

## BIODIVERSITY POLICY

With the implementation of its Biodiversity Policy, EDP is contributing to the world's objective of reducing biodiversity loss due to human activity.

IN PARTICULAR, EDP:

- Is aware of the sensitivity of natural ecosystems and of the pressures that these are subject to, as well as of the intrinsic value of the initiatives aimed at protecting biodiversity;
- Has significant experience in minimising the impact on biodiversity resulting from its activities;
- Wants to have an even more active role in the conservation of biodiversity and its promotion.

EDP deems biodiversity to be integrated in the management of its companies. The objective is to achieve an overall positive impact on biodiversity.

TO THAT END, EDP IS COMMITTED TO:

1. Integrate the biodiversity impact assessment in all phases of its activities: project design, construction, operation and dismantlement of its energy generation and distribution infrastructures;
2. Minimise any negative impact on biodiversity arising from its activities, and promote positive impacts. When any negative impact cannot be prevented, EDP will implement consensual compensation measures, which allows the achievement of a globally positive biodiversity balance sheet;
3. Contribute to broadening scientific knowledge on the different aspects of biodiversity, in particular by supporting institutions selected in a transparent manner and in accordance with superior technical capability criteria;
4. Strengthen dialogue and partnerships on biodiversity issues with public or private entities;
5. Regularly and transparently report on its performance in relation to biodiversity, under the revision of independent bodies, and promote regular consultation to the different stakeholders, on this issue.



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## 01. EDP GROUP

EDP – ENERGIAS DE PORTUGAL, S.A. is a vertically integrated utility company. It is a multinational company operating across 14 countries – China and Angola only have single offices – and businesses in the energy sector (electricity and gas). EDP is the largest generator, distributor and supplier of electricity in Portugal, being in the Iberian Peninsula the third largest electricity generation company and one of the largest gas distributors.

Electricity generated by EDP Group comes from conventional or non-intermittent generation, and renewables based on intermittent sources (wind and sun). EDP's conventional generation is located in three countries: Portugal and Spain (Iberia), and Brazil. EDP is the fourth-largest private electricity producer in Brazil and has two electricity distribution concessions. It is also the third largest private supplier in the liberalised market.

EDP Renováveis, responsible for energy from intermittent sources, operates in several other countries and is one of the world's largest wind power operators with wind farms across the Iberian Peninsula, the United States, Brazil, France, Belgium, Italy, Poland and Romania, with projects in development in United Kingdom and in Mexico. EDP also produces solar power in Portugal, Romania and the United States.

# edp IN A BIODIVERSE WORLD

EDP considers biodiversity as an integral part of its management. With the implementation of its biodiversity policy, the Group aims to contribute to the global target to reduce biodiversity loss resulting from our activity. EDP publishes its Biodiversity Report since 2009: [www.edp.pt](http://www.edp.pt) > sustainability > publications

## POLAND ROMANIAN ITALY

### FIGURES

|       |                                    |
|-------|------------------------------------|
| 96    | Employees                          |
| 1,003 | Installed capacity (MW)            |
| 824   | Net generation (GWh)               |
| 1,671 | MW under construction              |
| 100%  | Generation from renewable sources* |

### BIODIVERSITY

|      |  |
|------|--|
| 22,8 | <b>Environmental Costs</b> <sup>(2)</sup><br>Wind farms in classified areas (ha) |
|------|--|

 Hotspots Biodiversidade onde a EDP tem atividades

 Hotspots Biodiversidade

- \* MW EBITDA
- \* \* Includes hydroelectric, wind, biomass and waste

See on:  
[www.edp.pt](http://www.edp.pt) > sustainability > biodiversity

- EDP generation centres in RAMSAR Sites
- The species of fauna potentially threatened by EDP generation centres

#### Notes:

- (1) Consolidated according to the equity method
- (2) Environmental costs for the Rest of Europe: Investments (EUR thousand): 1,545 Spent (EUR thousand): 825
- (3) Includes 6MW of Renewables

## FRANCE UNITED KINGDOM BELGIUM

### FIGURES

|      |                                    |
|------|------------------------------------|
| 79   | Employees                          |
| 411  | Installed capacity (MW)            |
| 824  | Net generation (GWh)               |
| 0    | MW under construction              |
| 100% | Generation from renewable sources* |

### BIODIVERSITY

|     |  |
|-----|--|
| 4,6 | <b>Environmental Costs</b> <sup>(2)</sup><br>Wind farms in classified areas (ha) |
|-----|--|



## USA CANADA MEXICO

### FIGURES

|        |                                    |
|--------|------------------------------------|
| 316    | Employees                          |
| 3,835  | Installed capacity (MW)            |
| 10,204 | Net generation (GWh)               |
| 299    | MW under construction              |
| 100%   | Generation from renewable sources* |

### BIODIVERSITY

|       |   |
|-------|---|
| 6,022 | <b>Environmental Costs</b> <sup>(2)</sup><br>Investments (EUR thousand) |
| 3     | Costs (EUR thousand)  |

## PORTUGAL

### FIGURES

|           |                                      |
|-----------|--------------------------------------|
| 6.733     | Employees                            |
| 6.055.072 | Electricity and gas customers        |
| 9.310     | Installed capacity (MW)              |
| 25.498    | Net generation (GWh)                 |
| 65%       | Generation from renewable sources*   |
| 2.660     | MW under construction <sup>(3)</sup> |
| 43.808    | Distribution of electricity (GWh)    |
| 6.876     | Distribution of gas (GWh)            |

### BIODIVERSITY

#### Environmental Costs

|        |                           |
|--------|---------------------------|
| 15.450 | Investment (EUR thousand) |
| 16.521 | Costs (EUR thousand)      |

#### In classified areas\*

|       |  |
|-------|--|
| 3.073 | Area flooded by reservoirs (ha)                |
| 86    | Wind farms (ha)                                |
| 8.800 | Overhead high and medium voltage lines (km)    |
| 926   | Underground high and medium voltage lines (km) |
| 20    | Substations                                    |

## SPAIN

### FIGURES

|           |                                      |
|-----------|--------------------------------------|
| 1.898     | Employees                            |
| 1.797.706 | Electricity and gas customers        |
| 6.030     | Installed capacity (MW)              |
| 6.030     | Net generation (GWh)                 |
| 42%       | Generation from renewable sources*   |
| 1,8       | MW under construction <sup>(3)</sup> |
| 9.177     | Distribution of electricity (GWh)    |
| 46.970    | Distribution of gas (GWh)            |

### BIODIVERSITY

#### Environmental Costs

|        |                           |
|--------|---------------------------|
| 5.303  | Investment (EUR thousand) |
| 25.021 | Costs (EUR thousand)      |

#### In classified areas\*

|     |  |
|-----|--|
| 260 | Area flooded by reservoirs (ha)                |
| 57  | Wind farms (ha)                                |
| 805 | Overhead high and medium voltage lines (km)    |
| 46  | Underground high and medium voltage lines (km) |
| 8   | Substations                                    |



## BRAZIL

### FIGURES

|           |                                    |
|-----------|------------------------------------|
| 2.674     | Employees                          |
| 3.151.827 | Installed capacity (MW)            |
| 547       | Net generation (GWh)               |
| 343       | MW under construction (1)          |
| 26.443    | Distribution of electricity (GWh)  |
| 100%      | Generation from renewable sources* |

### BIODIVERSITY

#### Environmental Costs

|        |                                   |
|--------|-----------------------------------|
| 10.704 | Investment (EUR thousand)         |
| 2.275  | Costs (EUR thousand)              |
| 10.171 | Permanent preservation areas (ha) |

#### In classified areas\*

|       |  |
|-------|--|
| 0     | Area flooded by reservoirs (ha)                |
| 4.066 | Overhead high and medium voltage lines (km)    |
| 4     | Underground high and medium voltage lines (km) |
| 8     | Substations                                    |

## 1.1. BIODIVERSITY FOR EDP

Growing concerns amongst global organisations, in particular the United Nations Conference on biodiversity protection, are leading to biodiversity management being present in companies' strategic and operational decisions which have high impact.

Recognising the importance of the results obtained by the Millennium Ecosystem Assessment, in 2007 EDP published its **Biodiversity Policy** and assumed a commitment to promoting effective management of its impacts on biodiversity.

In the strategic management of biodiversity EDP takes into consideration two international benchmarking tools: The **Strategic Plan for Biodiversity** for the period 2011 to 2020, known as the 'Aichi Biodiversity Targets', and the EU **Biodiversity Strategy** for 2020 (particularly targets 1 and 2). Thus, to achieve a positive balance of impacts on biodiversity overall, EDP has defined a strategy focused on the following vectors:

- Promoting knowledge production;
- Impact management according to an ecosystem approach;
- Long-term vision;
- Transparency of reporting.

The availability and quality of water is of particular importance for ecosystem dynamics and for the conservation of biodiversity. It is therefore worth highlighting the publication of the **EDP Water Management Policy** in 2012 ([www.edp.pt](http://www.edp.pt) > sustainability > environment > water).

The management of different environmental issues is governed by the Corporate Environmental Management Systems (EMS) implemented in accordance with ISO 14001 ([www.edp.pt](http://www.edp.pt) > sustainability > environment), operated by the Business Units' EMS, which monitor and assess the measures, legal or voluntary, to mitigate or compensate for impacts on biodiversity (page 8).

