RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

BEAU SOLEIL DES LANDES
2018 - 2050


Trees planted close to the hen coop
© Saaltus

IDENTITY CARD

GEOGRAPHICAL LOCATION
Maisdon-sur-Sèvre (44)

TARGET ADAPTATION ISSUE(S)
- **Mitigation of very high temperatures**
- **Runoff control**

HABITAT(S) CONCERNED
Agricultural ecosystems

TYPE(S) OF NBAS
Sustainable management of ecosystems : recultivation and regeneration of former vineyards through agroforestry practices and rotational grazing

PROJECT LEADER(S) AND ASSOCATED PARTNER(S)
- **Beau Soleil des Landes Farm**
- « Trees for the Future » contest 2018 – Pur Project, Accor
- Nature 2050 Programme – CDC Biodiversité
- League for the Protection of Birds (LPO)
- Mission Bocage
- Sèvre et Maine Emploi Solidaire (SEMES)

FUNDERS AND BUDGET
- « Trees for the Future » contest grant– Nature 2050
- Owner's funds

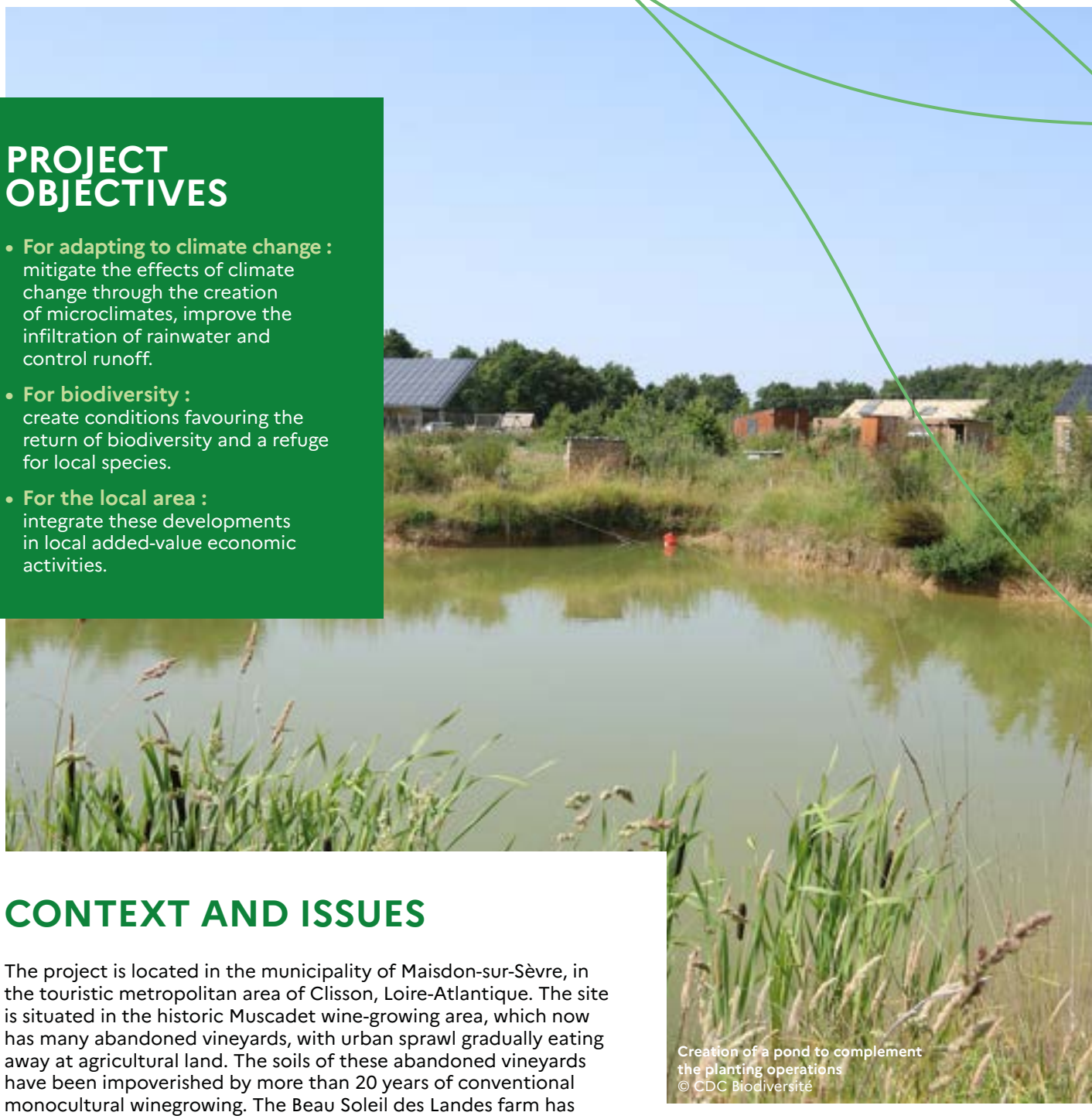
Total budget : **16 650 €**

Plus the cost of sustaining and monitoring the project until 2050, to be covered by the Beau Soleil des Landes farm and CDC Biodiversité.

FERME BEAU SOLEIL
OEUFS FRUITS LÉGUMES

PROJECT OBJECTIVES

- **For adapting to climate change :** mitigate the effects of climate change through the creation of microclimates, improve the infiltration of rainwater and control runoff.
- **For biodiversity :** create conditions favouring the return of biodiversity and a refuge for local species.
- **For the local area :** integrate these developments in local added-value economic activities.



Creation of a pond to complement the planting operations
© CDC Biodiversité

CONTEXT AND ISSUES

The project is located in the municipality of Maisdon-sur-Sèvre, in the touristic metropolitan area of Clisson, Loire-Atlantique. The site is situated in the historic Muscadet wine-growing area, which now has many abandoned vineyards, with urban sprawl gradually eating away at agricultural land. The soils of these abandoned vineyards have been impoverished by more than 20 years of conventional monocultural winegrowing. The Beau Soleil des Landes farm has made the transition to organic farming and is leading one of the few agroforestry projects in the Loire-Atlantique department. Its activity is divided between the extensive raising of about twenty dairy cows and egg-laying hens, and diverse market gardens partially processed on the farm (jams). The produce of the farm and other producers in the area are sold directly at the farm shop or to local organic shops and restaurants.

The planted areas extend over a 7-ha site characterised by a soil that has been impoverished, polluted and compacted by 20 years of conventional agricultural practices. The adoption of agroecological practices, notably the planting of hedges, improves the infiltration of water and favours the proliferation of beneficial organisms, which in turn improve the resilience of the farm.

REGULATORY CONTEXT OF THE PROJECT

- The Pays du Vignoble Nantais Territorial Coherence Scheme (SCoT)
- The Pays de the Loire Regional Ecological Coherence Scheme (SRCE)

ACTIONS IMPLEMENTED

Begun in 2018, the works consisted in :

- Creating 1000 metres of mounds, fertilising and mulching, and planting 2348 trees and shrubs suited to the pedoclimatic context (including 248 agroforestry trees, 300 fruit bushes and 1000 berry bushes).
- Planting 200 linear metres of fruit trees and 600 linear metres of hedgerows; alternating two lines of fruit trees and one line of nitrogen-fixing trees over a surface area of 4L8 ha. The lines follow the contours manually determined using a laser measurement tool at night.
- Deploying other green infrastructure for the management of runoff, in particular ponds, muddy areas and ditches, which proved to act as refuges for biodiversity and as carbon sinks.
- The works were carried out by means of participative worksites and maintenance is performed by several employees, notably through a mentoring system that puts the farm in contact with refugees. The replanted areas concerned approximately 5 % of the young plants, especially in the wetlands, where willow and poplar cuttings were preferred. The farm's business model is fairly diversified, and includes renting out land for camping and hosting teleworkers.

GOVERNANCE ADOPTED

In the long term, the owners take responsibility for the management, maintenance and monitoring of the trees, bushes and hedges planted.

The farm is also supported by CDC Biodiversité through the Nature 2050 programme and its scientific partners for defining and monitoring indicators until 2050, in addition to co-funding the action.

SCHEDULE

	PROJECT LIFESPAN			
	2018	**2019**	**2020**	**2021**
Works		Start of works : preparation of the soil, creation of mounds and first planting phase	End of works and replanted areas (5%)	
Life of the project	4th edition of the « Trees for the future » contest	The farm joins the LPO « Paysans de nature » programme Initial survey of biodiversity on the farm with the LPO		Building upon the Nature 2050 programme : acquisition of 1 ha of vineyards to plant a wood to act as a barrier to the phytosanitary excesses on neighbouring land
Monitoring and assessment			Monitoring of indicators until 2050	

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- Regenerating and stabilising the soil : the soil is structured and fertilised by the root systems of the trees and shrubs.
- Controlling runoff : trees assist the deep infiltration of rainwater and its filtration in the soil.
- Mitigating very high temperatures : enhanced shade to create cool areas on the farm.

