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Nature-based solutions are actions to protect, sustainably manage and restore ecosystems. In European rivers they are ...

- addressing societal challenges effectively and adaptively, **benefiting people**
- enhancing ecosystem functions, **benefiting nature**

Measures

- floodplain reconnection / re-meandering rivers (i)
- wetland restoration (ii)
- river bank restoration (iii)
- dam removal (iv)
- increase of water infiltration (v)

Benefits for both people and nature

- minimised downstream flood risk (A)
- zero pollution / clean drinking water (B)
- recreation & enjoyment (C)
- drought resilience & carbon storage (D)
- wetland habitats (E)
- biodiversity (F)
- safeguarding natural water needs (G)

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Lima floodplain forest restoration PT

Regional scalability plan Case study 12



Imprint

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1 For the reader

The plan was developed by Merlin project investigators and the stakeholder council. It was discussed in several meetings aimed at local political decision-makers. Having launched the challenge of developing a regional scalability plan, we brought together technicians and managers to prepare a proposal. The area was delineated, considering opportunities and limitations, a map was submitted for approval to the Protected Area Management Committee. After approval of this proposal, preliminary project work began, presenting and discussing ideas, plans and concrete actions. Through a survey and the draft plan, people and entities that they consider important were invited to make contributions to improve the project. A workshop was held with interested parties where the RSP was presented. This was followed by the delivery of the draft which, after review, gave rise to this document.

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The Stakeholders list corresponds to what is described in point 3.1

Title: **‘Ponte de Lima - Alto Minho’s Lung’**

With this document we intend to describe the possible scalability of the measures implemented under the MERLIN project, in an increased area, that will involve the Estorãos hydrographic basin, within the Protected Area limits, and the Lima River Special Area of Conservation, within the Ponte de Lima municipality limits.

The RSP aims to be a work guide capable of helping all the intervenient, direct and indirect, to understand the project, to assume responsibilities and to become aware of the importance of the planned actions, towards its proper execution, applying the ‘good practice guidance’ learned from MERLIN, that could be applied in future restoration actions.

It's targeted to public administration, like the Alto Minho municipalities community or the Northern Regional Coordination and Development Commission, private companies and chains with high power of regional intervention, as well as the landowners.

1 Focus of the RSP

1.1 Regional characteristics

Ponte de Lima is a Portuguese village, located in the Alto Minho sub-region (Viana do Castelo district) of the North region. Is considered as the most flowery village in Portugal. The respect and maintenance of green areas are reflected in the harmony that characterizes them.

Protecting the environment is one of Ponte de Lima's main commitments and is complemented by rurality and natural beauty, a present that we have received and that we want to preserve in a sustainable way. Surrounded by a valley of unique beauty, this complex that is the Ponte de Lima municipality brings together all the rural and environmental conditions that transform it into a paradisiacal place for tourism, in constant contact with nature, with people and with the rural environment that we are so proud of.

The Regional Protected Landscape of Lagoas de Bertandos e São Pedro d'Arcos is a good example of that. It's environmental value, recognized nationally and internationally (Ramsar site, and Natura 2000), was the starting point for the launch of a major nature, conservation, social construction, rural and territorial development project, which it was born from the possibilities of a singular area, but also from the vision and collective efforts of several agents, in their close relationship with the population and local owners. The Protected Area is characterized by mosaics of hygrophilous, swampy woods and wet meadows.

Over time, Ponte de Lima added to its natural beauty magnificent Gothic, Mannerist, Baroque, Neoclassic and 19th century facades, significantly increasing the historical, cultural and architectural value of this unique corner in the whole of Portugal. A very important location since the Roman era, documented by archaeological finds and other written documents. It is characterized by its medieval architecture and the surrounding area, bathed by the Lima River. It is known as the oldest village in Portugal.

Ponte de Lima is a rural territory, where economic activities linked to agriculture, livestock, forestry, industry and tourism predominate.

The implementation of a future vision materialized in the Regional Scalability Plan, may found several challenges. For example, the lack of coordination among different public administrations operating at the same land could be a barrier, as well as the difficulties associated with land property, with multiple landowners in mosaic of small pieces of land, strong attachment to land and to decisions taken to their management. Additionally, a structural problem in Portugal, the lack of owner's identification for the lands.