The main risks and opportunities identified in the management of biodiversity impacts, through an internal corporate analysis, can be read in [www.edp.pt](http://www.edp.pt) > sustainability > environment > biodiversity.

### ECOSYSTEM APPROACH

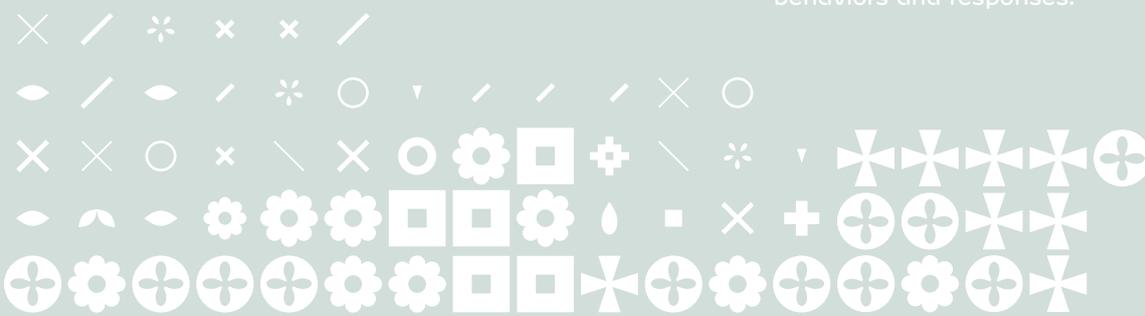
Defended by the Convention on Biological Diversity (CBA) as a strategy for integrated planning of land, water and biological resources. This ecosystem-based approach, supports the application of scientific methods covering:

1) the structure, processes, functions and interactions between organisms and their environment;

2) the recognition of the human being as an integral part of many ecosystems; and

3) biodiversity conservation as a key objective to ensure the balance of ecosystems and the continued economic and social well-being of communities.

This approach supports a participatory process, long-term, adaptive management, able to handle the dynamic nature of ecosystems and the uncertainties associated with their behaviors and responses.



## STRATEGIC APPROACH

Managing biodiversity, as an essential element of ecosystems and elementary functional stability, is to deal with uncertainties and some unpredictability in the behaviour and responses of ecosystems themselves.

The strategic cornerstones, described below, are included by EDP in managing its impacts on biodiversity, as a way of dealing with this dynamism and aligning expected results with international and European measures and initiatives taken.

The table below matches the contents on this report and the cornerstones of the EDP strategy and the objectives, goals and actions of the main reference instruments:

|   |   | ENHANCEMENT OF ECOSYSTEM SERVICES | FISH MIGRATION IN TOUVEDO  | BAXO SAVOR IN OPERATION                        | 10 YEARS OF ADJUSTING POWER LINES | IMPROVING GOLDEN EAGLE HABITATS | TURTLES IN TOCANTINS | BIODIVERSITY IN URBAN AREAS | OSPREY           | EDP CHAIR IN BIODIVERSITY                      | BROWN BEAR IN ASTURIAS     | PART OF US - THE ENVIRONMENT         | EDP FUND FOR BIODIVERSITY                      |
|---|---|-----------------------------------|----------------------------|--|-----------------------------------|---------------------------------|----------------------|-----------------------------|------------------|--|----------------------------|--------------------------------------|--|
|   |   | Systematic promotion of knowledge |                            | ●  | ●                                 | ●                               | ●                    | ●                           | ●                |  | ●                          | ●                                    |  |
| Ecosystem approach*                                   | Participatory approach and local engagement | ●                                 | ●                          | ●  | ●                                 | ●                               | ●                    | ●                           | ●                | ●  | ●                          |                                      |  |
|   | Long-term perspective                       | ●                                 | ●                          | ●  | ●                                 |                                 |                      |                             | ●                |  |                            |                                      |  |
|   | Adaptive management                         |                                   |                            | ●  | ●                                 |                                 |                      |                             |                  |  |                            |                                      |  |
| Long-term vision                                      |   | ●                                 | ●                          | ●  | ●                                 |                                 |                      |                             | ●                | ●  | ●                          | ●                                    | ●  |
| Transparency of reporting                             |   | ●                                 | ●                          | ●  | ●                                 | ●                               | ●                    | ●                           | ●                | ●  | ●                          | ●                                    | ●  |
| Aichi Biodiversity Goals                              |   | B,C, D                            | B,C                        | A,B,C,D,E                                      | B,C,E                             | B,C,E                           | B,C,E                | B,C,D                       | B,C,D            | B,C,D  | B,C,E                      | A,B,C                                | A,B,C,D  |
| Targets/actions of the European Biodiversity Strategy |   | GOAL 1<br>GOAL 2<br>GOAL 6        | GOAL 1<br>GOAL 2<br>GOAL 6 | GOAL 1<br>GOAL 2<br>GOAL 3<br>GOAL 5<br>GOAL 6 | GOAL 1<br>GOAL 2<br>GOAL 6        | n/k                             | n/k                  | n/k                         | GOAL 2<br>GOAL 6 | GOAL 1<br>GOAL 2<br>GOAL 3<br>GOAL 5<br>GOAL 6 | GOAL 1<br>GOAL 2<br>GOAL 6 | GOAL 1<br>GOAL 2<br>GOAL 5<br>GOAL 6 | GOAL 1<br>GOAL 2<br>GOAL 3<br>GOAL 5<br>GOAL 6 |

STRATEGIC CORNERSTONES

## BIODIVERSITY IN ENVIRONMENTAL MANAGEMENT SYSTEMS

EDP assessed the potential effects on biodiversity of its main exploration and operation. This analysis led to the conclusion that they are covered by existing environmental management systems and made possible further systematization and optimization of the best management practices while minimizing these effects on the Group.

Main impacts of Generation and Distribution Activities on biodiversity:

|                                 | Activity  | Environmental Aspect   | Environmental impact   | Effect on biodiversity   |
|---------------------------------|---|--|--|--|
| <b>HYDROELECTRIC GENERATION</b> | Dam rupture   | ➤ Sudden flooding of downstream land                               | ➤ Alterations/Disturbance of habitats, Loss of river continuum                               | ➤ Degradation of the chemical, biological and morphological characteristics of water courses |
|                                 | Drained reservoir   | ➤ Reduction of the mass of available water                         | ➤ Degradation of the chemical, biological and morphological characteristics of water courses | ➤  |
|                                 | Presence of dam/weir  | ➤ Upstream flooding and removal of water and sediment downstream   | ➤ Fragmentation of habitats and potential reduction in water quality                         | ➤ Degradation of ecosystems/loss of habitats and species                                     |
|                                 | Handling dangerous products   | ➤ Accidental/poor handling spillages                               | ➤ Soil pollution (by absorption) and water pollution (surface and subterranean)              | ➤  |
| <b>THERMAL GENERATION</b>       | Combustion  | ➤ Greenhouse gas emissions   | ➤ Climate change   | ➤ Loss of biodiversity   |
|                                 | Combustion  | ➤ Emission of acidic gases, such as NOX and SO2                    | ➤ Acid rain  | ➤ Loss of biodiversity   |
|                                 | Generated in the value chain through the transport of raw materials | ➤ Greenhouse gas emissions   | ➤ Climate change   | ➤ Degradation of habitats  |
|                                 | Resulting from the extraction of raw materials in the value chain   | ➤ Consumption of raw materials                                     | ➤ Alterations/Disturbance of habitats  | ➤ Alterations/ Disturbance of habitats   |
| <b>WIND GENERATION</b>          | Construction of accesses  | ➤ Discontinuity of fauna and flora                                 | ➤ <i>Opening of new accesses that attract more people</i>                                    | ➤  |
|                                 | Wind energy generation  | ➤ Existence of wind turbine  | ➤ Cutting the ecological corridor  | ➤ Loss of biodiversity   |
|                                 | Wind energy generation  | ➤ Existence of wind turbine  | ➤ Cumulative impacts   | ➤  |
| <b>DISTRIBUTION</b>             | Overhead and underground power distribution lines                   | ➤ Power distribution lines, particularly in Rede Natura 2000 zones | ➤ Alterations/Disturbance of habitats  | ➤  |
|                                 | Opening and cleaning of the buffer strip                            | ➤ Discontinuity of fauna and flora                                 | ➤ Alterations/Disturbance of habitats  | ➤ Degradation of ecosystems/loss of habitats and species                                     |
|                                 | Opening of accesses   | ➤ Discontinuity of fauna and flora                                 | ➤ Fragmentation of habitats and potential reduction in water quality                         | ➤  |
|                                 | Use of SF6  | ➤ Greenhouse gas emissions (SF6)                                   | ➤ Climate change   | ➤  |
|                                 | Use of CFCs in cooling equipment                                    | ➤ CFC emissions  | ➤ Climate change   | ➤  |



## 02. CASE STUDIES

### 2.1. . FISH MIGRATION IN TOUVEDO

The Touvedo Hydropower Plant, located on the River Lima in Portugal, with 22MW installed capacity, is mainly intended to regulate the turbine flows from the Alto Lindoso plant, storing them temporarily and returning them to the river.