BENEFITS FOR BIODIVERSITY

- Protecting the biodiversity of the farm from pollution and very high temperatures : using the windbreak effect of the trees to act as a barrier to pesticide residues and increase the shade provided to improve the well-being of farm animals.
- Creation of habitats propitious to wildlife : the hedges are a refuge for wildlife, notably beneficial organisms, and naturally fertilise the soil via their root systems.

OTHER BENEFITS

- Sequestration of carbon.
- Enhancing the food sovereignty of the local area.
- Integration in local added-value economic activities (use of firewood, commercialisation through partners, fuelwood sector, etc.).

MONITORING INDICATORS

Adaptation to climate changes

- Evolution/maturity of the ecosystem: measurements to assess the health of the soil and the natural abundance rate of Nitrogen 15 in the leaves.

Biodiversity

- Wildlife surveys (birds, reptiles, amphibians, insects), continuous biodiversity monitoring with the LPO, notably in the framework of the « Paysans de nature » charter, to which the farm is signatory, pedological analysis.

Planting on mounds
© Saaltus

LEVERS FOR SUCCESS

TECHNICAL ASPECTS AND PROJECT DESIGN

- **Adapting to local conditions :** the choice and mound-planting of tree species were determined by the hydromorphic situation, however maintenance proved complicated (more practical to work on the flat). Regular maintenance with a rotary slasher is required for the first three years.
- **Innovating :** using green fertiliser made from oats to depollute the soil.
- **Seeking an economic balance :** planting berry bushes provides additional income for the farm.

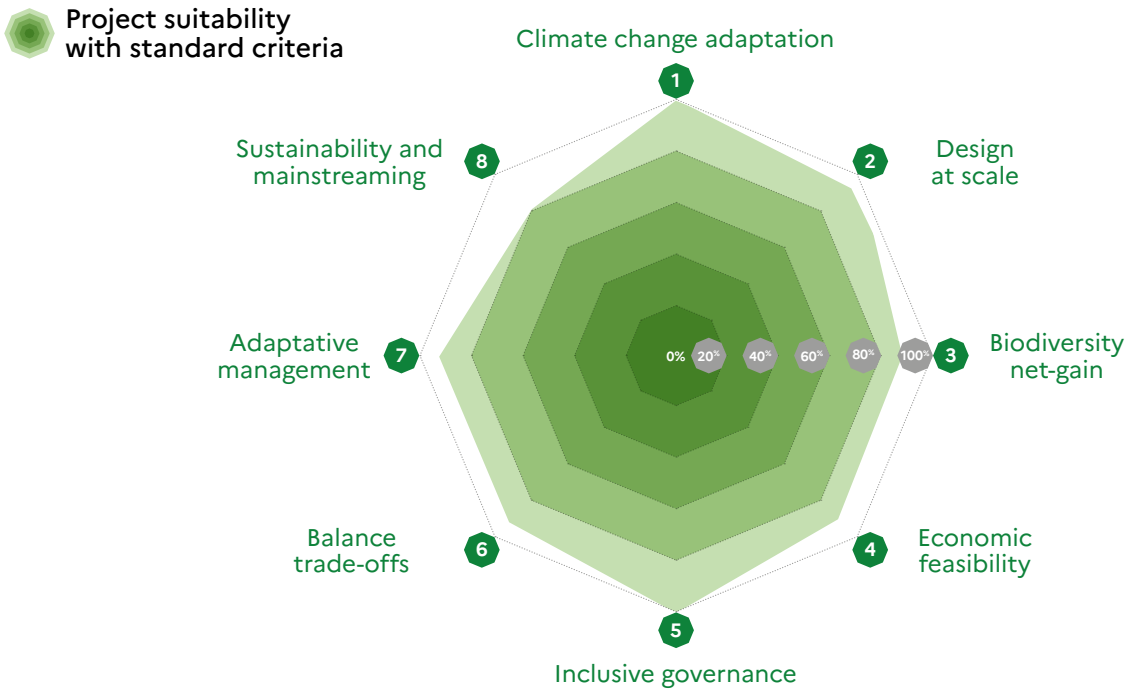
STAKEHOLDER COMMITMENT

- **Benefiting from expert advice :** the farm was assisted by local stakeholders (nurseries, associations, etc.) in the selection of tree species and farming practices.
- **Getting involved in local production :** the farm supplies its wood to the local area.
- **Consulting with local decision makers :** the farm can count on the support of the municipality.

MONITORING AND REPLICABILITY OF THE ACTION

- **Assessment :** the regular monitoring of species abundance by the LPO and indictors of soil and plant health by CDC Biodiversité enable the benefits of agroecological practices to be assessed scientifically.
- **Replicability and influence :** through its « introductions to self-sufficiency » and participative worksites organised throughout the year, the farm contributes to the dissemination of knowledge and the training of agroecological project leaders.
- **Sustaining the project over time :** its integration into the Nature 2050 programme will ensure the sustaining of monitoring until 2050.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

- Webpage (in French) of the farm
- Webpage (in French) of the Nature 2050 programme

CONTACT DETAILS OF THE PROJECT LEADER

- **Claire Gallon**
  https://www.beausoleildeslandes.com/contact/

DATE

July 2023
January 2024

DATE AND FACT FILE EDITOR

Jean-Baptiste Rallu
Albane Droal

www.secondRegard.fr - Coordination : Direction de la communication - Septembre 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

CDC BIODIVERSITÉ

artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

CŒUR VERT DES TARTRES
2021 - 2050

Plantations
© Franck BADAIRE

IDENTITY CARD

GEOGRAPHICAL LOCATION
Plaine Commune conurbation (93)

TARGET ADAPTATION ISSUE(S)
- **Respond to the needs of the residents of a densely populated urban area for natural surroundings by mitigating the effects of global warming and restoring ecological habitats.**

HABITAT(S) CONCERNED
Urban biodiversity

TYPE(S) OF NBAS
Restoration of ecosystems: creating a 2-hectare park combining open habitats, cool leafy areas and places for socialising in an urban environment lacking open spaces.

PROJECT LEADER(S) AND ASSOCATED PARTNER(S)
- **Public territorial institution (EPT) Plaine Commune, Greater Paris**
- Nature 2050 Programme – CDC Biodiversité
- Municipality of Stains
- Local public utility (SPL) Plaine Commune Développement
- Greater Paris Metropole (MGP)

FUNDERS AND BUDGET
Nature 2050 funding - MGP call for projects : 250 000 €

Self-funding : 87 310 €

Total project budget : **337 310 €**

Plus the cost of sustaining and monitoring the project until 2050, to be covered by Plaine Commune and CDC Biodiversité.

plaine commune GRAND PARIS

Pedestrian walkway
© Franck BADAIRE

PROJECT OBJECTIVES

- **For adapting to climate change :** creating an urban cool island and improving the management of rainwater on the site.
- **For biodiversity :** strengthening the urban green network and maintaining ecological continuities.
- **For the local area :** opening up a new natural area for residents.

REGULATORY CONTEXT OF THE PROJECT

- Plaine Commune Territorial Climate-Air-Energy Plan (PCAET)
- Les Tartres Concerted Development Zone (ZAC)
- Stains Natura 2000 site
- Regional Ecological Coherence Scheme of the Ile-de-France region

CONTEXT AND ISSUES

The site of Les Tartres spans three municipalities in Seine-Saint-Denis : Stains, Pierrefitte, and Saint-Denis. This area, which was favored for market gardening in the 19th and 20th centuries, gets its name from its topography (a « tertre »). By the end of the 20th century, market gardening activities had gradually diminished, giving way to informal family gardens, equipment storage activities, and a largely polluted wasteland. In 2011, the concerted development zone (ZAC) of Les Tartres was created to enhance this significant site. Despite the severe soil degradation and ecological impoverishment, the site was identified as being of ecological interest in the Regional Ecological Coherence Scheme of the Ile-de-France region(SRCE) and also as a nucleus of secondary biodiversity and an intersection of the east-west and north-south ecological continuities in the Plaine Commune Green and Blue Network. An ecological survey was carried out in 2018 by Urban Eco and detected the presence of many bird species characteristic of open and wooded habitats.

The territorial public institution (EPT) Plaine Commune is tasked with implementing and piloting this comprehensive development project, which includes the creation of 22 hectares of public spaces for the development of a mosaic of habitats, while extending the agricultural purpose of the site. For the development of the green heart of approximately 2 hectares in Plaine Est, the EPT has received support from the Métropole du Grand Paris and the Nature 2050 program as a winner of the 2019 edition of their joint call for projects.