The population exodus and the ability to retain those who already work and live here and attract new inhabitants to the territory are also a challenge.

There are some knowledge gaps which require promoting and reinforcing knowledge building. For example, in terms of understanding risks such as flooding. For these reasons the CS 12 is trying to cover this gap by incorporating new monitoring program and tools (e.g. water level loggers, hydrological modelling) in the major basin that crosses the Protected Area and can partially help to understand better those risks in the area to be scaled. Also, reinforcing the continuity of science-based evidence from monitoring of ecosystems would help in the improvement of best practice in restoration, allowing to better understand restoration trajectories and providing the basis for implementing adaptive management. This is crucial in tackling emerging global issues such as biological invasions, a key problem in the area, which is affected by both exotic species invasions and plant diseases impacting ecosystems supported by a key native foundation species (alder) along the most characteristic wetland habitats.

This Regional Scalability Plan intends to enhance the lessons learned from the MERLIN project, and the previous efforts (LIFE FLUVIAL, and previous experience by Municipality) upscaling the implementation area. In our case, to the entire Protected Area, that involve the Estorãos River and the Lima River, within the Ponte de Lima municipality limits, in a total area of 1.482 ha.

1.2 Justification for the region

The region now presented, and chosen for the Regional Scalability Plan, was adapted from the initial RSP proposal. It was decided by the Municipality in one of the periodic meetings from the Protected Area "Directive Commission", composed by the mayor, the councillor responsible for the environment, green areas, forest and biodiversity and also the responsible for the Protected Area Service (environment and green areas division chief).

This choice was, above all, due to a governance and political decision, defining an area, within the council boundaries, where the municipality could have more autonomy in work and decision-making.

The public domain of the delineated area was, therefore, fundamental. As our territory is mostly marked by smallholding areas, a greater expansion of the scale could dictate the failure of the project.

Therefore, the area to intervene was decided where the Ponte de Lima Municipality has direct influence.

1.3 Linkages and synergies with other initiatives

Ponte de Lima intends to be, in the next years, the **'Alto Minho's Lung'**, in an effort to be shared by everyone, with the objective to create native forests in all parishes of the municipality.

On the one hand, in April 2022, the first sign was placed in the first wood, in one of the parishes of the Protected Area, setting the tone to continue building a healthy and native forest, a green infrastructure that can last in time and space, that can connect each other, giving the municipal territory greater resilience with regard to the effects of climate change. These conservation forest spaces allow a natural diversification of the territory land uses, creating barriers that hinder the progression of rural fires. Gains are also expected in terms of the quality of the landscape, the guarantee of biodiversity flows, the protection and socioeconomic and environmental enhancement of forest areas and, ultimately, the improvement of services provided by ecosystems and, consequently, the quality of life of the population.

In the context of this Alto Minho's Lung initiative, to this date, 5 native forests locals have been promoted across the municipality's territory, covering a total area of more than 12 ha, where more than 1,500 trees have been planted at this time.

In other hand, an important work of awareness has also been carried out among the owners of land parcels in the Protected Area, reinforcing the importance of the work that has been done, in conjunction with the owners of land within it, in terms of controlling exotic terrestrial invasive species, particularly on specimens of the *Acacia* genus.

This work is carried out in partnership with teams of forestry sappers from the Lima Forestry Association, who also collaborate in surveillance work in the municipality's forestry area.

Under the 'Alto Minho's Lung' project, cooperation protocols have already been established between the Ponte de Lima Municipality and educational institutions, scout groups and social solidarity institutions. The aim is to ensure the involvement of the entire community in the production of plants to feed the "Tree Maternity" created in the Quinta de Pentieiros nurseries to provide the plant material necessary to implement this project. It is also intended to contribute to boosting pedagogical practices related to the life cycle of plants, as well as the various forms of propagation and raising awareness among the community of the importance of the Forest for current and future generations and the problems arising from climate change.

This project is a strong commitment from the Municipality of Ponte de Lima, the image represents the entire municipality, in a (human) lung, with a healthy green (native species)!

The afforestation and forest management actions within the Alto Minho's Lung, carried out across the municipality's territory, aim to encourage the transformation of the forest mosaic of the slopes and headwaters surrounding the RSP area, which is centered on the bottom of the valley. These actions, although localized, seek to encourage the use of native forest species and thus reduce the pressure of propagules of invasive exotic species that reach the riverside ecosystem (RSP area).