In view of the nature of the environmental impact, this plant is equipped with an elevator-type fish passage device to mitigate the barrier effect on river flow continuity. Its operation is conditional on the release of environmental flows (including the ecological and reserved flow regime), on the restriction to turbine flows at certain times of the day and the year, and on the restriction to flows in critical periods, such as spring tides.

To promote the effectiveness of the passage of fish through the elevator, EDP, together with the regulatory agencies - Portuguese Environment Agency (APA) and the Nature and Forest Conservation Institute (ICNF) -, launched the Action Plan for the Optimisation of the Fish Elevator at the Touvedo Hydropower Plant. The aim of this initiative was to assess the elevator's performance and to implement improvements to meet the objectives set out in the European Eel Management Plan (prepared by the Portuguese State in accordance with Regulation (EC) No. 1100/2007).

The initiative was carried out between September 2011 and February 2014 and had the scientific support of the School of Agronomy of the University of Lisbon, with implementation in 3 phases:

**Phase 1** - Diagnosis of the condition of the elevator and assessment of its effectiveness;

**Phase 2** - Hydraulic profiling of the attraction channel, proposal and implementation of improvement measures;

**Phase 3** - Reassessment of the elevator's effectiveness.

The action plan focused on six species native to the River Lima (common barbel, northern straight-mouth nase, ruivaco (*Rutilus macrolepidotus*), European eel, river trout and sea lamprey) and a monitoring programme was developed to:

- Compare the information collected from monitoring performed in 1998/99;

- Compare the information collected by videomonitoring in the elevator with the information collected from catching (electrofishing) downstream of the Touvedo dam. For this purpose, the following elevator effectiveness indicators were used: number of individuals observed in the elevator and number of individuals caught downstream of the dam.

- Profile the water availability in the attraction channel under different operating conditions of the generating set (maximum load, half load and off-load).

Over the 2,464 transposition cycles, the effectiveness results demonstrated that fish selectivity was low. However, higher effectiveness is suggested for species whose lifecycle only occurs in the river environment, as is the case of the northern straight-mouth nase. For migrating species, such as the eel and the lamprey, they are inconclusive due to lack of information on downward migration through the turbines and the spillways. They also demonstrated that there is a reduced propensity for smaller species, explained by the fact that the mesh used in the fish trap is large enough to allow smaller fish to escape.



These results enabled structural and operational improvement actions to be implemented which proved to be significantly more effective when comparing the results of prior and subsequent monitoring activities.

In the hydraulic profiling of the attraction channel, monitoring revealed that, under full load, the velocity at the three device inlets is sufficiently attractive and below the critical values for any species. Under half-load or off-load conditions, however, the data was inconclusive, and this prompted further studies for the 2nd phase.

The videomonitoring of the Touvedo elevator will continue in order to confirm the transposability patterns observed, and to evaluate the success of the measures implemented. New results are expected in late 2017.

## 2.2. BAIXO SABOR

The Baixo Sabor Hydropower Plant (AHBS) is located in Portugal's Trás-os-Montes region. It comprises two equalising reservoir dams with 172MW installed capacity (design value). This facility arises from the need to create a strategic water reserve in the uppermost reaches of the Douro in Portugal to regulate the whole flow of the downstream cascade.

The Environmental Impact Study identified areas of great nature conservation and biodiversity areas, located within Natura 2000 (an Ecological Network for the European Union space) which would be permanently affected. In particular, two Sites of Community Importance (SCI) stand out: that of the Rivers Sabor and Maças and that of Morais, and a Special Protection Area (SPA), that of the Rivers Sabor and Maças.

The project was approved, conditional on the implementation of 11 compensatory measures (CMs) with the aim of neutralising the impact, something that the other mitigation measures had not achieved, and reversing the natural environmental degradation trend of the area in which the plant is located.

EDP implemented these measures within an integrated planning and management strategy, supported by the Ecosystem Approach (page 8).

### AHBS OFFSETTING MEASURES

MC1 - Vilariga Habitat Compensation

MC2 - Enhancement and Habitat Recovery of Tributaries including water points with ecological objectives

MC3 - Enhancement of the river corridor on the Middle and Upper Sabor and River Maças

MC4 - Protection and Enhancement Programme for priority Habitats

MC5 - Creation and repair of shelters and habitats for Bats

MC6 - Otter Conservation Programme

MC7- Pyrenean Desman Conservation Programme

MC8 - Protection and Enhancement Programme for the Iberian wolf in Northeast Trás-os-Montes and Beira Alta

MC9 - Protection and Enhancement Programme for Rock-dwelling Birds in Northeast Trás-os-Montes

MC10 - General plan for Protection and Enhancement of Reptiles, Amphibians and Invertebrates in the Vale do Sabor

MC11 - Environmental Interpretation and Animal Recovery Centre (CIARA)



EDP established a technical-scientific consultancy protocol with the Study Centre for Biodiversity and Genetic Resources (CIBIO-UP), thus ensuring independent qualified support in the light of the following principles:

- Seeking a balance between conservation and use of biodiversity;
- Including scientific and local knowledge, innovation and good practice in decision-taking processes;
- Engaging all relevant sectors of society and scientific disciplines;
- Building and implementing community-centred programmes so as to give local stakeholders more control over natural resources on which they are dependent, and finding sustainable solutions;
- Promoting the decentralisation of the operational management of processes closer to the ecosystems, i.e. closer to the real "managers of biodiversity", the agricultural and forestry owners.
- Adopting suitable space and time scales with long-term objectives for the ecosystems;
- Striving for an integrated management without detracting from sectoral management.

This management model brought momentum to the process, resulting in a number of initiatives aiming at enhancing biodiversity conservation and local development.

## ADAPTIVE FIELD MANAGEMENT OF IMPLEMENTATION PROGRAMMES FOR COMPENSATORY MEASURES

### 1) INITIAL ACTIVITY

Sectoral field work and complementary studies by taxonomic group or geographic area were conducted to support the definition of CM conservation actions. It can be concluded that the management of the proposed action plans required an overall vision that enhanced synergies and complementarities. Initially, the possibility was considered that CM4 (priority habitats) could provide the scope for integrating the other measures; however, we realised that the integration effort was not justified since its effectiveness was not as interesting for biodiversity as expected.

### 2) ACTIVITY PERFORMED

Then our technical-scientific consultants submitted an opinion on the integration of the AHBS CMs, supporting the contents of the Report on the Integration of Compensatory Measures (RIMC), subsequently approved by the Environmental Monitoring Commission for the construction phase (CAAC) as a working tool for the following planning stages.

## ENVIRONMENTAL MONITORING

### 1) INITIAL ACTIVITY

Monitoring Programmes (MPs) for the construction, impounding and operation phases were designed. However, even at an early stage of implementation there was a need for optimising the methodologies of the different sector MPs in order to generate scientific gains in information gathering.

### 2) ACTIVITY PERFORMED

The MPs were amended in the context of the technical-scientific consultancy. An electronic platform was also established for integrating and providing the information gathered - Baixo Sabor Biological Data Systems (SIBBS).

Like what happened with the CMs, an Integrated Environmental Monitoring Plan (PIMA) was also drafted for the impounding and operation phases, and the monitoring of MC effectiveness, whose implementation is being undertaken by the University of Trás-os-Montes e Alto Douro (UTAD).

This data/information management process created the conditions for CIBIO, with the support of EDP and the Science and Technology Faculty, to set up the Baixo Sabor LTER (Long-term Ecological Research) site aimed at analysing the AHBS long-term effects.

## REDUCTION OF FIRE HAZARDS

### 1) ACTIVITY PERFORMED

Not anticipated.

### 2) ACTIVITY PERFORMED

A pioneer fire hazard reduction plan is part of the CM integration effort, based on the information gathered in the most important areas from a conservation point of view. The reduction of risk is based on a preventive strategy that relies on land uses capable of changing fire behaviour, e.g. by using farmland such as olive and almond groves, which contributes to self-expansion or to changing fire progression and intensity. The plan aims at preventing fires in a 6,528ha buffer zone (more than twice the reservoir area), of which 1,900ha is in priority conservation areas.

## HERITAGE DISSEMINATION AND AWARENESS

## 1) INITIAL ACTIVITY

Awareness-raising activities were provided alongside conservation actions on a sector basis in the CM studies and, likewise, it can be concluded that management lacked an overall, integrating vision.

## 2) ACTIVITY PERFORMED

An awareness-raising component was incorporated into the RMIC which relies on local biodiversity enhancement and awareness of the ecosystem services, the dangers of its disappearance and the role each of us can play in its conservation.

The programme includes initiatives targeting different audiences so as to cover the various stakeholders. One such initiative is awareness-raising in the school community, whose objective is to bring young people closer to the activities of local socio-economic operators who promote good biodiversity management practices (local farmers, shepherds, ENGOS, etc.), as well as foster a mindset change around the importance of biodiversity for human well-being.

In the implementation of the CMs, the involvement of stakeholders included the participation of landowners, parish councils, managing authorities of hunting areas, local ENGOS, among others. All in all, more than 2,000 partnerships were established, mostly with agroforestry owners (over 1,300). Management agreements are based on direct management by, or transfer of management to the three local ENGOS which took on the role of implementing the actions and acting as direct intermediaries with the remaining local partners. This mediation proved to be instrumental in achieving the ecosystem conservation and local development goals.