The project led by Plaine Commune won a prize in the 2019 edition of the « Nature 2050 – Greater Paris Metropole » call for projects and therefore benefited from support that enabled its implementation and integration into the Nature 2050 programme.

ACTIONS IMPLEMENTED

Begun in 2021, the aim of the project is to create a large, open-access, multi-purpose grassy area for local residents and a wooded, more protected area to encourage biodiversity. The objective is to reconcile open habitats (mowed grassland, parkland), dedicated to sports activities and relaxation, with a natural area made up of wooded and shrubby habitats, and woodland edges.

- An open parkland for leisure activities, predominantly raye gras and fescue, plus a range of flowery areas to encourage differentiated management;
- A mesophile grassland studded with birch and hornbeam groves favourable to insects, birds and small mammals;
- A meso-hygrophilous grassland with a wetter area enabling the infiltration of rainwater;
- 5 350 m^2 of tree hedges, predominantly oak, creating a particularly shrubby woodland edge favourable to pollinisers, and with 3 300 m^2 inaccessible to the public;
- A berms and hedgerows;
- orchards, predominantly with varieties local favourable to town birds and also rarer species such as Tawny Owl.

GOVERNANCE ADOPTED

For designing the project and defining the monitoring indicators until 2050, the Municipality was supported by the CDC Biodiversité team via the programme Nature 2050 and by the Greater Paris Metropole. Two companies were commissioned to carry out the works (Colas and Loiseleur).

SCHEDULE

	PROJECT LIFESPAN		
	2021	**2022 - 2023**	**2023 - 2050**
Works	Preparation of the soil	Layout, planting operations and opening of the park	
Monitoring and assessment			Monitoring and assessment of Nature 2050 programme indicators

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- Summer cooling provided by shade and evapotranspiration from trees and shrubs, in addition to the presence of damp habitats such as wet meadows, meso-hygrophilous grassland and ponds.

BENEFITS FOR BIODIVERSITY

- Multiplication of habitats favourable to animal and plant species.
- Maintenance of north/south and east/west continuities throughout the local area, underlining its position as a nucleus of secondary biodiversity between Butte Pinson and Georges Valbon Park.

OTHER BENEFITS

- Increasing local people's well-being and quality of life.
- Improving the water filtering capacity, thus de-clogging the rainwater network, and improving air quality through the absorption of pollution by trees.

Site of the Coeur vert des Tartres
© Franck BADAIRE

MONITORING INDICATORS

Adaptation to climate changes

- Evolution/maturity of the ecosystem : measurements to assess the health of the soil and the natural abundance rate of Nitrogen 15 in the leaves
- Photographic monitoring

Biodiversity

- Propage protocol monitoring
- Urban grassland flowers
- Tree management (tool being created)

Other

- Influence/awareness-raising
- Georeferencing of damage (« Bien vu » system)

LEVERS FOR SUCCESS

TECHNICAL ASPECTS AND PROJECT DESIGN

- **Soil :** re-forming of brunisols under the hedges to develop a thick layer of mull-type humus favourable to endogenous biodiversity and carbon capture. Restoration of neoluvisols in the sector of the meadow by deeply compacting the soil present and adding more clayey and humus-rich earth to enable the development of vegetation close to the cool areas of the floodplain. Treatment of pockets of pollution in agricultural sectors by adding topsoil.
- **Favour indigenous species :** revegetating using a mixture of indigenous herbaceous species and fruiting species favourable to wildlife. The labels « Végétal Local » and « Vraies Messicoles » can help in deciding. In the summer of 2022, a watering ban during the drought severely impacted the plantings, resulting in significant losses. The dead trees were replaced with a particular focus on selecting species that had best withstood water stress.
- **Encouraging wildlife :** setting up appropriate features such as drystone walls or piles of wood in the hedge to serve as hibernacula for small fauna.
- **Setting up permeable fences :** 15 cm X 15cm crossing point at ground level; vertical posts with picket fencing or firmly attached large-mesh rigid wire fencing, with a 10 to 20 cm gap between the ground and the bottom of the fencing to enable small fauna to cross.

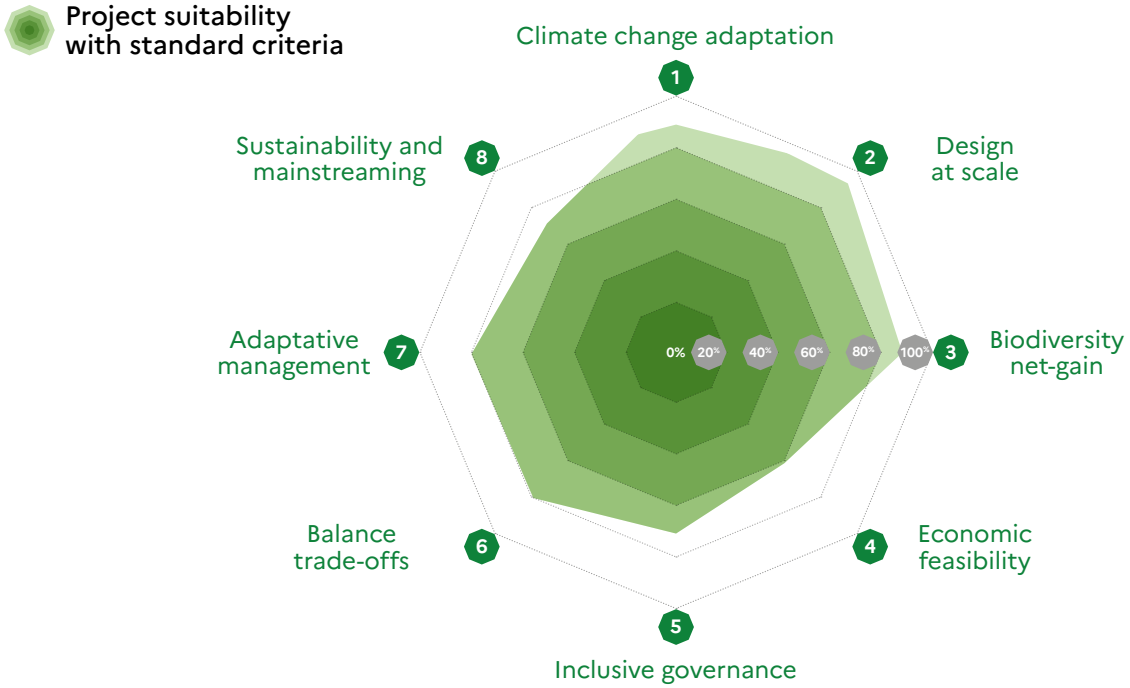
STAKEHOLDER COMMITMENT

- **Safety concerns :** the works were interrupted in 2022 because of vandalism and aggression towards the people working on the site. In 2023, a consultation with stakeholders (local authorities, the prefecture, the SPL, and the project manager) took place to ensure the safe completion of the work. The implementation of passive safety measures, close governance and communication among all parties involved, as well as increased awareness among local residents, are essential to prevent such incidents.

MONITORING AND REPLICABILITY OF THE ACTION

- **Extensive management of the wooded areas :** weeding around the saplings for 5-6 years to avoid competition with spontaneous species. Afterwards, only pruning to shape the young trees so as to achieve a dense, low shrubby layer. Rotary slashing every 5 years in autumn between the rows. Thinning could be required after 15 years.
- **Perspective of the project :** the objective is, by 2027, to provide a new living space for the local area, combining nature areas, agricultural activities, family allotment gardens, and areas for leisure activities and relaxing.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

- Webpage (in French) of the Nature 2050 programme
- Webpage (in French) of the Town of Stains

CONTACT DETAILS OF THE PROJECT LEADER

- **Plaine commune**
  +33 (0)1 55 93 55 55
  nature2050@cdc-biodiversite.fr

DATE

March 2023
January 2024

DATE AND FACT FILE EDITOR

Jean-Baptiste Rallu
Albane Droal

www.secondRegard.fr - Coordination : Direction de la communication - Septembre 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