With the RSP we intend to continue the effort that has been developed to combat invasive exotic species, allowing the restoration of freshwater ecosystems. It can demonstrate the importance of eliminating invasive exotic species in water quality, river flows and improving the attractiveness of the area.

More information about the project 'Ponte de Lima - Pulmão do Alto Minho' (Alto Minho's Lung) can be found in the Protected Area and the Ponte de Lima Municipality official websites and social media (see chapter 9. References/Relevant material)

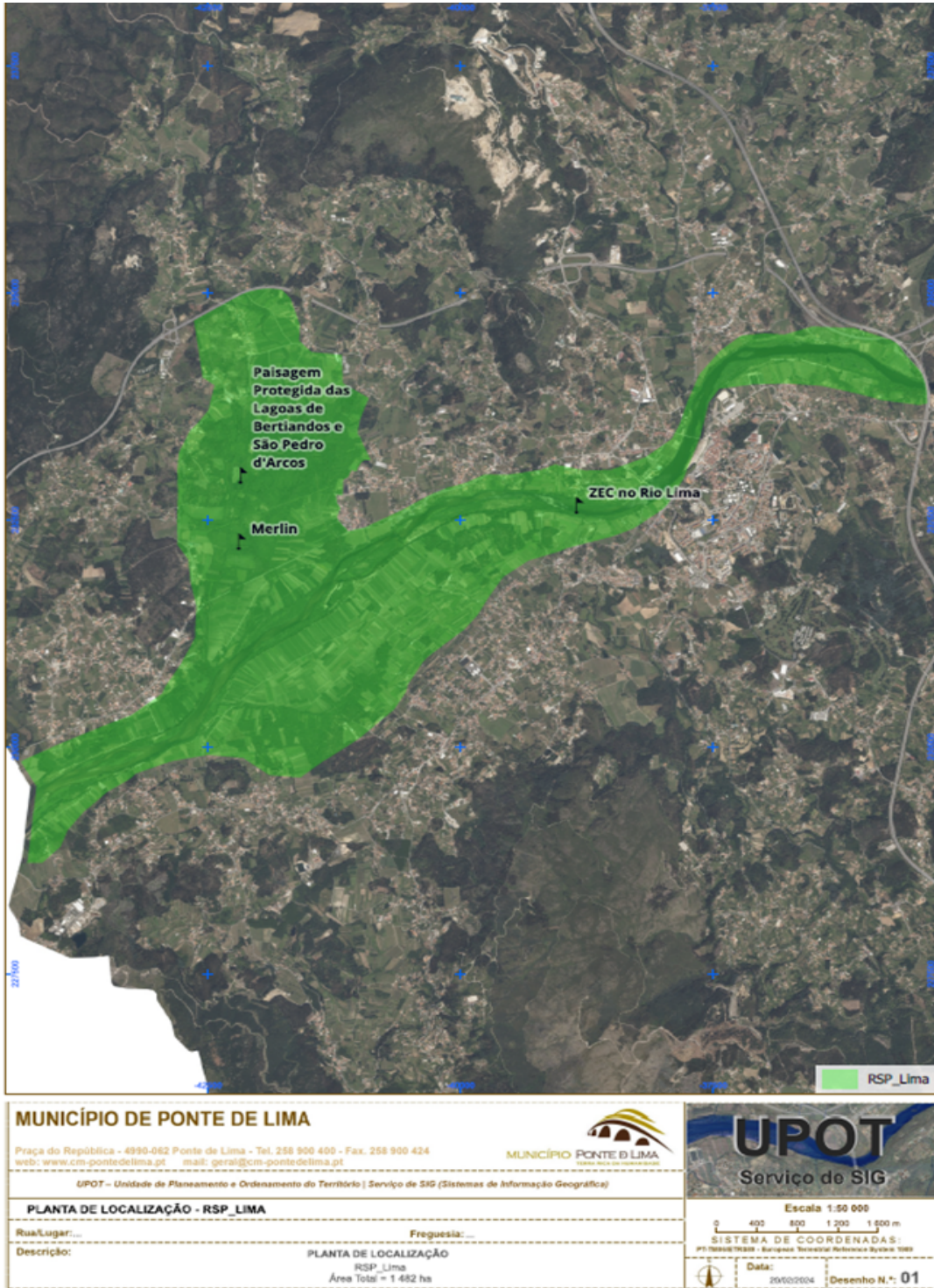


Figure 1 The map for the Regional Scalability Plan



Figure 2 The Lima River and the floodplains



Figure 3 Lagoon in the Protected Area

2 Stakeholders of the RSP

Involvement status	Involvement status	Involvement status	web addresses
Junta de Freguesia de São Pedro de Arcos	JFSPA	Cross Sector (governance, regulation, etc.)	
Junta de Freguesia de Bertandos	JFB	Cross Sector (governance, regulation, etc.)	
Escola Superior Agrária de Ponte de Lima	ESA-IPVC	Other	https://www.aeplima.pt/aeplima/contactos/
Associação de Defensores da Natureza de São Pedro de Arcos	ADNSPA	Environment, climate and disaster	
Comissão de Coordenação e Desenvolvimento Regional do Norte	CCDR-N	Spatial Planning	https://www.ccdr-n.pt/
Landowner	landowner	Forestry	
Landowner	landowner	Forestry	
Câmara Municipal de Ponte de Lima	CMPL	Cross Sector (governance, regulation, etc.)	https://www.cm-pontedelima.pt/
Associação de Produtores e Criadores de Bovinos da Raça Minhota	APACRA	Agriculture	https://apacra.pt/
Eletricidade de Portugal	EDP	Hydropower	https://www.edp.pt/
Rede Eléctrica Nacional	REN	Other	https://www.ren.pt/
Trifolium Campus		Agriculture	
Centro Aventura		Other	https://www.aeplima.pt/aeplima/contactos/
Guarda Nacional Republicana- Departamento Territorial de Arcos de Valdevez	GNR-SEPNA	Other	https://www.aeplima.pt/aeplima/contactos/
Associação H. dos Bombeiros Voluntários de Ponte de Lima	AHBVPL	Other	https://www.aeplima.pt/aeplima/contactos/
Associação Florestal do Lima	AFL	Forestry	https://www.aflima.pt/
Escola Secundária de Ponte de Lima	ESPL	Other	https://www.aeplima.pt/aeplima/contactos/

2.1 Further stakeholder opportunities