Two factors were key in implementing this model of local engagement:

- The number of partners involved, which demonstrates local responsiveness to improve the region's natural conditions and reinforces the guarantee of long-term continuity;
- Greater effectiveness in the implementation of measures, with an advantageous cost-benefit ratio for the conservation of the region's natural wealth.

EDP believes that this will, in the long term, be the model that will best contribute to a positive global balance in biodiversity, as a result of the construction of this undertaking. The model's set of methodologies and practices have been shown to be suitable for adoption by other similar projects.

## PARTICIPATORY PROCESS

An ecosystem approach to biodiversity impact management presupposes a multi-stakeholder participatory process. Under the EIA, a CAAC was set up with representatives of the ENGOS, national, regional and local authorities, the scientific community and the promoter.

## ENVOLVIMENTO DOS STAKEHOLDERS NA IMPLEMENTAÇÃO DO MODELO DE ENVOLVIMENTO LOCAL

## Partnerships

## Land Managers

APATA + Foresters

Responsibility for implementation of most of the activities in areas where projects are already developed

## Associations

AEPGA + APFNT + PALOMBAR

## Official Entities

Participation in clarification sessions and involvement in actions whose implementation depends on the success of its activities in the area (e.g.: Civil Protection; Technical Forestry Offices)

## Areas of Support

## Technical

Development of management plans with a view to future sustainability, going beyond legal obligations

## Scientific

Development of specific actions and issuing reports to support the decision

## Funds

Responsibility for identifying boundaries and owners of agricultural buildings and participation in the negotiating phases

APATA - Associação de Produtores Agrícolas Tradicionais e Ambientais  
AEPGA - Associação para o Estudo e Proteção do Gado Asinino  
APFNT - Associação de Produtores Florestais do Nordeste Transmontano  
PALOMBAR - Associação para a Conservação da Natureza e do Património Rural  
Silviconsultores - Ambiente e Recursos Naturais S.A.  
ZIF - Zona de Intervenção Florestal  
ENGO - environmental non-governmental organization

Additional information at [www.a-nossa-energia.edp.pt](http://www.a-nossa-energia.edp.pt)

## 2.3. A DECADE MINIMISING IMPACT ON THE GRIDS

### NATURE OF THE IMPACTS OF EDP'S ELECTRICITY DISTRIBUTION

The expansion of the power distribution grid highly depends on land use management. As new construction takes place in zones adjacent to areas with nature protection status, the number of kilometres of lines to build in such regions increases. In the Iberian Peninsula, the main impact on biodiversity resulting from EDP's distribution activity stems from collisions by, and electrocution of wild birds. In Brazil, this impact extends to other small mammal species.

- Gauging the effectiveness of the monitoring of the impact on wild birds in the rectified, flagged and newly installed lines with new technologies;

- In the context of this protocol and other processes deemed to be relevant, introducing in phases the corrective measures for those lines with an impact on wild birds identified on the basis of the results from the previous protocol;

- Ensuring compliance with the technical recommendations on the minimisation of impact on wild birds in new or existing lines, in accordance with the Bird Directive (79/409/EEC);

- Deepening the assessment of impact on medium voltage overhead lines in specific situations, such as on the populations of bustards and little bustards in the Castro Verde SPA;

- Building on knowledge of the dispersion of priority birds, to complete the process initiated under the previous protocol.

### WILD BIRD PROTOCOL

The first meeting in Portugal about Electrical Lines and wild birds was jointly organised in 1999 by the Portuguese Society for the Study of Birds (SPEA), the Portuguese Association for Nature Conservation (Quercus) and EDP Distribuição (EDPD).

This forum discussed the impact of electrical lines on wild birds and the need to consider mitigation measures in the planning, construction and maintenance phases of medium voltage (MV) and high voltage (HV) overhead electrical lines.

In 2003, EDP signed the first Wild Bird Protocol applicable to electrical lines, with the setting up of a support task force - the Wild Bird Task Force (GTAS). The mission of this technical advisory group was to track and monitor the corrective measures for lines considered to be dangerous, and to carry out investigation studies on critical lines. This role has been performed by the Technical Monitoring Committee for Electrical Lines and Wild Birds (CTALEIA) since 2009.

The actions outlined have essentially focused on sensitive areas (Protected Areas and Natura 2000) and targeted species of protected birds, particularly larger species, such as eagles, griffon vultures, bustards, etc. The importance of the investigation and monitoring studies on overhead electrical lines, conducted by partner ENGOs for identifying the most critical lines and allocating nature and biodiversity conservation efforts, deserves a special mention.

EDP's participation in this protocol led to the potential impact on biodiversity being taken into account in decision-taking processes during the design and construction phases. This task follows the Recommendation Handbook for the design and construction of new HV and MV Overhead Lines in Special Protection Areas and Protected Areas that was developed under the protocol.

This handbook provided for the standardisation of line construction techniques in protected areas, containing a set of technical solutions for rectifying the existing electrical lines identified as hazardous for wild birds.

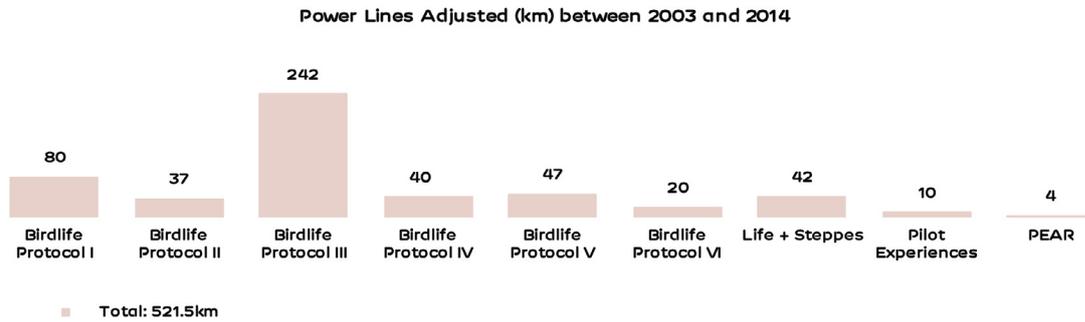
Over the last 11 years, a total of 521.5km of overhead electricity distribution lines deemed critical for birds have been rectified within the National Network of Classified Areas.

#### THE PROTOCOL AIMS AT:

- Deepening knowledge on the impact of high voltage and medium voltage overhead lines on wild birds, with a special focus on listed areas and Important Bird Areas;

- Promoting the application of the Index of Hazardousness for birds along the layout of all lines in listed and Important Bird Areas;





**OTHER EDP DISTRIBUIÇÃO INITIATIVES FOR THE PROTECTION OF WILD BIRDS:**

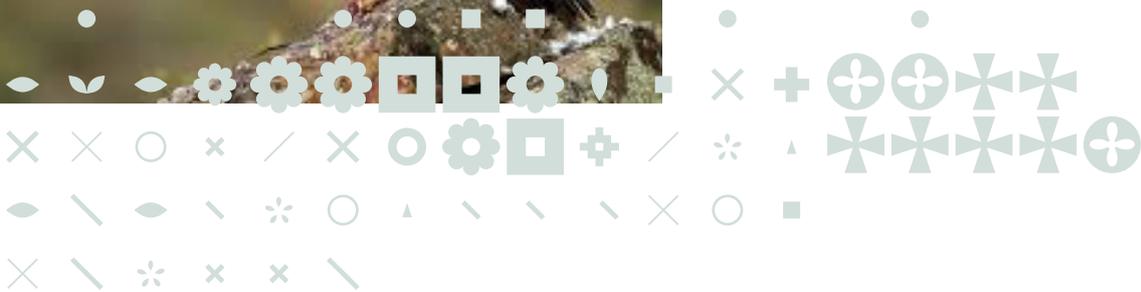
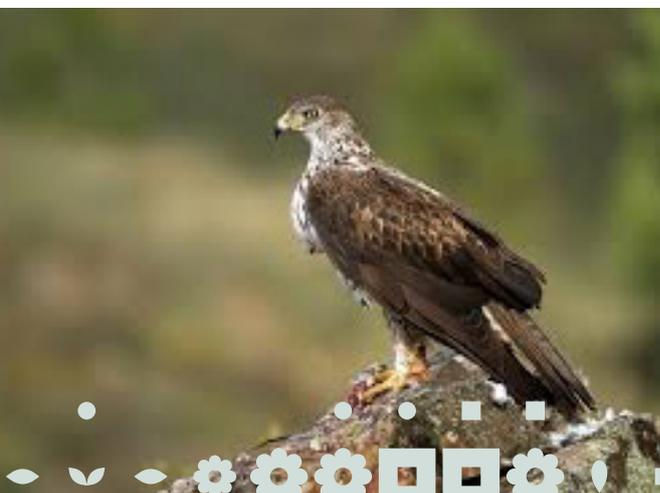
- **Pilot Experiences in 2007-2009:**  
Integration of new bird protection technologies;
- **Pilot Experiences in 2008-2012:**  
Experimentation and application of new bird protection technologies: Anti-electrocution and anti-collision measures, with the correction of 10.4 km;
- **PEAR project (2008-2009):**  
Correction of Medium Voltage overhead sections under the Emergency Plan for the Recovery of 3 Species of Rock-Dwelling Birds in the Douro International Nature Park, a partnership with ICNB and EDP Distribuição, with the correction of 4km.

