe monitoring)
Fri pm	Habitat/ Vegetation survey Lecture 4 - Iberian Wildlife and Conservation Course
Fri eve	Presentation preparation
Sat am	Herpetofauna survey (transect/ pitfall traps)
Sat pm	Bat Survey (transect/ trapping) Lecture 5 - Iberian Wildlife and Conservation Course
Sat eve	Presentations
Sun am	Small mammal trapping (collect traps)
Sun pm	Invertebrate transect and workshop Lecture 6 - Iberian Wildlife and Conservation Course
Sun eve	Community engagement activities (community oven activity, leaving meal with community or local produce and artisans)
Mon	Transfer to marine site

3. Biodiversity Monitoring

Amphibians and Reptiles

Herpetofauna data will be collected using active searching along the forest transect lines between 9.30am-1pm (to monitor diurnal species) and between 7.30pm-11.30pm (to monitor nocturnal species). Searches will be conducted along the transect line and up to 2m either side of the transect line. The duration of the survey and total distance travelled will be recorded for each survey in order to calculate relative abundance of species that incorporates survey effort. For each animal observed the species will be identified using field guides, the GPS location and distance travelled along the transect will be recorded along with the time, weather conditions and habitat type. Wherever possible, the animal will be captured in order to mark for recapture (scale clipping of reptiles only) and to record additional information before releasing the animal in the same location as capture. For each animal captured the sex, age (adult or juvenile), weight (g), the length of the animal (SVL), length of the head, and length of tail (were relevant) and colouration (camouflage or aposematic) will be recorded. In addition, the animal will be photographed in situ (back, head and side).

Data collected will involve two methods. Diurnal and nocturnal timed searches will be conducted for amphibians, snakes and lizards. For each capture, the sex, age (adult or juvenile), weight(g), the length of the animal (SVL), length of the head, and length of tail (were relevant) and colouration (camouflage or aposematic) will be recorded. In addition, the

animal will be photographed in situ (back, head and side). The process will be repeated several times until final numbers recorded become consistent across separate counts.

Birds

Bird data will be collected using point counts and mist netting. The point count surveys will be completed between 05:30am and 09:00am. If it is raining heavily or there are strong winds the survey should be cancelled. On all surveys the weather conditions at the time of the point count should be recorded. Point counts of birds (by sight or call) will be conducted at 10 different points along the transect a 200m intervals. No settling down period should be allowed with counts starting immediately. Then over the next 10 minutes for each species the following details should be recorded: species, number of individuals, whether the bird(s) was seen or heard, and the approximate distance of the bird from the observer (recorded at 5m intervals).

The abundance and diversity of understory birds will also be assessed using mist nets. Mist nets are unable to sample canopy and mid-canopy species adequately but does allow for quantitatively reliable data to be produced for tropical understory birds, allows for the identification of birds that are shy or seldom vocal, minimises observer bias, and produces results that are easily repeatable. Mist nets surveys will run 6 days per week at each research camp using a suitable existing clearing along one of the sample routes with enough space to erect two 12m long mist nets 2.5 meter high. The location of this mist net site will be marked, and the GPS location recorded. All mist netting will be conducted at the same site per camp. Mist netting will occur in the mornings between 6:30am and 10:30am (allowing time for bird point counts prior to mist netting) and in the afternoons between 3.30pm and 6:00pm.

The opening and closing time of the nets will be recorded each session and nets will be checked every 20 minutes for the duration of the survey. When birds are found in the net, the time of capture will be noted. The birds will be taken out of the net, placed in a cotton bag for holding whilst other birds are being processed. The birds will be weighed (to the nearest gm) and standard morphological measurements taken. The birds will be released close to the net site but far enough away to avoid them being immediately re-trapped. The abundance and community composition will be compared between habitats and all the species will be categorised into breeding, habitat and feeding guilds.

Bats

Bat mist nets surveys will run 6 nights per week at the research camp using a suitable existing clearing along the transects with enough space to erect five 6m long mist nets 2.5 meter high. Additional mist netting sites outside of the transects may also be used. The location of each mist net site will be marked and the GPS location recorded. Mist netting will be conducted between 7:30pm and 1am, but as data collection may be affected by rain, the exact opening and closing time of the nets will be recorded each session. The nets will be checked every 15 to 20 minutes during the first 3 hours of sampling and every 30 minutes for the last three. All the bats will be extracted from the nets following standardized protocols so as to minimize the stress and will be kept in a capture bags for 30mins, maximum. This time will vary depending on the size of the bat and the sex; pregnant females will be measured and

released. Bats will be weighed, sexed, and species, reproductive status, the length of the forearm, feet and leg will be measured.