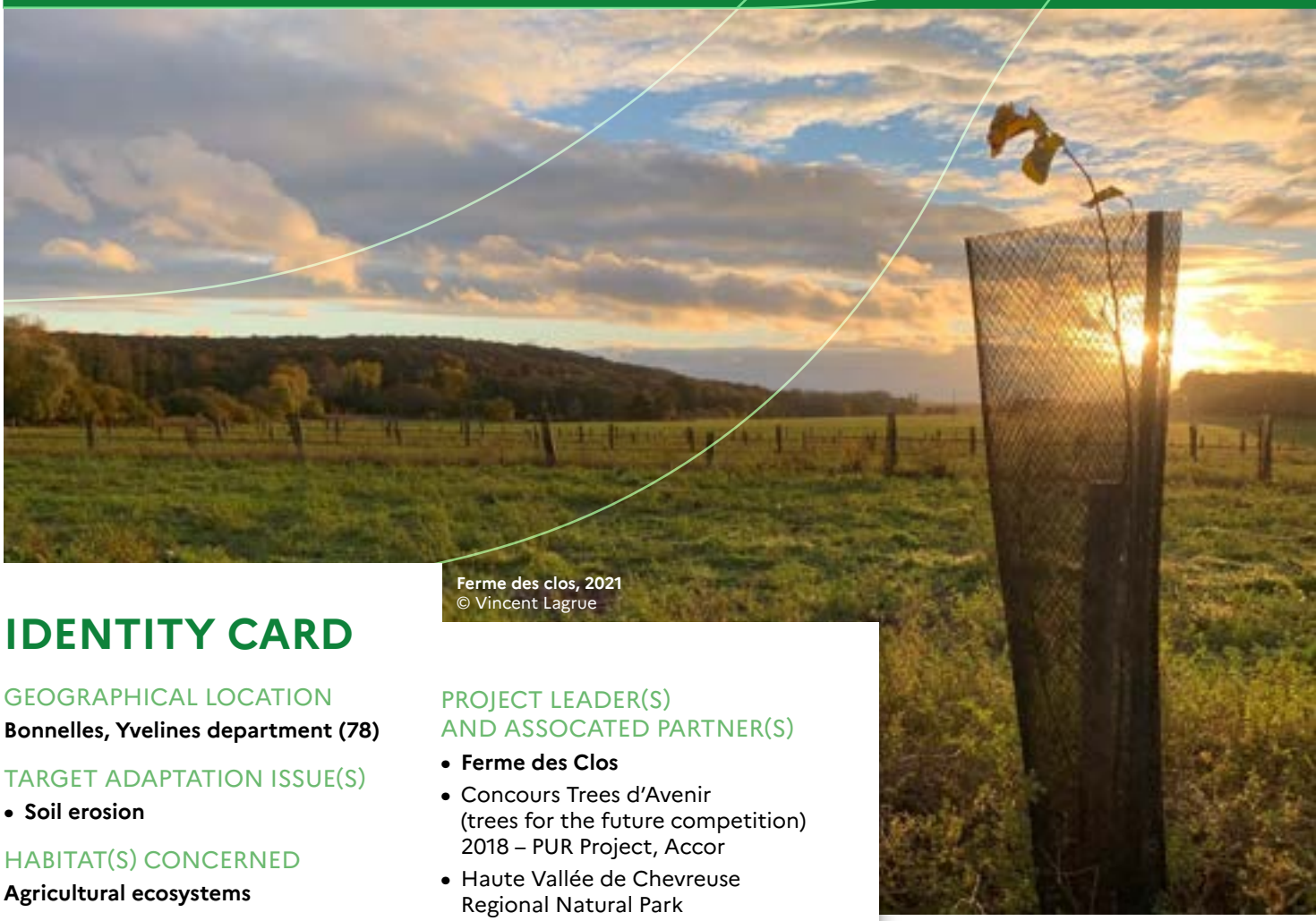
CDC BIODIVERSITÉ

artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

FERME DES CLOS
2019 - 2050



Ferme des clos, 2021
© Vincent Lagrue

IDENTITY CARD

GEOGRAPHICAL LOCATION
Bonnelles, Yvelines department (78)

TARGET ADAPTATION ISSUE(S)
- **Soil erosion**

HABITAT(S) CONCERNED
Agricultural ecosystems

TYPE(S) OF NBAS
Sustainable management of ecosystems : incorporating trees into all agricultural activities on the farm in order to improve resistance to very high temperatures.

PROJECT LEADER(S) AND ASSOCATED PARTNER(S)
- **Ferme des Clos**
- Concours Trees d'Avenir (trees for the future competition) 2018 – PUR Project, Accor
- Haute Vallée de Chevreuse Regional Natural Park
- Nature 2050 Programme – CDC Biodiversité
- Agroof

FUNDERS AND BUDGET
CDC Biodiversité Nature 2050 Programme : **16 650 €**

Plus the cost of sustaining and monitoring the project until 2050, to be covered by the Ferme des Clos and CDC Biodiversité.

FERME DES CLOS

Planting between fields, 2021
© CDC Biodiversité

PROJECT OBJECTIVES

- **For adapting to climate change :** plant trees and shrubs suited to the pedoclimatic context (chemical pollution, shelter from wind and storms, combatting drought, etc.) and combat soil erosion.
- **For biodiversity :** create ecological continuity between the Regional Natural Park and cereal fields, recreate the humus and surface soil layers.
- **For the local area :** contribute to the economic revenue of the local authority and use the wood in the firewood sector.

REGULATORY CONTEXT OF THE PROJECT

- A farm located in the Bonnelles commune belonging to the Haute Vallée de Chevreuse Regional Natural Park

CONTEXT AND ISSUES

The farm covers approximately 80 hectares and consists of a group made up of five agricultural associates: two beekeepers, one hop grower, one arboriculturist and one market gardener. The associates have set up synergies between trees and all their organic farming systems : raising hens, cereals, berries, hedges, isolated trees, etc.

The particularly permeable sandy-loam soil is very sensitive to erosion.

Planting trees between fields creates favourable microclimates for maintaining humidity and restoring the degraded humus layer through the decomposition of organic matter (leaves, dead branches, etc.) by soil organisms.

ACTIONS IMPLEMENTED

Begun in 2020, the works consisted in :

- planting 286 timber trees (maple, oak, rowan, linden, wild cherry, elm…)
- planting 572 shrubs (birch, poplar, alder, willow…)
- setting up 1832 shrubs in hedges

The project, funded by the Nature 2050 programme spreads over 8 hectares, the 2976 trees and shrubs being arranged in rows between fields with occasional openings to enhance perspectives and show the tree to good effect.

GOVERNANCE ADOPTED

The project is the result of concertation between the five associates who, individually and at various levels, benefit from the many services provided by the trees. Two of the associates make use of their training in landscape architecture to make the agroforestry project a success.

The project leaders received Agroof training to acquire the agroforestry knowledge and techniques required. This training course was partly funded by VIVEA.

The farm was also assisted by the ecologists of the Haute Vallée de Chevreuse Regional Natural Park, the facilitator of the Bonnelles Ponds Regional Nature Reserve and the Paris-region agroforestry association Agrof'Ile.

SCHEDULE

PROJECT LIFESPAN

	2020	**Winter 2020 - 2021**	**2021 - 2050**
Works	Preparation of the soil and first planting phase	Second planting phase	
Monitoring and assessment			Monitoring of ecological health indicators until 2050

Participative worksite, 2021
© Ferme des clos

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- Plant trees and shrubs suited to the pedoclimatic context (chemical pollution, shelter from wind and storms, combatting drought, etc.) and combat soil erosion.

BENEFITS FOR BIODIVERSITY

- Regenerating a layer of humus favourable to crop growth and the microbial life of the soil.
- Recreating refuges for field birds and small raptors, which provide an effective pest bioregulation service, and creating ecological continuity between the groves and woods already present.
- Favouring the proliferation of insects, notably pollinisers which provide an essential ecosystem service for maintaining the productivity of farmland.
- Favouring the natural fertilisation of the soil and the infiltration of rainwater.

OTHER BENEFITS

- Creating synergies between local natural and productive areas by means of ecological corridors between cultivated plots and the various forest massifs of the Haute Vallée de Chevreuse Regional Natural Park.
- Boosting the local forestry sector by enhancing future timber production.
- Mitigating climate change by creating carbon sinks.
- Improving the food sovereignty of the local area by combining several complementary agricultural activities and training workshops for the public.

MONITORING INDICATORS

Adaptation to climate changes

- Evolution / maturity of the ecosystem : measurements to assess soil health and the natural abundance rate of Nitrogen 15 in the leaves

Biodiversity

- Bird monitoring

Other

- Monitoring the local influence of the project : reception of the public, media coverage

LEVERS FOR SUCCESS

TECHNICAL ASPECTS AND PROJECT DESIGN

- **Planting before December :** the resistance of saplings to increasingly frequent, long and intense droughts depends on the depth of their root system. Planting early gives the young plants time to connect with the water resources in the soil and thus confront the next drought.
- **Sustainable water management :** the associates of the Ferme des Clos water the trees from a tank (two waterings a fortnight apart) and use the mulching technique to maintain humidity at the foot of the trees.
- **Choosing indigenous tree species :** the success rate varies considerably in function of the species. For example, larch and Paulownia did not give good results whereas Field Maple, Elm and Sweet Chestnut are thriving.
- **Protecting saplings from deer :** tall (2.10m-2.50m) and sufficiently robust (6-8 cm in diameter) chestnut stakes need to be set up that are capable of resisting bark-grazing pressure from deer.