**2.4. MONITORING THE POPULATION OF EAGLES**

**GOLDEN EAGLE**

The state of the Golden Eagle (*Aquila chrysaetos*) population plays an important role in how EDP Renováveis develops and operates its wind power projects, in accordance with its adherence to US law protecting the American Bald Eagle and Golden Eagle (Bald and Golden Eagle Protection Action).

EDP Renováveis has financed specific efforts to understand the situation of eagle populations in certain US states, through the Oregon Eagle Foundation and the Washington Department of Fish and Wildlife. So far, the Oregon Eagle Foundation has been conducting studies for four years, and the Washington Department of Fish and Wildlife for two years. The results of these studies will be published soon, and the preliminary results do not indicate that populations of this species in Washington and Oregon State are in sharp decline.



## BONELLI EAGLE

In Spain, in the Coll de la Garganta Windfarm (Tarragona), GPS tracking of a pair of Bonelli's Eagles (*Hieraetus fasciatus*) is being carried out to determine the impact of the wind farm in the area overflowed by these birds of prey.

Data analysis from the first year of GPS monitoring found that they occupy a very concentrated living area, which is lower than the average for other pairs of birds. The main migration routes connect their breeding grounds and main feeding areas.

Consolidated information associated to the territory of the couple proceeded to the implementation of the land opening works in improving habitat for prey species of double-eagles of Bonelli. It is not yet available the final interpretation of results report, but the visits during the first quarter of 2014 showed that there was reproduction thanks to the detection of a calf in the nest. Similarly, during the month of July has undertaken to release phase of rabbit exemplary and Partridge, that which caused the immediate GPS location appearance in the area of the opening work of the ground where months before, hardly had detected locations.

It should be taken into account that the third year of the study coincides with the opening up of land as part of habitat improvement for the pair of Bonelli's Eagles. The final report is not yet available for the interpretation of results, but visits carried out during the first quarter of 2014 showed that there had been reproduction thanks to the detection of an eaglet in the nest. In July rabbit and partridge were released, which caused the immediate appearance of GPS signals in the area being opened up where, months before, almost none had been detected.

## 2.5. TURTLES IN TOCANTINS

Peixe Angical Hydroelectric Plant - with 498.75MW of installed capacity - is located on the Tocantins River, between the municipalities of Peixe and San Salvador, in the State of Tocantins, Brazil. With the damming of a section of river to make a reservoir, the chelonian group (tortoises and turtles) is among the animals impacted. This group of animals can occupy lentic and/or lotic environments with varying degrees of success. There are 331 known species and 121 known subspecies, of which 36 occur in Brazil.

In the Tocantins-Araguaia river basin, the most common are the yellow-spotted river turtle (*Podocnemis unifilis*) and the Arrau turtle (*Podocnemis expansa*). Currently, all species of the *Podocnemis* genus are listed in Appendix II of CITES - although not under threat of extinction, they may enter this category if their commercial exploitation is not controlled.

Due to human activity in their habitat and because they are the target of human consumption (for food or sale), a project to monitor egg-laying and manage the turtles is being run by Enerpeixe S.A. to help conserve the species, particularly in the areas affected by the Peixe Angical power plant, through:

- Mapping of spawning grounds;
- Management of nests to prevent natural or human predation;
- Relocation of nests in danger of flooding;
- Monitoring of the species by measuring population density;
- Environmental awareness amongst the riverside population.

Spawning areas are visited daily in the breeding season along the banks of the rivers Tocantins, Paraña and Palms (32 kilometres from the bank). Where the nests are at risk, the eggs are relocated to an area near the spawning site. After hatching, the baby turtles stay in the nests until their shells have completely hardened, the umbilical cord has scarred and the smell of fat left by the egg has disappeared, to prevent detection by predators. They are subsequently released into environments conducive to their survival and away from intense human activity.

Raising environmental awareness among local people involves inviting them to take part in looking after the turtles and giving out information pamphlets explaining the importance of maintaining the species.



**Results:**

- All spawning areas have been mapped over three years and it is now possible to identify the areas they prefer;
- Nest predators, especially humans, have decreased over time. This type of loss accounts for 3.3% of monitored nests (11 nests out of 331);
- The loss of nesting sites due to flooding has fallen and in 2013 there were no losses of this kind;
- The population has now stabilised in the area. The population density has also not fluctuated significantly over the years;
- Environmental awareness has resulted in greater survival of young over the years as human predation for meat, offal, eggs and ornaments has declined.

## ADDING VALUE TO ECOSYSTEM SERVICES

### NATURE OF THE IMPACTS OF EDP'S ELECTRICITY DISTRIBUTION

Ecosystem services (ES) are the benefits that humans get from functions held by nature (ex.: food products, climate regulation, recreational activities, among others). Currently there has been a growing trend towards the SE concept of incorporation in the evaluation of business projects and progressive regulatory change that in the medium term will require the identification, evaluation and communication of the impacts of activities and projects of companies in different SE.

This transaction may represent an extra cost for companies that need to use the Environmental Impact Assessment process (EIA), but can also help to make the process more efficient and more useful for all parties involved.

Given this uncertainty, EDP asked the Instituto Superior Técnico (IST) - University of Lisbon, a study to evaluate the possibility of using information produced within the EIA process to calculate the economic value of the project externalities for each affected ecosystem service.

As the main objective, one tried to assess the effort required to move from one approach to more biodiversity conservation to a more anthropocentric approach, where the benefits of biodiversity are recognized by the economic model in which we live and where the decision-making considers a cost-analysis benefit of the options studied.

The work developed by IST sought to answer the following questions:

- Can the information currently collected under an EIA feed into an impact analysis which includes ES? That is, can the impact of projects be estimated in terms of changes in ES from the information currently collected?
- Are the methodologies and metrics for characterization and assessment of the impact on biodiversity enough for a quantification of the impact on the affected SE?
- Which are the improvements suggested in future EIA, to minimize or nullify a possible extra effort?
- Can we apply methods of Economic Valuation of the environmental impacts of installations already in operation, based on existing information or are there indirect ways to do it?

Using the Common International Classification of Ecosystem Services- CICES, there was a correlation analysis of the information collected in each of the EIA descriptors and defined a set of indicators that allow quantification/valuation of space SE. For this exercise we used the EIA for the Hydroelectric Foz Tua.

It was found that most of the information produced in the EIA process does not allow a direct assessment of the change of the different affected SE, it is not possible its economic valuation.



Given the results, a Methodological Map was proposed for use in future EIA procedures. This guide proposes a set of SE indicators and valuation methods to be used for SE, in order to target the collection of information in the EIA phase, facilitating the ecosystem approach service.

The guide seeks to contribute to the future use of cost-benefit analyzes in the decision-making process that incorporates the environmental effects of the project. In addition, this approach allows you to focus and optimize minimization initiatives and compensation, contributing to an overall positive impact on biodiversity.

### 03. SUPPORT TO SOCIETY

De acordo com a sua Política de Biodiversidade, a EDP visa contribuir para aprofundar o conhecimento científico sobre diversos aspetos da biodiversidade. Nesse sentido, a empresa apoia e colabora em projetos com ONG, instituições científicas e académicas, contribuindo para que a sociedade adquira um maior e mais amplo conhecimento nesta matéria.

#### 3.1. OSPREY

In 2011, EDP in partnership with the Centre for Research into Biodiversity and Genetic Resources (CIBIO) launched a project to reintroduce the osprey (*Pandion haliaetus*), in Portugal and encourage the population to reproduce here once again. The species stopped nesting in the country at the beginning of the 20th century and the action is directed towards the efforts of reconstruction of a core breeder, based on the following steps:

1. Youth collection and transfer of donor countries (Sweden and Finland);
2. Placing juveniles in haking tower \*, where they are fed until they complete their development;
3. Release to their new environment, where they continue to be fed;
4. Migration towards south through the Sahara, ending in West Africa (Senegal, Gambia, Guinea Bissau, Mali and Ivory Coast);

5. After 2 to 3 years in the dispersal area, start migrating back to the areas of origin to nest there (after reaching adulthood the third year of life). consider the release area as home area.

In 2013, 12 juveniles arrived (6 Sweden and 6 in Finland) all between 5 and 6 weeks old and completed their development in the haking tower, located in margin of Alqueva dam in Roncão for about 24 days.

In 2014, 7 new males and 4 females arrived from Sweden and Finland (males tend to return to their area of origin). They are the ones who primarily establish breeding territories, where the females (re-introduced or otherwise) can later be attracted.

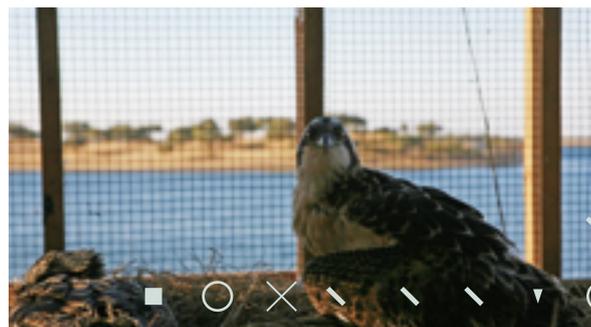
The birds were fed mainly on fish from the reservoir itself: on the tower ((mainly perch and barbel), for example, in 2013, 79kg of fish was consumed in the phase of adaptation and growth and 185 kg being released. The nests inside the cages were built from branches of broom (*Retama sphaerocarpa*) and covered with stems and leaves of bulrushes (*Typha sp.*), and local lichens.