Although all the entities listed below were invited, for various reasons, not all of them were present at the workshop, however a survey was distributed, and many collaborated through written responses. After presenting the project to the participants, the researchers invited those present to actively participate in a discussion of ideas and suggestions. This work proved to be quite productive as it made public opinions and points of view regarding the regional scalability plan. Many of the suggestions were addressed and used to develop the final plan.

The entities invited to integrate the Stakeholder board are:

Public administrations:

- CIM Alto Minho; - CCDR Norte;

Private companies:

- Vila Galé; - Esporão; - Quinta da Aveleda; - ADAM; - Intermarché; - Continente; - Pingo Doce; - Lidl; - McDonald's; - Burger King; - Aldi; - Borgwarner Emissions Systems; - DS Smith Paper Viana SA; - Eurostyle Systems Portugal; - Enercon GmbH; - Steep Plastique Portugal; - Recial; - SAmbiental; - Painhas; - Amavical – Soluções Industriais; - Coindu; - Zendal; - Kyaia; - Doureca; - TransCoura; - Akwel

Future Stakeholders can be included, for example landowners.

The RSP was designed to be managed by the Ponte de Lima Municipality.

3 Green deal goals

3.1 SMART Green Deals relevant for the region: primary goals

The RSP has as primary Green Deal goals:

1. Biodiversity net gain
2. Drought resilience
3. Flood resilience
4. Health & Human well-being
5. Inclusivity

1. Biodiversity net gain - a rewetted floodplain as part of an ecological robust river ecosystem, will increase biodiversity and give an enormous boost to the functioning of the river ecosystem.

As the Protected Area, the main concern of this plan is the conservation and increase of biodiversity.

Biodiversity related goal: **150** ha predicted to be restored, **350** ha floodplain predicted to be connected.

2. Drought resilience - by promoting best practices in water management of floodplains it will help increase freshwater storage.

All rewetting activities: Natural engineering works to divert water to flow into wet meadows, peat bogs and swamp forests help retain water in the environment, thereby increasing resilience to drought.