Each bat captured must be marked to control for recaptures (i.e. capture-mark-recapture sampling). The marking of captures only needs to last for the duration of the study and as data collection will only be conducted over the summer so the same method of painting rings around the feet with different coloured nail polish can be used (where rings painted on the right foot depict mist net location and rings on the left foot indicate the number of times captured).

Butterflies

The relationship between forest structure and tree species composition with butterfly community structure will be investigated by placing a series of conical traps in different forest locations. Traps will be made from mosquito netting rolled into a large cylinder. Mosquito netting will also be used to enclose the top of the cylinder and a plastic plate will be hung from the bottom of the cylinder using wire. The plastic plate will be baited with rotten bananas and other fruit each morning at 10-11am and then checked in the afternoon between 3-4pm. Traps will be hung from suitable trees in different areas of the forest and a 20m x 20m habitat plot (using the previously described methods) will be conducted around each trap in order to record forest structure variables and tree species composition. A total of 10 traps (5 understorey and 5 canopy) will be used in each of the research camps. Each butterfly caught in the trap will be identified to species level and will then be released.

Mammals

Small and large terrestrial mammals will be surveyed along line transects that were placed without any pre-determined knowledge of the distribution of the animals. Large mammals will be surveyed using distance sampling as they are conspicuous and the particular species present in the reserve do not shy away from observers. These data will be collected by walking the entire length of the transect line in small groups of 4-5 observers walking quietly starting at 6.30am, when they are most active and are easiest to detect. Each time a large mammal is encountered, the species, whether the animals was seen or heard, number of individuals (visual sightings only), perpendicular distance from the individual to the transect line, habitat, time, distance travelled along the transect line and weather conditions will be recorded.

The distance sampling method is only suitable when animals are relatively easy to detect and is therefore unsuitable for monitoring elusive species or species that naturally live at low densities such as the Iberian wolf. Thus, an additional method will be used to monitor these species known as patch occupancy sampling. Patch occupancy sampling involves detecting animals based on tracks and faeces rather than visual or vocal sightings of the animals (Figure 3). For each track encountered the following data will be recorded: species, length and width of track, approximate age of track (days) and leaf litter depth.

In addition to transect surveys, large mammals are monitored using camera traps and river surveys will be used for otter distribution.

4. Iberian Ecology and Conservation Course

Lecture 1: Conservation, Operation Wallacea and Peneda Gerês National Park

- Opwall Conservation Model
- Pressures and issues in the national park
- Sustainable agriculture

Discussion/Activity – Discussion of the pressure on rural areas

Lecture 2: Biodiversity and Evolution

- Definitions of biodiversity
- Biodiversity gradients, Darwin and Wallace
- Biodiversity monitoring, sampling strategies and replication
- Mark-recapture surveys
- Line transect surveys
- DISTANCE and PRESENCE to model species abundance
- How data is used for long-term monitoring

Discussion/Activity – Discussion on pros and cons of different survey techniques

Lecture 3: Endemism, hotspots and Habitat types

- Endemism
- Biodiversity hotspots
- Formation of and habitat characteristics of the Iberian Peninsula
- Endemism in Portugal
- Impact of Agriculture on biodiversity

Discussion/Activity – How does agriculture alter the biodiversity of the park?