Equipped with VHF radio transmitters, they were released at nine weeks old, over 2 consecutive days. The females were released first as in previous years they were found to be calmer and tended to stay in the vicinity of the tower. In this way they helped attract the males, who tend to be more nervous and who were released the following day, in order to reduce the risk of early dispersal.

In this fourth year of the project 4 adult individuals were sighted in the surrounding areas of Alqueva, fishing at the site where they were released. However, only one ringed bird was sighted, almost certainly part of the species reintroduction programme.

Additional information on [aguiaquesqueira.org](http://aguiaquesqueira.org). The reintroduction of the osprey in Portugal is being supported by the Institute for Nature Conservation and Biodiversity (ICNB), and developed in partnership with SAIP, TAP and EDIA.

Internationally, the project involves researchers from the birds' donor countries, Finland and Sweden, and has the close collaboration of partners from Spain, where a similar project has been carried out with great success since 2003.



### 3.2. BROWN BEARS IN ASTURIAS

The Cantabrian brown bear (*Ursus arctos*) is a protected species in Spain, with small and isolated sub-populations. The Cantabrian Mountains are its core habitat and a region where EDP operates. For this reason, the Fundación EDP has been collaborating since 1992 with the Fundación Oso de Asturias (FOA), a private cultural non-profit organisation, which was created to promote and develop initiatives for the conservation of the Cantabrian brown bear and its habitat.

Its activities focus on four cornerstones:

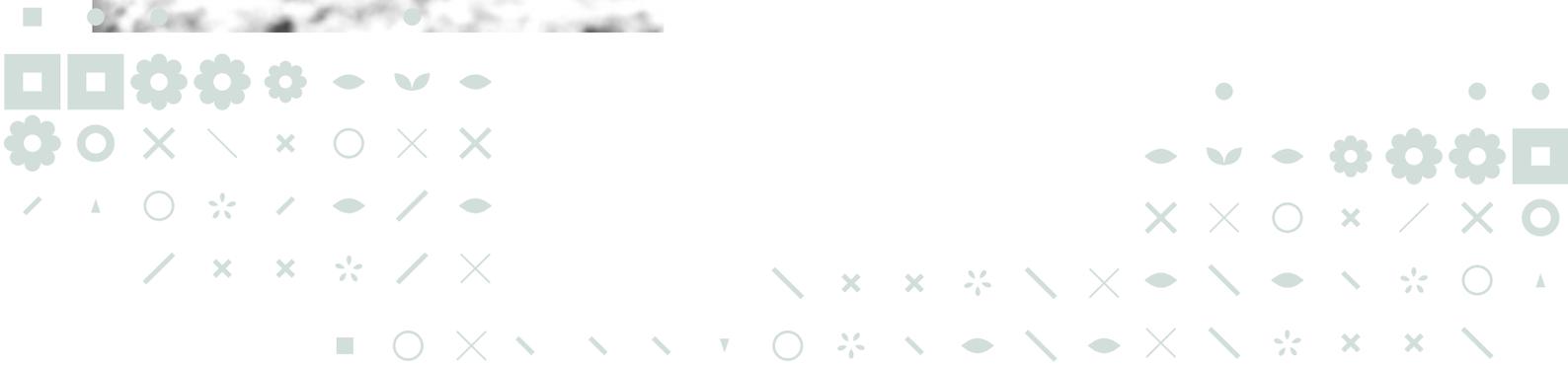
- **Management of the Casa del Orso:** Located in Proaza, this is the official headquarters of the Asturias Bear Foundation, which receives thousands of visitors each year. The Casa del Oso is a centre for information, awareness and environmental education hosting technical meetings, courses, conferences, exhibitions, etc.;

- **Maintenance of bear fences:** In the various fenced enclosures located in Santo Adriano, along the Caminho do Urso, are the only specimens in the world of the Cantabrian brown bear remaining in captivity: Paca, Tola and Molina. This type of facility, unique in the Cantabrian mountains, can be used for the recovery of animals, as well as to provide shelter to those who are unable to adapt to the wild;

- **Environmental Education:** The FOA offers a variety of environmental education programmes for schools, institutions, associations, companies and individuals throughout the year;

- **Field work:** The main activities in this area are surveillance and monitoring of the bear population, and sharing information with public institutions and other groups to promote the conservation of the species, as well as collaborating on different scientific research projects.

Further information at: [www.osodeasturias.es](http://www.osodeasturias.es).



### 3.3. IT'S UP TO US – ENVIRONMENT

**It's up to us - Environment** is part of EDP's corporate volunteer programme, which is active in every country where EDP operates.

In 2013 and 2014, there were 3,816 participants internationally involved in 58 initiatives, totalling around 21,663 hours of volunteer service, with an impact on about 420,900 beneficiaries

In Portugal it has had the support of its employees, family, friends and around 85 partners (Municipalities, suppliers, local agents and social organisations) with the objective of raising society's awareness of environmental problems, so that everyone can help preserve nature and forests in particular. The focus was on invasive species as one of the main causes of biodiversity loss in forests. There have been 32 initiatives up and down the country in forests located within protected areas, selected by the Institute for Nature and Forest Conservation (ICNF) and on beaches chosen by the municipal council responsible.

The value of the EDP-ICNF Voluntary partnership, within the Part of us – the Environment initiative, was publicly recognised by the Portuguese Government in the person of the Secretary of State for the Environment, Spatial Planning and Energy at a public meeting in the Peneda-Gerês National Park in September 2014.

Initiatives by EDP Renewables employees began in Spain for the protection and planting of native tree species, and trees were also planted in Poland. In Brazil, trees were planted and initiatives undertaken such as the collection of waste from the banks of the Tocantins River which filled 25 small municipal boats; in Italy they planted an urban vegetable garden and in the United Kingdom areas were cleared for the protection of wild orchids.



### 3.4. EDP CHAIR FOR BIODIVERSITY

Since 2009, EDP has supported the EDP Chair in Biodiversity, in partnership with the Foundation for Science and Technology and the University of Porto, which aims to attract specialists in the field of biodiversity and nature conservation to Portugal. The Chair aims to promote scientific knowledge on the impacts of electricity production on biodiversity, with the aim of minimising and monitoring them.

With a grant of €120,000 per year, it was agreed to pursue four lines of enquiry:

Between 2012 and 2014, research findings from the EDP Chair in Biodiversity gave rise to the following publications and communications:

- 18 publications (or in the process of publication) in specialist scientific journals;
- Six publications and in the final phase of submission;
- Two book chapters;
- 21 presentations at congresses;
- The organisation of the International LTER Network Congress (Long Term Ecological Research);
- A website for the publication of the work of the Chair: <http://maerua.iict.pt/applecol>

| Lines of action   | Species  | Results/Conclusions  |
|---|--|--|
| Population ecology  | Bonelli's Eagle (Aquila fasciata)              | No cause-and-effect relationship was found between hydroelectric dams and the population decline in the mountainous northeast (Vale do Douro, Sabor and Tua)   |
|   | Wolf (Canis lupus)                             | Wind farms have little impact when away from breeding grounds. They only adversely affect the reproductive phase of the life cycle of this species.  |
| Fragmentation of habitats and persistence of a metapopulation | Pyrenean Desman (Galemys pyrenaicus)           | On population regression, no cause-and-effect relationship was found with the construction of the dam. This is also happening in nearby areas that do not experience any impact from the Sabor dam.<br><br>The next studies will aim to clarify the causes of regression, testing the effects of climate change, the competitive effect of invasive species (red crayfish) and predation by otters given the increase in population. |
| Long term ecological research                                 | Biodiversity in general and ecosystem services | The main innovation is the integration of ecosystem services into the process of assessment, mitigation and monitoring of impacts.   |
| Offsetting and mitigation of impacts                          | Biodiversity in general                        | Development of two methodologies/tools to:<br><br>Estimate statistically how long it takes to prospect a species to be able to conclude with high probability that it is missing;<br><br>Identify all species present by collecting a sample at a specific location, based on the collection and analysis of DNA (environmental genomics), obtained from biological samples or sample water.   |
|   |  | More efficient allocation of resources (human and financial) with benefits for biodiversity;   |
|   |  | Avoid implementing unnecessary initiatives   |
|   |  | An inclusive impact analysis of positive externalities makes a cost-benefit analysis more efficient.   |
|   |  | More robust information, obtained in less time and more efficiently.   |

**BROWSEDP**  
Browse dp allows you to access all publicly-available environmental information, or that which the company deems to be of interest to the community.

At [www.browsedp.edp.pt](http://www.browsedp.edp.pt) the company's Environmental Impact studies are available, as well as other types of studies being promoted by EDP.

The intermediate and final reports of the EDP Fund for Biodiversity projects are also available on the same site.