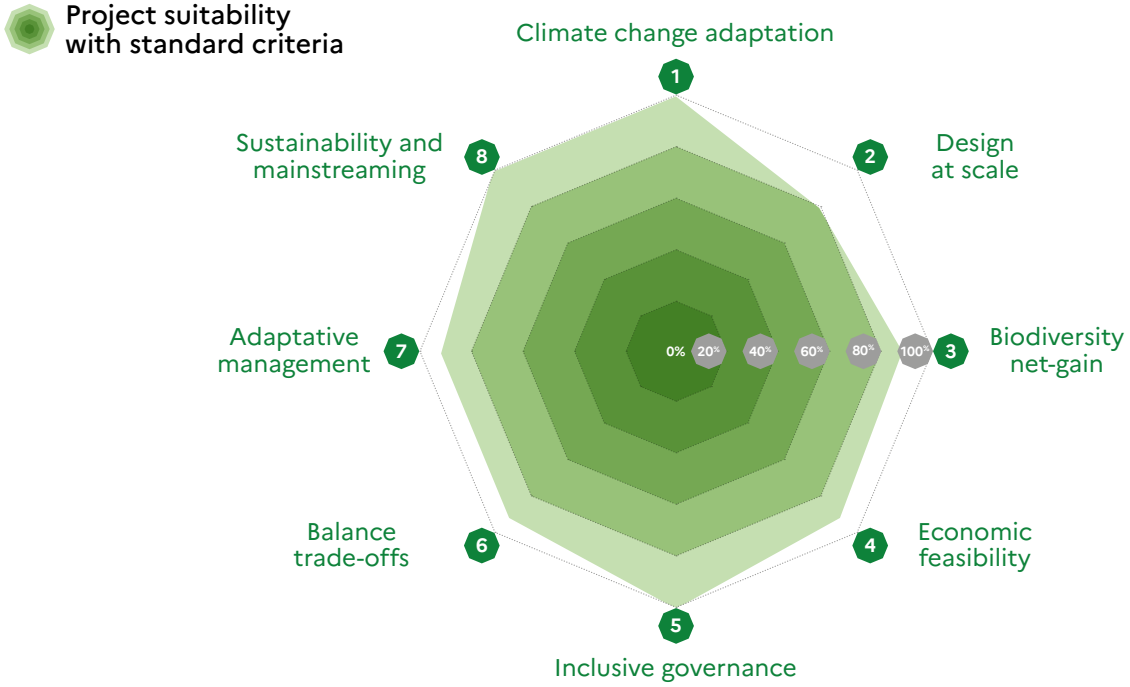
STAKEHOLDER COMMITMENT

- **Activate the driving forces of the local area :** the Ferme du Clos has implemented participative worksites with schools and the farm's customers to carry out the agroecological works ques and raise public awareness.
- **Create synergies between different production activities :** a shepherd has his sheep graze the farm's agroforestry.

MONITORING AND REPLICABILITY OF THE ACTION

- The monitoring-assessment indicators of the Nature 2050 programme can identify good practices in collaboration with the project leaders, help to adjust them if required and measure the long-term benefits of agroforestry techniques for the climate, biodiversity and the local area.
- The project leaders are not currently remunerated for the agroforestry developments despite the many benefits provided to the community. Payment systems for maintaining ecosystem services could make this type of project more attractive in the future.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

- Webpage (in French) of the Nature 2050 programme
- Webpage (in French) of the Ferme des Clos

CONTACT DETAILS OF THE PROJECT LEADER

- contact@fermedesclos.com

DATE

March 2023
January 2024

DATE AND FACT FILE EDITOR

Jean-Baptiste Rallu
Albane Droal

www.secondRegard.fr - Coordination : Direction de la communication - Septembre 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

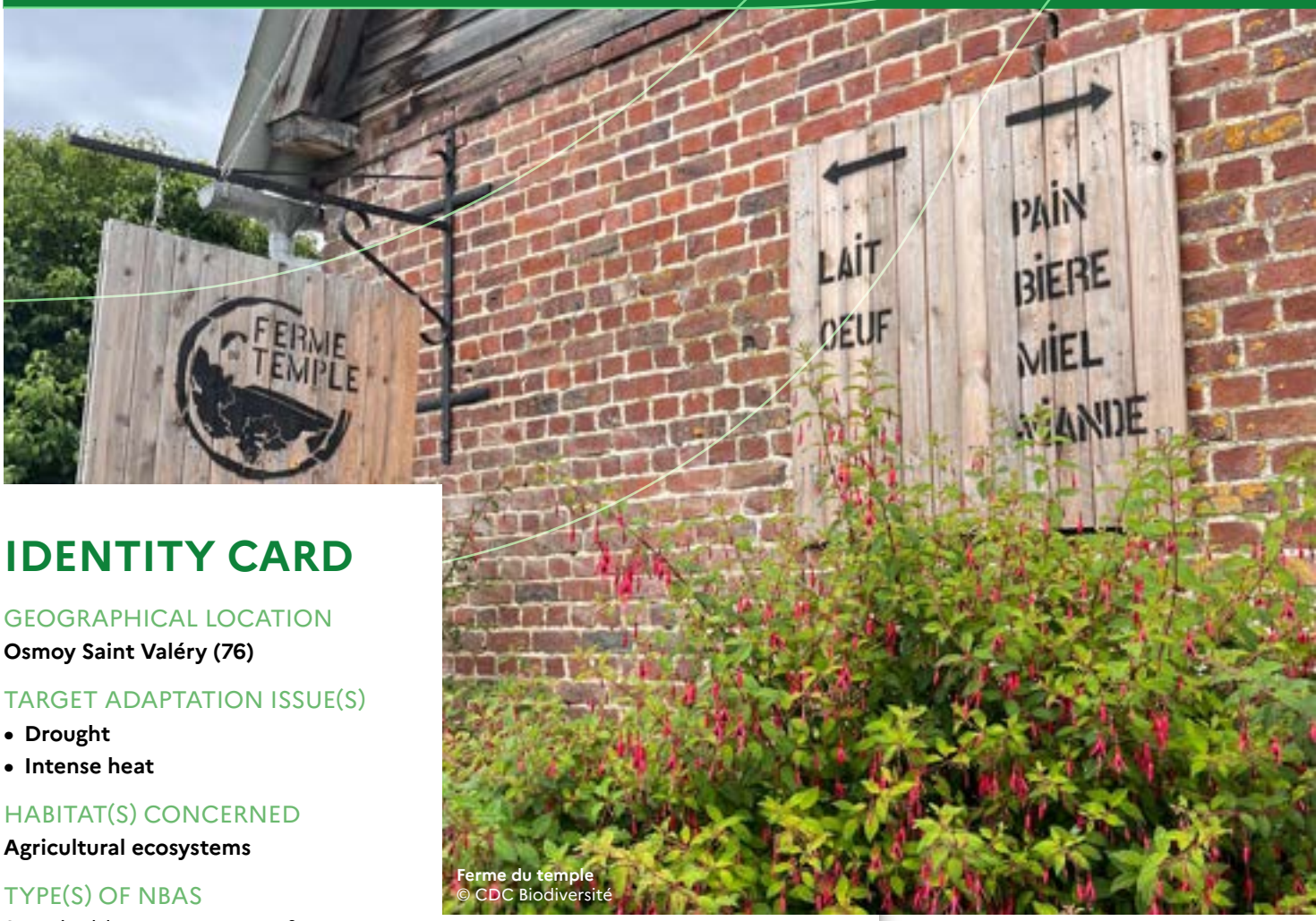
CDC BIODIVERSITÉ

artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

FERME DU TEMPLE
2017 - 2050



Ferme du temple
© CDC Biodiversité

IDENTITY CARD

GEOGRAPHICAL LOCATION
Osmoy Saint Valéry (76)

TARGET ADAPTATION ISSUE(S)
- **Drought**
- **Intense heat**

HABITAT(S) CONCERNED
Agricultural ecosystems

TYPE(S) OF NBAS
Sustainable management of ecosystems : creating ecological continuities combined with a livestock farming system.