Lecture 4: Birds of the Iberian Peninsula

- Bird diversity and evolution
- Bird anatomy and adaptation
- Bird Identification
- Courtship and mating
- Flight and migration
- Birds of Calakmul

Discussion/Activity – Bird Sampling Challenge

Lecture 5: Herpetofauna, Butterflies and Adaptations

- Classification of herpetofauna
- Amphibians
- Snakes and Lizards

- Butterflies as forest indicators
- Cryptic and warning colouration
- Batesian mimicry and Mullerian mimicry

Discussion/Activity – Adaptation quiz

Lecture 6: Iberian Mammals and Survey Techniques

- Bats – roost site preferences and survey methods
- Large Mammals – Iberian wolf, wild horses

Discussion/Activity – Check the latest camera trap photos

5. Learning Outcomes from Week 1

The students should achieve the following learning outcomes from the fieldwork, practicals, lectures and discussions/activities:

- Be able to describe different Iberian habitat types
- Be able to describe the key flora and fauna found in the Iberian Peninsula
- Describe different farming practices and how these impact biodiversity
- Give examples of cryptic, warning colourations, Batesian and Mullerian mimic species
- Be able to identify 5 species of herpetofauna in Peneda Gerês National Park.
- Describe different bird survey techniques
- Be able to identify 10 species of resident birds in Peneda Gerês National Park
- Describe survey techniques used to monitor mammal populations.
- Be able to identify 5 species of forest mammals in Peneda Gerês National Park
- Be able to describe the pros and cons of agriculture on the environment

6. Marine Project Overview

Berlengas Biosphere Reserve

The Berlengas Biosphere Reserve includes a group of small islands and rocks, and the city of Peniche on the mainland. The reserve includes the Berlengas archipelago, the city of Peniche located in the mainland and a marine corridor between the archipelago and Peniche. The main conservation concerns in the reserve are located in the Berlengas archipelago, which consists of a group of islands and coastal reefs in three groups: Berlenga Island and associated reefs, Farilhões and Estelas.

The geology and geomorphology of the archipelago do not favour the formation of aquifers or perennial watercourses and the vegetation is mainly herbaceous. Most of the rocky substrate is in the form of steep cliffs sparsely covered with vegetation, sheltering important seabird nesting colonies. The archipelago is situated 5.7 miles off the mainland, in a region

characterised by two important geomorphological structures Cabo Carvoeiro and the Nazare Canyon.

These two formations have a significant influence on the physical environment and ecological features of the region, since they interact with the circulation associated with coastal upwelling to intensify primary production in the ecosystem.

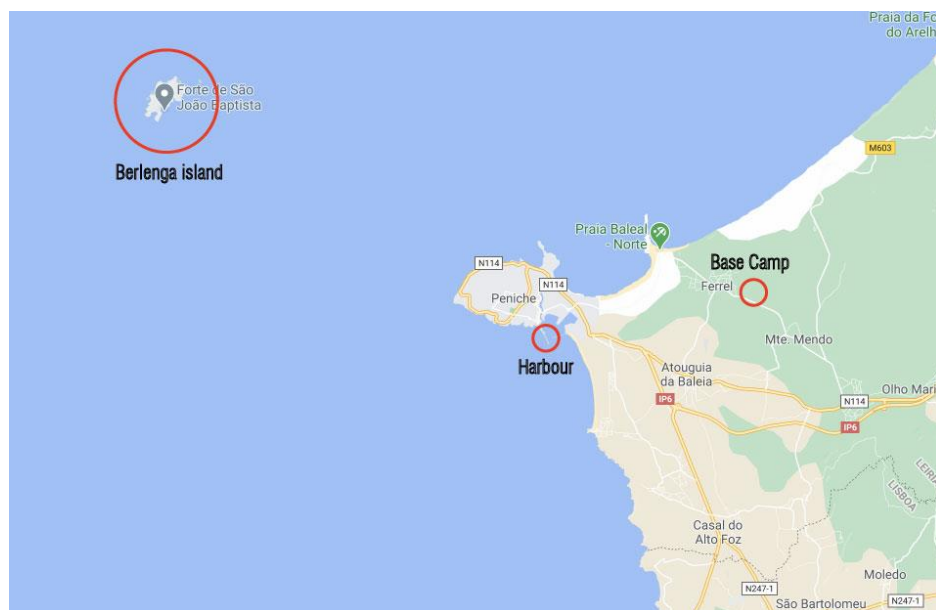
There is no population living permanently on the Berlengas archipelago. Residence is temporary and confined to Berlenga Island where there is a small services area that hosts temporary visitors and tourists.

The city of Peniche has 16000 inhabitants. Most of the economic development of the Peniche is based on tourism, fishing and associated activities.

These zones are generally classed under a group of domestic and European land use and nature conservation instruments, viz.: Nature 2000 Network (Sitio do Arquipelago da Berlenga e Zona de Protecção Especial das Berlengas), Rede Nacional de Áreas Protegidas (Reserva Natural das Berlengas) and Plano Director Municipal.