The following table lists the projects supported by the EDP Biodiversity Fund, their main objectives, products and conclusions:

| PROJECT   | OBJECTIVE/PRODUCTS   | CONCLUSIONS  |
|---|--|--|
| <p>BrioAtlas – Portugal</p> <p>Atlas of endangered bryophytes Portugal</p>                | <p><b>Objectives</b></p> <p>Preparation of Red list of Bryophytes from Portugal and identification of priority areas for their conservation.</p> <p><b>Products</b></p> <p>Final report of the project on Browsedp.</p> <p>Publication of the book: Atlas and Red Data Book of Endangered Bryophytes of Portugal.</p>  | <p>Bryophytes are terrestrial plants which are fundamental to the maintenance of biodiversity and ecosystems, as they are important indicators of ecological and environmental changes. The bryoflora of Portugal, with a total of 704 species, comprises some 40% of the European species and almost 65% of Iberian bryophytes. The species with the highest conservation status amount to 28.4%.</p> <p>The book presents specific conservation measures and demarcation of priority areas with a view to maintaining biodiversity. For 141 species considered most relevant, there is: a summary description, distribution maps, images, and conservation status.</p>         |
| <p>Local and regional movements of the Little Bustard (Tetrax tetrax)</p>                 | <p><b>Objectives</b></p> <p>Preparation of a collision risk map with overhead power lines for the Little Bustard – a bird classified in the Red Book of Vertebrates as vulnerable in Portugal and affected by EDP power distribution activity.</p> <p><b>Products</b></p> <p>Final report of the project on Browsedp</p> <p>Publication of the work in an international scientific magazine: "Conservation Biology: A spatially explicit approach to assess the collision risk between birds and overhead power lines: a case study with the Little Bustard"</p> | <p>The collision risk maps were spatially and temporally validated with real mortality data obtained under Birdlife Protocols I and II.</p> <p>The results of the project were presented and discussed at a seminar with specialists, students, employees and technical officers from EDP and REN.</p> <p>The work was published in the reputable international scientific publication.</p> <p>Cartography could constitute an important tool for planning the installation of new power lines, for identifying existing lines that represent greater risk of collision, and for future actions to adjust power line sections that come into conflict with endangered birds.</p> |
| <p>National Plan for the Conservation of the European River Lamprey and Brook Lamprey</p> | <p><b>Objectives</b></p> <p>To promote the conservation of two species of lamprey threatened with extinction.</p> <p><b>Products</b></p> <p>Final report of the project on Browsedp.</p> <p>1 scientific article published in an international journal - Biological Conservation: "Influence of macrohabitat preferences on the distribution of European Brook and river lampreys: implications for conservation and management"</p> <p>1 Doctoral thesis and 1 Master's thesis</p>  | <p>The work:</p> <p>Confirmed the high threat status to the species and its reduced distribution area in Mainland Portugal.</p> <p>Developed an explanatory and predictive statistical model that indicates the environmental parameters that influence the distribution of these species and assesses the likelihood of their occurrence in Portugal</p> <p>Defined the classification criteria for prioritising rivers for their conservation, useful information to be incorporated in the Natura 2000 planning tools, for example in defining Special Conservation Areas.</p>  |



PROJECT OBJECTIVE/PRODUCTS CONCLUSIONS

|  |            |   |   |   |
|--|------------|---|---|---|
| Conservation and Enhancement of Endemic Flora Under Threat in Portugal | Objectives | Conservation of rare and endangered plant species in Portugal, in situ and ex situ, and their use, in particular in medicinal applications. | ✕ | 14 endemic species were studied ( <i>Angelica pachycarpa</i> , <i>Anthriscum lusitanicum</i> , <i>Arabis sadina</i> , <i>Chaenorhinum serpyllifolium</i> subsp. <i>lusitanicum</i> , <i>Convolvulus fernandesii</i> , <i>Daucus carota</i> subsp. <i>halophilus</i> , <i>Digitalis amandiana</i> , <i>Distichoselinum tenuifolium</i> , <i>Eryngium duriaei</i> , <i>Narcissus fernandesii</i> , <i>Omphalodes kuzinskyanae</i> , <i>Pseudoarrhenatherum pallens</i> , <i>Santolina semidentata</i> and <i>Senecio doronicum</i> subsp. <i>lusitanicus</i> ), most of which are threatened.   |
|  | Products   | Final report on Browsedp  |   | Seeds from the species were stored for long-term conservation in the seed bank Banco de Sementes A.L. Belo Correia. The percentage of protected species by the Habitats Directive and preserved ex situ increased from 27% to 36%.<br><br>In vitro multiplication methods were developed and the optimum conditions for seed germination identified in six species. The chemical characteristics and bioactivity of several species (antifungal and antioxidant activity) were identified.<br><br>Population genetic diversity was determined of <i>Senecio doronicum</i> subsp. <i>lusitanicus</i> and its vulnerability assessed. This information will be useful for future conservation measures in situ. |

|  |            |   |   |  |
|--|------------|---|---|--|
| CHARCOScomBIO<br>Research, Conservation and Dissemination of Biodiversity in Temporary Ponds | Objectives | Study and dissemination of Biodiversity and Ecology of Crustaceans in Temporary Ponds<br><br>Development of a Network of Microreserves and a nationwide Education Programme<br><br>Project report on Browsedp.<br><br>Websites: <a href="http://sites.google.com/site/charcoscombio">sites.google.com/site/charcoscombio</a> and <a href="http://www.charcoscomvida.org">www.charcoscomvida.org</a> .<br><br>Exhibitions: (1) Amphibians: One foot in the water, another on land, exhibited in 23 cities in Portugal and (2) Trapped in the Pond, the biodiversity of crustaceans, displayed in the National Museum of Natural History and Science. | ✕ | Developed by a network of organisations. Included several additional approaches to deepen the study of biodiversity in temporary ponds in Portugal, its existence publicised and conservation encouraged.<br><br>High-visibility initiatives developed such as the exhibitions "Trapped in the Pond" and "Amphibians: One foot in the water, another on land", and the campaign Ponds with Life (still ongoing) raised awareness of ponds and their unique biodiversity with schools and the general population. |
|  | Products   | International seminar on the conservation of amphibians National Environmental Education Campaign for Ponds with Life (99 schools);<br><br>Digging of approximately 100 new ponds; •Creation of 3 micro-reserves for the conservation of ponds; • Publicity Material: 2 videos, posters, 2 books, 1 calendar, 2 brochures;<br><br>Photography competition;<br><br>Communications at scientific congresses: 32 ;<br><br>Scientific articles in international journals = 5 ; Chapters of scientific books = 1; • Thesis: Master's = 3 + 1 (in progress); Undergraduate internships = 16;  |   | Creation of 3 pioneering micro-reserves and inventory of ponds countrywide extended our knowledge of the distribution of these habitats and contributed to the conservation of sites of recognised importance. This project builds future actions that will improve the knowledge of these ecosystems and their conservation.  |



| Projeto            | Objetivo/Produtos   | Conclusões  |
|--------------------|---|---|
| Faia Brava Reserve | <p><b>Objectives</b></p> <p>Promoting nature conservation to establish and sustainably manage a private nature reserve, involving NGOs and the community at large</p> | <p>The following were restored:</p> <p>5 km river corridors.</p> <p>150 ha cork and holm oak woodland (100 ha of forest-grassland and 50 ha of forestry)</p> <p>The following were dug:</p> <p>20 ha cereal plots.</p> <p>pond networks with 20 water outlets.</p>  |
|                    | <p><b>Products</b></p> <p>Project report on Browsedp.</p>   | <p>The following have been integrated into the project 12 researchers, 4 inventories completed (invertebrates - spiders and insects - flora, reptiles and amphibians), out of a total of about 600 species identified, and 2 Master's theses on the Egyptian Vulture.</p> <p>The goal of 1,000 visitors per year (target fixed for 2019) was achieved.</p> <p>The reserve was classified, in 2010, as the first private protected area in the country (214 ha) and based on the Management Plan of the Faia Brava reserve, a strategic document - the APP Faia Brava management plan - was approved by the Institute of Nature Conservation and Biodiversity (ICNB) and attached to the Management Protocol signed by ATN and the ICNB.</p> |

|  |   |   |
|--|---|---|
| Overwintering and Migratory Bird Atlas of Portugal | <p><b>Objectives</b></p> <p>Promoção do conhecimento quanto à distribuição e abundância relativa de espécies de aves durante o período de migração pós-nupcial e de inverno, em todo o território nacional.</p> | <p>Participação de mais de 400 colaboradores: 10 elementos da comissão científica, 17 coordenadores regionais, 320 colaboradores de campo, 25 anilhadores, 60 autores de textos e mais de 50 fotógrafos;</p> <p>Realização de 3.850 horas de contagem de aves nas visitas sistemáticas que produziram 144.500 registos de observações;</p>  |
|  | <p><b>Products</b></p> <p>Edição do "Atlas da distribuição e abundância das aves de Portugal durante o inverno e a migração pós-nupcial".</p>   | <p>A cobertura das visitas sistemáticas atingiu os 55% no período da migração pós-nupcial (545 quadrículas visitadas) e os 75% no período de Inverno (737 quadrículas visitadas);</p> <p>Os registos adicionais permitiram incluir mais 148 quadrículas no período pós-nupcial e 81 quadrículas no Inverno;</p> <p>No total foram registadas 415 espécies, das quais 307 têm mapas de distribuição e/ou textos descritivos.</p> |