PROJECT LEADER(S) AND ASSOCATED PARTNER(S)
- **Ferme du Temple**
- Nature 2050 Programme – CDC Biodiversité
- Concours Arbres d'Avenir (Trees for the Future competition) 2017

FUNDERS AND BUDGET
CDC Biodiversité Nature 2050 Programme : 16 650 €

Total budget : **16 650 €**

Plus the cost of sustaining and monitoring the project until 2050, to be covered by the Ferme du Temple and CDC Biodiversité.

PAYS DE BRAY
FERME DU TEMPLE

Hedge surrounding the plot
© CDC Biodiversité

PROJECT OBJECTIVES

- **For adapting to climate change :** mitigating the effects of climate change, creating microclimates and stabilising forage yields.
- **For biodiversity :** creating ecological continuity between the various areas of high ecological interest and developing a fodder system favourable to biodiversity.
- **For the local area :** creating developments using a landscape approach, which is a symbolic, heritage issue in the area, and integrating them into local supply chains.

REGULATORY CONTEXT OF THE PROJECT

- Natura 2000 SAC
- ZNIEFF I and II

CONTEXT AND ISSUES

At the western end of the Pays de Bray in Seine-Maritime, the Ferme du Temple covers 180 hectares being converted to agrosilvopastoralism. Part of the land is organically farmed as pasture and to produce hay for the dairy herd. The second part is given over to a crop rotation including wheat, barley, oilseed rape, peas, spelt, broad beans, and occasionally flax, buckwheat and hemp (conversion completed in 2020). The plots are bordered by a Natura 2000 site to the west and south, and a natural area of ecological, faunistic and floristic interest (ZNIEFF II) to the north and south.

The 70 cows are grass-fed all year round, using a plot of land organised around the milking parlour. In 2021, the farmer opened a mobile run for 80 laying hens on the pastures of the Ferme du Temple. The system he has developed conserves pastureland and enhances the landscape by lining paths and plots with a variety of hedges. The agri-environmental and climatic measure (MAEC) of late-mowing is applied to 15 hectares of meadows, and 45 hectares of field crops will eventually be reconverted to meadowland.

A third activity involves receiving tourists at the farm, mainly cyclists who travel along the « Avenue Verte » Paris-London cycle route. Festivities are organised every year in June, bringing together the local producers associated with Gautier Fihue's farm (livestock farmer, beekeeper, brewer).

ACTIONS IMPLEMENTED

Begun in 2017, the works consisted in :

- Planting 5 350 trees and shrubs, including 3 000 high branch trees and shrubs in hedges and 339 intra-plot agroforestry saplings in the first year.
- Planting three more intra-plot rows of 470 ml the following year to divide a 25-hectare plot into three future grazing and cereal-growing areas (10-year rotation).
- In 2020, planting 800 plants taken from willow, ash and alder cuttings in flood-meadows.

GOVERNANCE ADOPTED

In the long term, the management, maintenance and monitoring of the plantings will be the responsibility of the owners.
The Ferme du Temple is supported by CDC Biodiversité via the Nature 2050 programme and its scientific partners in defining and monitoring indicators until 2050, in addition to co-financing the action.

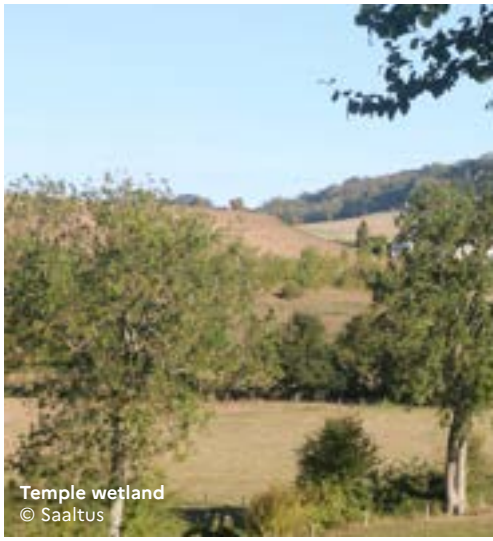
Residents have been invited to discover the developments along a dedicated walking trail and during an event based around the discovery of landscapes and agroecology that has been held annually since June 2018 (1500 visitors over a weekend).

Local elected officials (mayors, MPs, departmental and regional councillors) consult the Ferme du Temple and use it as an example. The farm also contributed to the production of a Local Biodiversity Atlas in August 2022.

SCHEDULE

PROJECT LIFESPAN

	2017 - 2018	2018 - 2019	2020	2018 - 2050
Works	First planting phase	Second planting phase	Third and last planting phase	
Monitoring and assessment				Monitoring Nature 2050 programme indicators



Temple wetland
© Saaltus

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- Improving the resistance of the farming system to climatic hazards by protecting plots of land and livestock against increasingly frequent and intense droughts and high temperatures.

BENEFITS FOR BIODIVERSITY

- Enabling the return of farmland birds and small birds of prey.
- Strengthening the green network by means of new ecological corridors.
- Creating refuges for beneficial organisms and birdlife.
- Improving soil quality and water infiltration.
- Protecting grazing animals.

OTHER BENEFITS

- Diversification of activity through tourism is underway.
- The technical and reception buildings will be heated by a biomass boiler fuelled by the residues from hedgerow maintenance.

MONITORING INDICATORS

Adaptation to climate changes

- Ecosystem evolution/maturity : measurements to assess soil health and the natural abundance rate of Nitrogen 15 in leaves

Biodiversity

- Wildlife counts
- Bird survey
- Insect survey

LEVERS FOR SUCCESS

TECHNICAL ASPECTS AND PROJECT DESIGN

- **Protecting the seedlings :** the main threat to the agroforestry plot is grazing by deer. The project leader therefore plans to set up a 2-metre-high 5-wire fence.

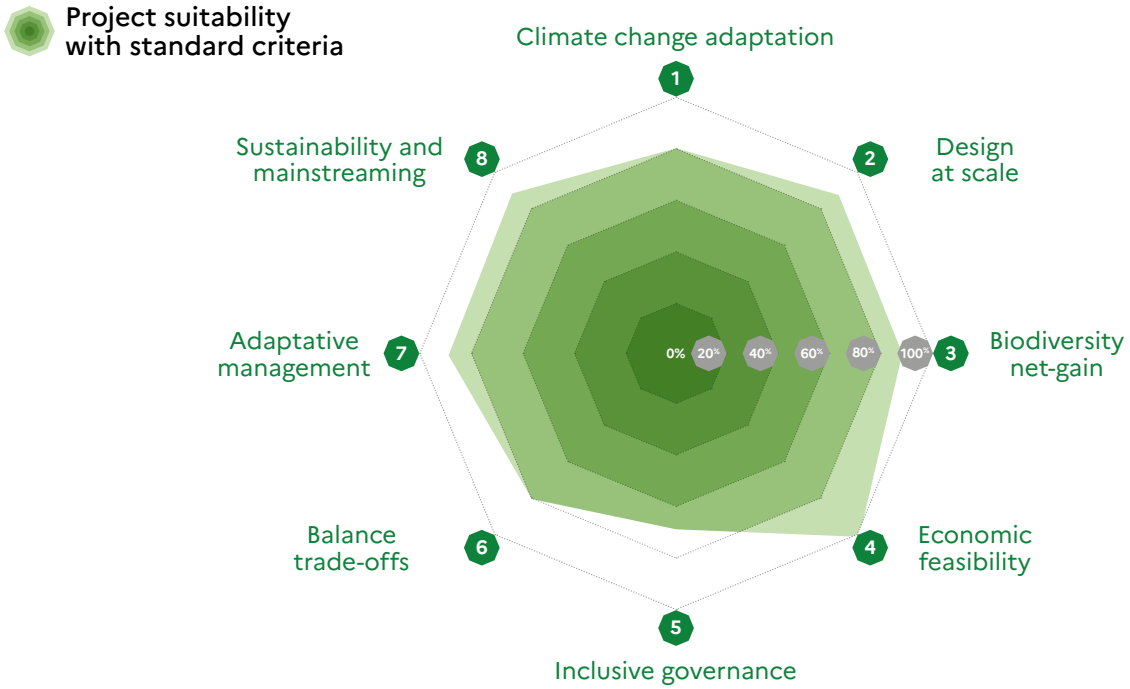
STAKEHOLDER COMMITMENT

- **Sharing knowledge :** the farmer has set up the « Au Mont Blanc Normand » association, organising a 4km nature trail with information panels.
- **Building a network :** the farmer, a brewer, a honey producer, a baker, a vegetable grower and producers of ice cream, made with milk from the farm, have set up a direct sales network in which they also exchange techniques.