A range of goals and management guidelines have been established for these areas. The Berlengas archipelago and adjacent sea is governed by the Plano de Ordenamento da Reserva Natural das Berlengas. The body created to manage the whole Biosphere Reserve is the Permanent Working Group of the Berlengas Biosphere Reserve.

Figure 3. Map of Berlengas and Peniche



7. Week 2 Itinerary

The students will complete 5 days of training in marine science. Students will arrive at Peniche on the Monday afternoon and go directly to the research and accommodation facilities located in a beautiful, wooded lot just a short 15-minute drive from the harbour from which they will depart every day to their diving and research activities. Accommodation is in tents and the camp has central dining and lecture areas. Students will eat breakfast at the accommodation site and then travel in minibuses to the designated harbour for their diving

and research activities. Students will spend the day at the survey sites and will eat lunch at these sites or back at the accommodation.

If students are already dive trained or don't want to learn to dive, then they can do the Berlengas Marine Ecology Course with the practical elements done either by diving or snorkelling. Alternatively, they can learn to dive to PADI Open Water level. A third alternative is to complete their theory and confined water practical's before coming on expedition and then completing the open water dives to achieve the PADI Open Water qualification on site before moving on to the Berlengas Marine Ecology Course. Students will be occupied in the evenings through a series of science talks, documentary viewings and discussions or activities relating to the Berlengas Marine Ecology Course.

8. Berlengas Marine Ecology Course

Table 2 below shows an example timetable of the activities that students undertaking the Berlengas Marine Ecology Course will complete over the week. The contents of the timetable are comprehensive, but the timing of the sessions will vary for each group. The practical element of the Atlantic ecology course can be completed by either diving or snorkelling. If students are already qualified divers by the time they arrive on site, they will be required to complete a compulsory check dive with a PADI Professional at the start of the course. The Berlengas Marine Ecology Course is designed specifically for 6th Form students in mind. It covers a range of topics suitable to support A-Level biology and geography students over a range of different syllabuses. Lectures will be supported by in-water practicals. In addition to the lectures, a discussion/activity element will be sure to engage the students into the science and get them thinking themselves of the importance of the study topic.

Table 2 shows Indicative timetable for students completing the Berlengas Marine Ecology Course. Note there may be changes to this itinerary depending on fitness of students, weather conditions or operational issues on site.

Day	Full Berlengas Marine Ecology Course group
Monday pm	Welcome lecture Allocation to groups for diving and practical sessions
Monday evening	Dive documentation
Tuesday am	Skin diver swim test
Tuesday pm	Buoyancy dive
Tuesday evening	Lecture 1
Wednesday am	Snorkel and free dive training
Wednesday pm	Snorkel and free dive training
Wednesday evening	Lecture 2
Thursday am	Sea urchin survey training
Thursday pm	Sea urchin survey
Thursday evening	Lecture 3
Friday am	Fish survey training
Friday pm	Marine ID workshop
Friday evening	Lecture 4
Saturday am	Fish survey

Saturday pm	Sea urchin survey
Saturday evening	Packing & social evening
Sunday am	Depart Peniche early morning to Oporto airport

Berlengas Marine Ecology Course Lectures

The Berlengas Marine Ecology Course covers the following topics which are designed to train students in the ecology, conservation issues and survey techniques that are being used on the surveys. The lectures, films and practical exercises on this course will help the students become immersed in the ecology and conservation issues of the Atlantic Ocean and will cover the following areas:

Lecture 1: Introduction to Berlengas Natural Reserve and conservation programs

Lecture 2: Marine Survey techniques

Lecture 3: Flora and fauna biodiversity in the Berlengas Natural Reserve

Lecture 4: Invasive species in the Berlengas Natural Reserve

9. PADI Open Water Diver Course

This course consists of three different elements of learning: dive theory (knowledge development), confined water dives and open water dives. Each component plays its own role in the students' development to meet the performance requirements and objectives they need to become a qualified diver.

Please be aware that as a part of the PADI Open Water Course, all students will be required to complete some basic stamina tests on site. Student divers will need to demonstrate that they can comfortably maintain themselves in water too deep in which to stand by completing a 10-minute swim/float without using any swimming aids. Students will also have students complete a 200m continuous surface swim or a 300 m swim with mask, fins and snorkel.