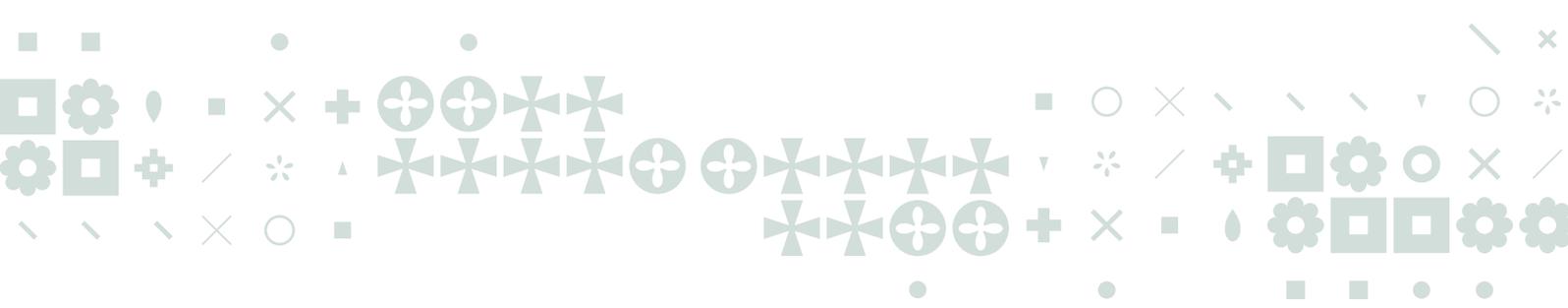




| Projeto   | Objetivo/Produtos   | Conclusões   |
|---|---|--|
| Findkelp forests on the seabed                    | Produtos<br>Project report on Browsedp  | <p>Northern populations consist of extensive forests of high genetic connectivity; the populations of southern Portugal are smaller and highly isolated. They are the richest in terms of genetic diversity</p> <p>The transplanting of adult individuals is viable to colonise areas that enhance marine biodiversity</p> <p>The wealth of existing fish species was documented in the kelp forests</p> <p>Field actions have developed innovative techniques to record the positioning of sessile species on video and GPS</p>   |
|   | Objetivos<br>Promoting knowledge of kelp and the species that depend on it; construction of management guidelines using public participation tools; and scientific publication.   |  |
| Atlas of riparian vegetation in mainland Portugal | Produtos<br>Project report on Browsedp<br>Website: <a href="http://riosbiodiv.uevora.pt/">http://riosbiodiv.uevora.pt/</a><br>Publication of "Atlas of riparian vegetation in mainland Portugal", printed version, web and mobile application | <p>Promotion and dissemination of knowledge about the flora characteristic of riparian systems and their geographical distribution</p> <p>The atlas systematises and gathers information about taxonomic characteristics, nomenclature, geographical distribution, ecology, methods of propagation and traditional uses of each species. This includes tree species, shrubs, as well as the most characteristic herbs to be found in the freshwater ecosystems of mainland Portugal, particularly watercourses, reservoirs, wetlands and lakes</p> <p>Both spontaneous species and naturalised exotic species are covered</p> <p>Content is disseminated through a website and an application for mobile devices which uses multiple interactive identification keys. It is illustrated and based on readily observable characteristics, so that the user can identify a species</p> |
|   | Objetivos<br>Preparation of a handbook to gather information on the plant species characteristic of riparian ecosystems in Mainland Portugal.   |  |



| Projeto   | Objetivo/Produtos   | Conclusões  |
|---|---|---|
| <p>Biodiversity, endemics and protected species associated with lagoons and waterways in the Serra da Estrela: valuing a century of hydroelectric use</p> | <p>Project report on Browsedp</p> <p>Themed exhibition on the "Lakes of Serra da Estrela - F27 energy and biodiversity" which will be reflected in the CISE in 2015 and 2016, and then tour the country</p> <p>To contribute to a better knowledge of Macroinvertebrate species associated with the natural lakes and undeveloped coast of the central plateau of the Serra da Estrela mountain range and rivers rising from it.</p>  | <p>Multidisciplinary approach to biodiversity associated with the lakes of the Serra da Estrela mountains</p> <p>Organisation of exhibitions and training activities to publicise the project with local communities and visitors to Serra da Estrela, college students and nature conservation officers</p> <p>Systemising knowledge on the biodiversity of Serra da Estrela and organising a collection involving contact with domestic and foreign experts. This will contribute to the biodiversity of this protected area so that it becomes one of the best known in Portugal and receives international recognition for the quality of the information obtained, analysed and made available to the scientific community, policy makers and the population in general.</p>   |
| <p>ECOFLOW<br/>Ecological effect of hydrological regime on the Portuguese river fish community</p>  | <p>Final report available at Browsedp</p> <p>Scientific paper submitted to Ecohydrology journal and 2 articles in preparation</p> <p>Temporary exhibition at Mora Fluviarium</p> <p>Study of the effect of the change in the flow regime on the freshwater fish community typical of rivers in central Portugal; the case of the River Mondego. Contribution to the definition of a hydroelectric generation policy that minimises the impacts of hydrological changes.</p> | <p>Project on the Mondego River (artificial flow regime) and the Vouga River (natural), the latter working as a reference for possible changes identified in the Mondego River related to artificial flow</p> <p>Hydrological analysis indicated that the regularisation for hydroelectric purposes on the River Mondego affects, in particular, the variables associated with the summer season</p> <p>Main results:<br/>There was a greater abundance of exotic species and limnophila on the non-navigable sections of river and eurytopic species on the navigable stretches (Task 1), explained by these species' distinct adaptive capabilities to different hydrological regimes and their seasonal variability of habitat; • The barbels in the navigable parts of the river use a more extensive and continuous area than the population on the non-navigable river (Task 2), in conjunction with a significant change in the seasonal pattern of movement, probably in response to differences in the degree of habitat variation on these watercourses. The barbels subject to the phenomenon of hydropeaking show lower muscle activity during the period of turbine flow associated with refuge behaviour at the banks of the river (Task 3).</p> <p>The information collected on this project can be used in management programmes for the protection and rehabilitation of regular aquatic ecosystems.</p> |



| Projeto   | Objetivo/Produtos  | Conclusões   |
|---|--|--|
| <p>Economountain<br/>The economics of biodiversity in the mountains of Vila Pouca de Aguiar</p> | <p><b>Produtos</b></p> <p>Final report available at Browsedp<br/>Validation of the targeted grazing technique, as an economic, intelligent and competitive tool for fuel management (landscape management)</p>       | <p>Targeted grazing technique has the immediate effect of decreasing fuel available, depending on the load used, and a second effect of encouraging the return of wild flowers from successive interventions over time;</p> <p>Reduction in the costs of fuel management to 200 euros per hectare through targeted grazing, values similar to controlled burning and well below manual-motorised cutting (e.g. fire-fighters: 700 to 1000 euros per hectare);</p> <p>Developing initiatives that have made it possible to increase the value of what is produced by the economy, helping to increase the competitiveness of the land, to manage the risk of fire and reduce investment risks. Development of actions that increase service provision in the visiting area and tourism - generating wealth and proximity - and increase the recognition of the value of ecosystem services; •Creation of a national network to promote the use of animals in landscape management involving public and private entities associated with production, research, education and associations.</p> |
|   | <p><b>Objetivos</b></p> <p>To strengthen the links between the local economy and the production of ecosystem services, through internalising costs of managing ecosystems in recoverable products on the market.</p> |  |
| <p>The Miranda Donkey in low shrub management and high conservation value ecosystems</p>        | <p><b>Produtos</b></p> <p>Final report available at Browsedp</p>   | <p>Understanding and appreciating the behaviour of this selective herbivore: it has been proven to contribute positively to the quality and productivity of pastures and hay - demonstrating, particularly, that the indigenous Miranda donkey can play a key role in the recovery of meadows without interfering in sheep and cow farming, because it has distinct food needs and consumes herbaceous plants (where grasses predominate) and a large quantity of woody plant species.</p> <p>When using the donkey on low shrub management in abandoned meadows, as well as the consequent environmental benefits, we found another way to enhance this breed economically, by forming a herd of 20 young animals which could be used to maintain, manage and conserve the floral biodiversity of meadows in the future.</p>  |
|   | <p><b>Objetivos</b></p> <p>To help promote semi-natural meadows - as high-value conservation ecosystems through management (cutting and grazing) using an indigenous breed - the Miranda Donkey.</p>                 |  |



## 04. THIS REPORT

This report highlights initiatives on biodiversity, between the period 2013 and 2014, focusing on the Group's activities that generate greater impact. All technical and operating data for characterization of the company, reporting to December 2014, having been checked by an external company under the EDP 2014 Annual Report.

Additional information can be found at [www.edp.pt/sustainability/environment/biodiversity](http://www.edp.pt/sustainability/environment/biodiversity). In order to improve the transparency of reporting, the glossary which includes the definition of quantitative indicators and methods used, presented throughout the document, can be found online at [www.edp.pt/pt/pages/glossario.aspx](http://www.edp.pt/pt/pages/glossario.aspx).

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