MONITORING AND REPLICABILITY OF THE ACTION

- **Monitoring plantings :** around 5 % of the trees had to be replanted, depending on the row. The beech and pedunculate oak trees suffered particularly badly from the hot weather in 2022, so it was decided not to replant these species.
- **Row maintenance :** every year, 2 people spend 3 days clearing, 15 students from Saint Joseph's High School in Mesnières en Bray spend 2 days pruning and 9 of them spend an extra day on shaping.
- **Continuity :** the farm is continuing to develop agroforestry at a rate of around 2 000 ml per year in partnership with the forestry school of Saint Joseph's High School in Mesnières en Bray. As a director of the Normandy Rural Agricultural Initiatives Centre (CIVAM) since 2022, the farmer has noted a growing interest in agroforestry in the region.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

- Webpage (in French) of the Nature 2050 programme
- Facebook page of the farm

CONTACT DETAILS OF THE PROJECT LEADER

- **Gautier Fihue**
  nature2050@cdc-biodiversite.fr

DATE

March 2023
January 2024

DATE AND FACT FILE EDITOR

Jean-Baptiste Rallu
Albane Droal

www.secondRegard.fr - Coordination : Direction de la communication - Septembre 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

CDC BIODIVERSITÉ

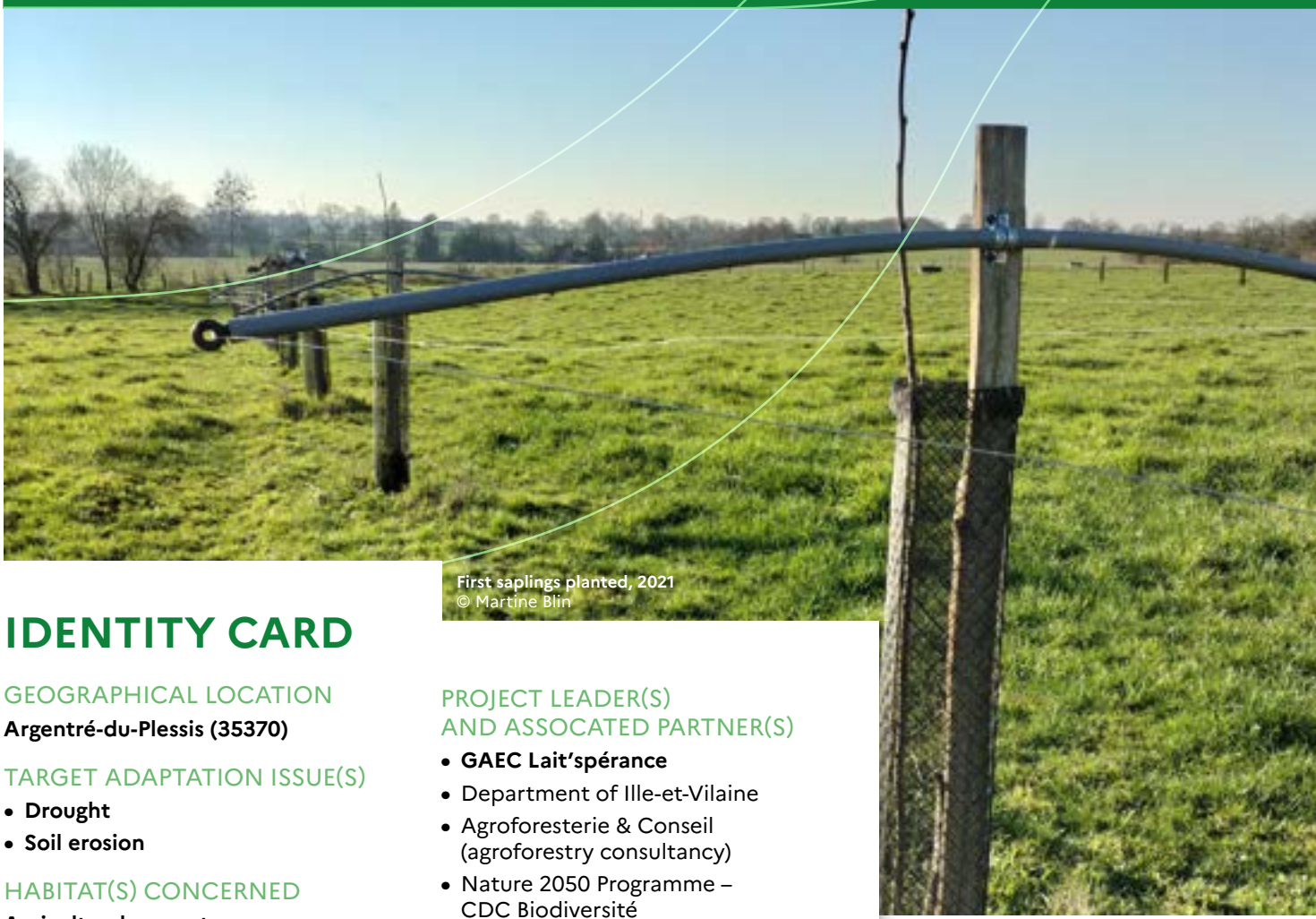
artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

GAEC LAIT'SPÉRANCE

2019 - 2050



First saplings planted, 2021
© Martine Blin

IDENTITY CARD

GEOGRAPHICAL LOCATION

Argentré-du-Plessis (35370)

TARGET ADAPTATION ISSUE(S)

- **Drought**
- **Soil erosion**

HABITAT(S) CONCERNED

Agricultural ecosystem

TYPE(S) OF NBAS

Sustainable management of ecosystems : improving the farm's resistance to climate change by restoring the ecosystem functions provided by trees, in particular providing cool conditions for livestock, shade for meadows and soil regeneration.

PROJECT LEADER(S) AND ASSOCATED PARTNER(S)

- **GAEC Lait'spérance**
- Department of Ille-et-Vilaine
- Agroforesterie & Conseil (agroforestry consultancy)
- Nature 2050 Programme – CDC Biodiversité

FUNDERS AND BUDGET

- Nature 2050 Programme – CDC Biodiversité : 20 000 €
- Department of Ille-et-Vilaine : 13 709 €
- Lactalis : 1 266 €

Total budget : **34 975 €**

In addition, the cost of maintaining and monitoring the project until 2050 will be covered by GAEC Laitspérance and CDC Biodiversité.

Third strip of saplings planted
© Martine Blin

PROJECT OBJECTIVES

- **For adapting to climate change :** limiting drought and soil erosion.
- **For biodiversity :** offering a refuge for biodiversity and regenerating soil life by reintroducing trees to grazing land.
- **For the local area :** strengthening the long-term economic sustainability of the farm.

REGULATORY CONTEXT OF THE PROJECT

- Regional Ecological Cohesion Plan for Brittany
- Territorial Coherence Scheme (SCoT) for the Pays de Vitré area

CONTEXT AND ISSUES

The joint agricultural grouping (GAEC) Lait'spérance has been labelled as having converted to organic farming and has a herd of 110 Phrim Hostein dairy cows and 70 heifers for milk production, the farm's main activity. Today, the farm is facing problems of soil erosion and repeated droughts, causing yield losses and discomfort for the herd in summer.

By reintroducing trees into the farm, the issue is to provide a safe haven for biodiversity while ensuring that the farm is managed in a more sustainable way. The planting of tall trees and fodder thickets in rows will both enable shade to be provided for the animals and provide a complementary and diversified source of fodder, based on regular pruning and controlled grazing. They will also have an innovative function, enabling them to produce ramial chipped wood (RCW). Once chipped and spread on the soil, it will encourage natural soil regeneration by reconstituting forest humus. The wood chips can also be used as mulch before being returned to the plots. The total surface area of the project is 18.8 ha.

ACTIONS IMPLEMENTED

Begun in 2020, the work consisted in :

- Planting 447 melliferous species of tall trees at 6-metre intervals on a linear grass strip 2682 metres long and one metre wide. Between two rows of trees, the cultivated or grazing area is 24m wide on the first plot and 36m wide on the second, enabling favourable conditions for reintroducing biodiversity to the plots.
- Planting 1,005 fodder trees every metre.
- During the winter of 2020-2021 : planting 266 tall agroforestry trees, covering an area of 8.8 ha.

In addition to the Nature 2050 developments, an additional one-week participatory operation to plant standard trees over 34 ha.

GOVERNANCE ADOPTED

Long-term management, maintenance and monitoring of the planted trees will be the responsibility of the owners. The farm is supported by CDC Biodiversité via the Nature 2050 programme and its scientific partners in defining and monitoring indicators until 2050, in addition to co-financing the action.

SCHEDULE

PROJECT LIFESPAN

	2019 - 2020	**2020 - 2021**	**2021 - 2050**
Works	1st planting phase on 10 ha.	2nd planting phase on 8.8 ha.	
Monitoring and assessment			Nature 2050 Programme monitoring indicators

Aerial photo of the farm, 2022
© Martine Blin

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- Improving the resilience of the farm (to drought, flooding, frost, etc).
- Reducing soil erosion and soil leaching on sloping land.
- Improving shade and the windbreak effect on the farm.
- Creating cool islands.