Table 3 shows indicative timetable for students completing the PADI Open Water Course. Note there may be changes to this itinerary depending on progression through the course, fitness of students, weather conditions or operational issues on site.

Day	Open Water group
Monday pm	Welcome lecture
Monday evening	Dive documentation
Tuesday am	Swim test and Confined water 1
Tuesday pm	Dive theory
Tuesday evening	Lecture 1
Wednesday am	Confined water 2
Wednesday pm	Dive theory
Wednesday evening	Lecture 2
Thursday am	Confined water 3
Thursday pm	Dive theory & exam
Thursday evening	Lecture 3
Friday am	Open Water 1

Friday pm	Open water 2
Friday evening	Lecture 4
Saturday am	Open water 3 & Dive certification
Saturday pm	Snorkel and free dive training
Saturday evening	Packing & social evening
Sunday am	Depart Peniche early morning to Oporto airport

10. PADI Open Water Referral Course

For those students who have completed both the dive theory and confined water sessions prior to expedition they can complete their PADI Open Water Referral Course on site. The students will first complete a check dive with their instructor to demonstrate that they still remember and can confidently perform the necessary skills to progress on to complete their open water dives.

Once referral students have successfully completed the final stages of their PADI Open Water course, they will be able to progress on to the Berlengas Marine Ecology course. Although there will not be enough time to run the full course, referral students will be able to join at a stage where they can get the chance to learn about the application of survey techniques in the marine environment and how that supports the management of coral reefs.

Table 4 shows indicative timetable for students completing the PADI Open Referral Course. Note there may be changes to this itinerary depending on progression through the course, fitness of students, weather conditions or operational issues on site.

Day	Open Water Referral group
Monday pm	Welcome lecture Allocation to groups for diving and practical sessions
Monday evening	Dive documentation
Tuesday am	Check dive
Tuesday pm	Open Water 1
Tuesday evening	Lecture 1
Wednesday am	Open Water 2
Wednesday pm	Open Water 3
Wednesday evening	Lecture 2
Thursday am	Open Water 4 & exam
Thursday pm	Snorkel and free dive training
Thursday evening	Lecture 3
Friday am	Marine ID workshop
Friday pm	Fish survey training
Friday evening	Lecture 4
Saturday am	Fish survey
Saturday pm	Fish survey
Saturday evening	Packing & social evening
Sunday am	Depart Peniche early morning to Oporto airport

11. Links to A levels and UCAS points

The following two tables highlight how your Opwall expedition relates to the AS and A-level syllabuses across all exam boards. The red blocks indicate that the keywords listed are covered on our expedition (through lectures, practical's or in discussion topics) and that these keywords are also within AS or A-level topics as shown.

Table 4: Highlighted in Black are topics that you might experience at your research site. Key: C = Cambridge. Pre-U, C.int = Camb. Int. CCEA = N.Ireland; Ed/Sal = Edexcel Salters, S= SQA ; Edex = EdExcel ; IB = International Bacc; AP=Advanced Placement (v. 20/11/14)