3. Flood resilience - increase in the number and/or areas of floodplains will increase the room for the rivers and will thus contribute to flood resilience.

By maintaining natural ecosystems, eliminating invasive exotic species, they become safer and allow the existence of places where water capture from extreme rainfall and strong currents that form is efficient. By removing dikes that isolate the alluvial barriers of rivers, the soil absorbs water and thus maintains some habitats that are worth preserving.

4. Health and wellbeing - There are more and more people looking for and visiting these natural spaces due to the results they provide in their lives. The search for well-being, whether walking, doing physical activity, observing flora and fauna or simply resting, makes us obligated to maintain, care for and improve, restoring degraded areas, for example, these welcoming places.

5. Inclusivity for local community.

For the plan to function properly and be implemented, it is essential to have community support for the planned conservation activities. It is necessary to involve the population, consult, invite them to participate, leave it until they propose activities, this is an essential condition for success. As it is an area where there are many owners, where plots of land have small areas, to restore the ecosystems in question, we will have to effectively involve people from the community. Consensus is essential for the objectives of the RSP to be achieved.

3.2 SMART Green Deals relevant for the region: secondary goals

The RSP has as secondary Green Deal goals:

1. Climate regulation
2. Zero pollution
3. Sustainable food system
4. Green Growth

1. Climate Regulation - gains in biodiversity and equilibrium of the riverine ecosystem, relating to water balance issues, to mitigate extreme events of floods and droughts, which ecological restoration measures can encourage, bring benefits to sectors of activity such as agriculture, and it is important that farmers stay aware of the impacts that their land use decisions may have to increase or mitigate the consequences of climate change.

2. Zero pollution - We know how important our wetlands are and the role they play in retaining and draining excess nutrients resulting from agricultural activities. There is considerable pressure at this level caused by agriculture carried out upstream, both in the Lima and Estorãos river basins. The wetlands located near these rivers, namely the Ponte de Lima Lagoons Protected Area, have the enormous capacity to purify water and provide nutrients. They will also play a determining role in carbon sequestration.

3. Sustainable food systems - The exodus of the population from rural areas, the abandonment of agricultural activities, led to a very sharp decrease in people linked to the sector. There are habitats whose maintenance and promotion depend on human action - natural meadows and also pond vegetation depend on extensive grazing to counteract ecological succession; Aquatic habitats are favored by the rational use of water in irrigated agriculture and the sparing use of fertilizers, seeking to reduce the use of synthetic products. Therefore, one of the goals can be the increase in the amount of public land in the protected area, or in the surface of land that is covered by agreements with landowners in order to address the Green Deal Goals.

4. Green growth - This region is particularly linked to nature tourism. If there are more local inhabitants taking advantage of tourism and thereby obtaining substantial income, they will support any activities that this plan contemplates, such as the rehumidification of their land, they will not oppose environmental progress or sustainable development in their region. There could be the creation of green jobs which, as we know, depend on healthy ecosystems.

4 From general goals to actions

Actions towards Climate Goal

- action 1 - raising awareness and training farmers and other stakeholders in the landscape on the importance of the system being balanced, as it is one of the ways to better cope with climate change, which can often be associated with unpredictable events. Activities on the ground must be sustainable at all levels and provide a future and not, on the contrary, shrink that future.

Actions towards Biodiversity Goal

Habitats: 3110, 3150, 3160, 3260, 4020, 6410, 6430, 91E0, 91F0 and 92A0

-action 1 - continuing and expanding the protection and restoration of key Natura 2000 habitats linked to freshwater ecosystems in 150 ha of the RSP area...;

-action 2 - improving the connectivity among habitats in 150 ha of the RSP area in 350 ha of the floodplains that are expected to be re-connected through:

- encouraging extensive grazing of indigenous breeds to maintain herbaceous habitats (6410, 6430 and also 3110), associated with other traditional livestock management practices (4020);
- protocols with competent entities to mitigate water pollution (3150, 3160, 3260);
- protection of existing native forest plots and promotion of natural regeneration to expand and consolidate riverine forest habitats (91E0, 91F0, 92A0), reinforcing with the introduction of main forest species if necessary.
- All associated with the control and management of invasive alien species in an integrated and sustained way in the different sectors of activity that intervene in the landscape and in the daily management of its vegetation.