Topic	Biology	AQA		C	CCEA		C.int		Ed/Sal		OCR		SQA		WJEC		AP	IB	
		S	2		S	2	S	2	S	2	S	2	H	AH	S	2			
Evolution, Classification and DNA	Evolution; Speciation; Species; Endemism; Gene pool; Allopatric; Sympatric; Isolation; Variation; Adaptive radiation Adaptation; Wallace; Darwin		◆	◆		◆		◆	◆		◆		◆	◆		◆	◆	◆	
	Classification; Taxonomy; Binomial system; Dichotomous Keys	◆		◆	◆		◆	◆	◆	◆			◆	◆				◆	
	PCR; Genome sequencing; Genetic fingerprinting; DNA profile		◆	◆	◆				◆		◆	◆				◆	◆	◆	
Ecology and Ecosystems	Ecology; Habitat; Niche; Abiotic; Biotic		◆	◆	◆		◆		◆	◆	◆					◆	◆	◆	
	Biome; Ecosystems; Rainforests; Deserts; Coral reefs; Mangroves; Marine; Coasts; Hot arid; Semi-arid; Woodland Bush; Tropics; Tropical		◆	◆		◆	◆					◆				◆	◆	◆	
	Populations; Competition; Interspecific; Intraspecific; Predator Prey; density dependent; independent: Symbiosis		◆	◆		◆	◆					◆				◆	◆	◆	
	Succession; Climax community		◆			◆				◆	◆	◆				◆		◆	
	Biodiversity	◆		◆	◆			◆	◆	◆	◆				◆		◆	◆	
	Practical work; Field techniques; Ecological sampling; Random sampling; Transects; Capture, mark, release and recapture; Biodiversity indexes; Data handling and; presentation; Quadrats; Statistical testing; Measuring; GIS; Research tools		◆	◆		◆				◆	◆	◆	◆	◆		◆	◆	◆	
	Written reports; Research project; Report; Case studies			◆					◆				◆	◆		◆	◆	◆	
Agriculture, Human activities, Conservation and Sustainability	Sustainability	◆		◆					◆	◆	◆					◆			
	Agriculture; Agricultural impact; Agricultural exploitation; Cultivation crops; Food production; Sustainable agriculture; Sustainability; Forestry; Timber; Deforestation; Fisheries; Over fishing; Deforestation; Human management; Human effects; Human activities	◆				◆						◆	◆			◆	◆		
	Fair-Trade; Coffee; Rain Forest Alliance; Ecotourism; Tourism; Carbon trading; Greenhouse gas emission control (REDD)															◆			
	Indicator species; Pollution; Climate change; Global warming Carbon footprint; Fossil fuels		◆	◆		◆				◆	◆		◆				◆	◆	
	International conservation; Endangered species; Invasive species; Biological control; Pests; CITES; Ethical, Local; Global	◆	◆	◆		◆		◆				◆	◆	◆			◆		◆
	National Parks; Wildlife reserves							◆										◆	
	Environment; Environmental monitoring; Environmental impact; SSSI																		
Behaviour	Animal behaviour; Primate Social behaviour; Courtship; Territory; Co-operative hunting; Herbivores; Grazing	◆		◆	◆		◆				◆	◆	◆		◆	◆	◆		

Table 5: Highlighted in Black are topics that you might experience at your research site. Key: IB ESS = Env Systems and Societies; APES = Advanced Placement Env. Science (v. 20/11/14)