Actions towards Inclusivity Goal

-action 1 - involvement of stakeholders will be reinforced by replicating the methodology used in MERLIN implementation area to the RSP area, e.g. agreements with stakeholders and workshops and permanent contact/involvement, namely with landowners; results will be used with other landowners to promote alignment with Green Deal goals in expanded area of the RSP

- action 2 - developing a Citizen Science initiative with an App to involve visitors/nature tourists/citizens in general in a freshwater biodiversity information system about the native species, the biological invasions (alert system), the condition of the ecosystems (environmental education) and the results of the restoration actions (environmental education). These App will be connected to a platform where information will be stored as a biodiversity database of the region. The initiative will be connected to the Alto Minho Lung project that is being developed by the Municipality in the region.

Flood and Drought resilience Goals

-action 1 - Developing knowledge building to improve the understanding of the floodplain responses to hydroclimatic changes and water management. Notably developing a reinforced monitoring plan including water level survey and hydrological modelling, in combination with ecosystem monitoring, that will set the basis for a better water resources management and better understanding of flood/drought risk in the medium term. This monitoring plan is expected to be completely implemented during the period of the RSP.

Health & Human well-being Goal

-action 1 - increase walking routes through habitat areas subject to recovery/restoration.

Sustainable food systems Goal

-action 1 - purchase land in the protected area to maintain natural pastures for indigenous breeds;

-action 2 - establish agreements or partnerships with landowners.

5 Proposed timeline

	Period (2 yr interval)					Period (5yr interval)		
	2025-26	2027-28	2029-30	2031-32	2033-34	2035-39	2040-44	2045-49
1. Invasive Exotic control								
1.1 Peeling	x	x	x	x				
1.2 Cut and removal		x	x	x	x			
1.3 Regeneration control	x	x	x	x	x	x	x	x
2. Active Restoration								
2.1 Planting/ Seeding	x	x	x	x				
2.2 Replantation		x	x	x	x			
3. Stakeholders agreements/contacts	x	x	x	x	x	x	x	
4. Barriers removal		x		x		x		
5. Riparian galleries								
5.1 Margins stabilization	x	x	x	x	x	x	x	
5.2 Restoration (staking/planting)	x	x	x	x	x	x	x	x
6. Natural engineering/reconnection	x	x	x		x		x	
7. Hydrologic modelling/establish registration protocols	x	x	x	x	x	x	x	x
8. Monitoring/evaluation	x	x	x	x	x	x	x	x

6 Budget

The implementation of the RSP may be conditioned to public funds raising.

Rough estimates in: invasive species control (2 000 000 €); active restoration cost (500 000 €).

Actions can be: finding funding; co-develop funding solutions together with interested companies; Involve interested (new) stakeholders in that type of searching and co-development; etc.

7 Uncertainties and assumptions/ boundary conditions

Regarding the main uncertainties/assumptions of the RSP:

1. financing will need to be guaranteed;
2. organize applications for possible financing that arises;
3. ensure that the plan survives possible policy changes;
4. ensure that partnerships/protocols with current stakeholders survive or are renewed with these and/or other stakeholders;
5. assemble a team that guarantees the technical and operational support of the proposed goals and actions

Implementation challenges, the lack of coordination between different public administrations and property barriers can be overcome with new laws. The lack of identification of the landowner also if registration is mandatory. Knowledge, for example understanding risks such as floods, can partially help to better understand. Strengthening the continuity of science-based evidence from ecosystem monitoring would help improve best practices in restoration. This is crucial to tackle emerging global issues such as biological invasions, a fundamental problem in the area, which is affected by both invasions of exotic species and plant diseases that affect ecosystems.

As for the main political barriers and the ideas for overcoming them, it is clear that they are considered to be solid, but we are not entirely sure whether they will be implementable. Our sphere of influence is not very comprehensive, that is, politically we will not have much strength in influencing decision-making, even given recent developments regarding the CAP. However, our contribution combined with others could influence the CAP in the future, towards a more capable agricultural sector, more sustainable agriculture, rural development. And yes, we try to share everything with interested parties. Knowledge is essential and fundamental to clarify uncertainties, it can be a goal to be achieved over time.

8 References / Relevant material

https://www.cm-pontedelima.pt/pages/941?news_id=7615

https://lagoas.cm-pontedelima.pt/pages/972?news_id=8368

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