Topic	Environmental Science APES and ESS	IB ESS	APE S	UK Geography A Levels AQA, Edexcel, eduqas and OCR
Evolution, Classification and DNA	Evolution; Speciation; Species; Endemism; Gene pool; Allopatric; Sympatric; Isolation; Variation; Adaptive radiation Adaptation; Wallace; Darwin	◆		There has been a complete revision of UK Geography A levels. Although our expeditions are possibly not going to be as relevant to Geographers as they are to Biologists there are a significant number of topics covered by the various examination boards in which matching occurs with reference to: <ul style="list-style-type: none"> • human impact on ecosystems • ecosystems in general • biodiversity • sustainability • fair trade • work of NGOs • deforestation • GIS • carbon trading • climate change • case studies linked to biomes such as rainforests.
	Classification; Taxonomy; Binomial system; Dichotomous Keys			
	PCR; Genome sequencing; Genetic fingerprinting; DNA profile			
Ecology and Ecosystems	Ecology; Habitat; Niche; Abiotic; Biotic	◆	◆	All exam boards expect experience of field investigation techniques, statistical use and data manipulation which are very relevant to their experiences whilst on location at their expedition site. Almost all boards now require an independent investigation by students which fits really well with the present IRPs although the topic chosen must relate to their exam syllabus so topics such as the REDD scheme are possible choices. Their IRPs are between 3,000 and 4,000 words and should take up 4 days minimum to achieve. AQA have defined primary data as “Primary data is defined as unmanipulated data, either collected in the field or a raw dataset” which will work well with past data sets and the research data they help to collect when on their expedition. Specific detailed exam board matching is available on request.
	Biome; Ecosystems; Rainforests; Deserts; Coral reefs; Mangroves; Marine; Coasts; Hot arid; Semi-arid; Woodland Bush; Tropics; Tropical	◆	◆	
	Populations; Competition; Interspecific; Intraspecific; Predator Prey; density dependent; independent: Symbiosis	◆	◆	
	Succession; Climax community	◆		
	Biodiversity	◆	◆	
	Practical work; Field techniques; Ecological sampling; Random sampling; Transects; Capture, mark, release and recapture; Biodiversity indexes; Data handling and; presentation; Quadrats; Statistical testing; Measuring; GIS; Research tools	◆	◆	
	Written reports; Research project; Report; Case studies	◆	◆	
Agriculture, Human activities, Conservation and Sustainability	Sustainability	◆	◆	All exam boards expect experience of field investigation techniques, statistical use and data manipulation which are very relevant to their experiences whilst on location at their expedition site. Almost all boards now require an independent investigation by students which fits really well with the present IRPs although the topic chosen must relate to their exam syllabus so topics such as the REDD scheme are possible choices. Their IRPs are between 3,000 and 4,000 words and should take up 4 days minimum to achieve. AQA have defined primary data as “Primary data is defined as unmanipulated data, either collected in the field or a raw dataset” which will work well with past data sets and the research data they help to collect when on their expedition. Specific detailed exam board matching is available on request.
	Agriculture; Agricultural impact; Agricultural exploitation; Cultivation crops; Food production; Sustainable agriculture; Sustainability; Forestry; Timber; Deforestation; Fisheries; Over fishing; Deforestation; Human management; Human effects; Human activities	◆	◆	
	Fair-Trade; Coffee; Rain Forest Alliance; Ecotourism; Tourism; Carbon trading; Greenhouse gas emission control (REDD)	◆		
	Indicator species; Pollution; Climate change; Global warming Carbon footprint; Fossil fuels	◆	◆	
	International conservation; Endangered species; Invasive species; Biological control; Pests; CITES; Ethical, Local; Global	◆		
	National Parks; Wildlife reserves			
	Environment; Environmental monitoring; Environmental impact; SSSI	◆		
Behaviour	Animal behaviour; Primate Social behaviour; Courtship; Territory; Co-operative hunting; Herbivores; Grazing			

12. IRPs or Individual Research Projects

In the last few years an increasing number of students joining our research programmes take this opportunity to undertake IRPs. These research projects take many different forms, but what they all have in common is the need to pose and answer a research question. Examples of these include Extended Project Qualification (EPQ), Extended Essay (EE) for IB, as well as many different projects specific to various education systems worldwide.

We can support a selection of different topics for either essay-based research projects or data-led research projects that are tailored towards what the students will experience on site. It is a fantastic opportunity for a student to witness first-hand many of the aspects of their research question and, in many cases, they will have access to samples of past datasets for their project. Students may also have the opportunity to talk with the actual scientists involved which will give them a convincing 'slant' to the way in which they answer their research question.

For success with IRPs, careful planning is needed by the student and a lot of the work will be done prior to their expedition. They will need close guidance from their school supervisor, and the scientists in the field need to be briefed so that support can be provided where they can. If you or your students are interested in undertaking a research project with us, you should contact schoolresearchprojects@opwall.com.

For more information visit the Opwall website - <https://www.opwall.com/schools/educational-benefits/independent-research-project/>.

References and Suggested Reading

Conservation Planning for Biodiversity and Wilderness: A Real-World Example.

2015. Silvia Ceausu, Inês Gomes and Henrique Miguel Pereira

Ecosystem Services and Human Well-Being: a Participatory Study in a Mountain Community in Portugal.

2005. Elvira Pereira, Cibele Queiroz, Henrique Miguel Pereira and Luis Vicente

Stakeholder Network Integrated Analysis: The Specific Case of Rural Tourism in the Portuguese Peneda-Gerês National Park.

2014. Sónia Nogueira and José Carlos Pinho

Temporal (1958–1995) pattern of change in a cultural landscape of northwestern Portugal: implications for fire occurrence.

2001. Francisco Moreira, Francisco C. Rego and Paulo G. Ferreira

Nuno Vasco-Rodrigues, Susana Mendes, João Franco, Maria Castanheira, Nuno Castro & Paulo Maranhão. 2011. Fish diversity in the Berlengas Natural Reserve (Portugal), a marine protected area.

<http://www2.icnf.pt/portal/ap/pnpg>

<https://www.inaturalist.org/places/berlengas-natural-reserve>