BENEFITS FOR BIODIVERSITY

- Increased diversity of plant species and habitats favourable to biodiversity.
- Improved well-being for the herd.
- Encouraging natural soil regeneration through the use of ramial chipped wood (RCW).

OTHER BENEFITS

- Reducing climate change by encouraging carbon sequestration.
- Recreating a pleasant, wooded landscape for residents and visitors alike.
- Raising awareness of the benefits of agroforestry among neighbouring farms.
- Promoting local production of ramial chipped wood (RCW).

MONITORING INDICATORS

Adaptation to climate changes

- Ecosystem evolution/maturity : measurements to assess soil health and the natural abundance rate of Nitrogen 15 in leaves

Biodiversity

- Monitoring earthworms
- Monitoring birds

Other

- Camera monitoring
- Project outreach

LEVERS FOR SUCCESS

TECHNICAL ASPECTS AND PROJECT DESIGN

- **Planting trees around livestock buildings** so that the animals can benefit from the shade and cool of the trees.
- **Protecting young trees f**rom animals in grazing areas by setting up electric fences at the right height so that heifers cannot pass under them.
- **Keeping trees at least 24 metres apart** to allow farm machinery to pass through.
- **Seeking specialist advice** on the choice of tree species.
- **Seeking public subsidies and corporate funding** to cover some or all of the planting costs.

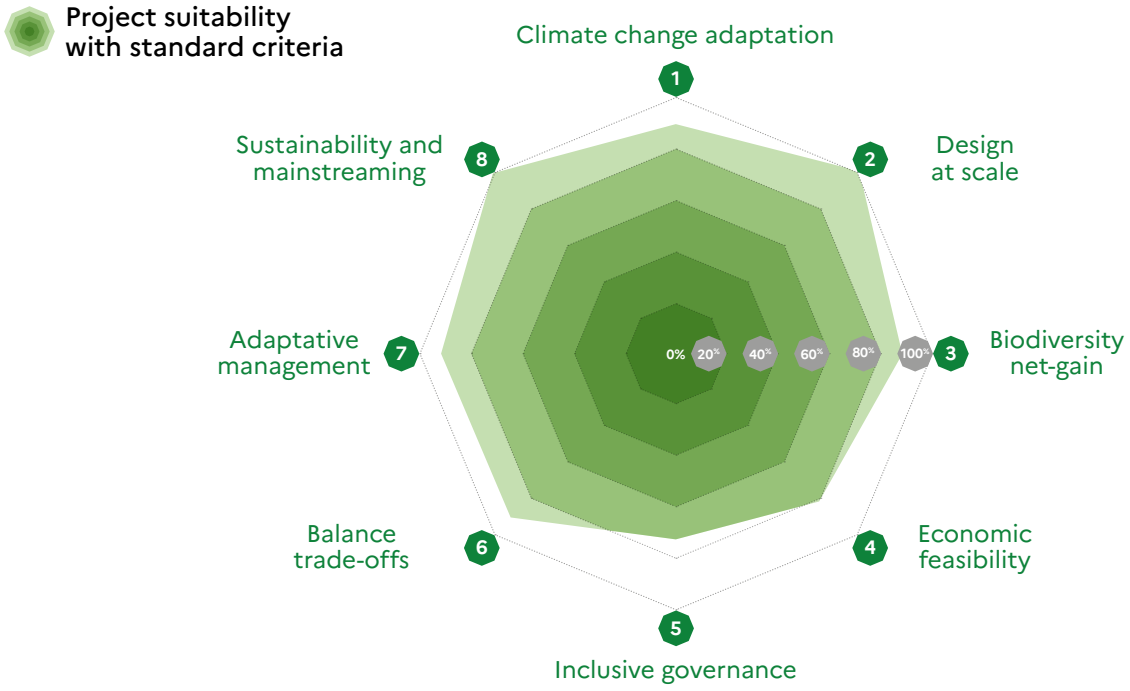
STAKEHOLDER COMMITMENT

- **Inviting schools** to participate in planting workshops.

MONITORING AND REPLICABILITY OF THE ACTION

- **Adaptation through evaluation :** setting up a monitoring and assessment system via the Nature 2050 programme ensures that the project can be evaluated and adapted to improve its effectiveness.
- **Anticipating how long the trees will take to grow,** as it will take several years before they are tall enough for the herd to benefit from the shade.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

- Webpage (in French) of the Nature 2050 programme
- Project page on the (in French) CDC Biodiversité website

CONTACT DETAILS OF THE PROJECT LEADER

- **Monsieur Régis Badie et Madame Martine Blin**
  martine.blin35@gmail.com

DATE

March 2023
January 2024

DATE AND FACT FILE EDITOR

Jean-Baptiste Rallu
Albane Droal

www.secondRegard.fr - Coordination : Direction de la communication - Septembre 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

CDC BIODIVERSITÉ

artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

GAEC LES ROCS
2020 - 2050

Setting up sapling protection
© Pays de Pouzauges

IDENTITY CARD

GEOGRAPHICAL LOCATION
Pouzauges, Vendée (85)

TARGET ADAPTATION ISSUE(S)
- **Drought**
- **Very high temperatures**

HABITAT(S) CONCERNED
Agricultural ecosystems

TYPE(S) OF NBAS
Sustainable management of ecosystems : enhance the inclusion of trees and biodiversity in agricultural and forestry areas.

PROJECT LEADER(S) AND ASSOCATED PARTNER(S)
- **GAEC Les Rocs**
- CPIE Sèvre Bocage environmental initiatives centre
- Pays de Pouzauges local authority grouping
- Nantes University Institute of Technology (IUT) for ecological monitoring
- Nature 2050 Programme – CDC Biodiversité

FUNDERS AND BUDGET
- CDC Biodiversité Nature 2050 Programme : 6 432 €
- Pays de la Loire Region
- Loire-Britanny Water Agency

Plus the cost of sustaining and monitoring the project until 2050, to be covered by GAEC Les Rocs and CDC Biodiversité.

Pays de Pouzauges
COMMUNAUTÉ DE COMMUNES

Visit to the farm during the « Companies and Biodiversity » event, 24th November 2022
© CDC Biodiversité

PROJECT OBJECTIVES

- **For adapting to climate change :** conserve the quantity and quality of the water downstream of catchment areas and consolidate the resistance of forest habitats to the effects of climate change.
- **For biodiversity :** conserve the biological richness of the soil and reduce the pressure of forestry on the soil.
- **For the local area :** enhance the bocage landscape, integrate the project in the Territory Committed to Nature (TEN) process and strengthen the resistance of the grazing systems.

REGULATORY CONTEXT OF THE PROJECT

- Territorial forestry charter (CFT)
- Type-2 Natural Area of Ecological, Faunal and Floristic Interest (ZNIEFF)
- Territorial Climate Air Energy Plan (PCAET)
- Territory Committed to Nature (TEN)

CONTEXT AND ISSUES

The Pays de Pouzauges local authority grouping is located in the Haut-Bocage in the eastern Vendée and consists of 10 communes with a total population of 23 000. In 2019 it was recognised as a « Territory Committed to Nature » (TEN) by all the members of the Regional Biodiversity Collective including the Pays de Loire Region. One of the key actions of the TEN process is the sustainable management of agricultural and forest areas, for example through the implementation of innovative agroecology operations. The sustainable management plans for the bocage raised farmers' awareness of the roles of the bocage landscape and good management practices.

In the framework of the Nature 2050 programme, GAEC Les Rocs is involved in the Pouzauges Bocage project, which is divided into four main operations: GAEC Les Rocs, GAEC La Niro (cattle farming), a demonstration of natural regeneration on a 1.25-hectare plot at Les Echardières and the transition from dying chestnut trees to a diverse high forest at La Fromentière.

The farmers of the GAEC Les Rocs have been committed for several decades to adapting their practices to emerging environmental and societal issues in order to improve their autonomy and resistance to climate risks. The organic farm extends over 182 ha and combines dairy cattle, fodder crops (maize, dredge corn, alfalfa, clover) and field-grown vegetables.

Trees in all forms (hedges, intra-field agroforestry) are a central element in their strategy for maintaining the long-term performance of the farming system. The first hedges were planted in the mid-1990s, resulting now in a hedge density of 160 linear meters per hectare. In addition, since 2017, rows of trees have been planted between plots in pasture areas. The project thus reflects the historical continuity of the actions undertaken throughout the Pays de Pouzauges.

ACTIONS IMPLEMENTED

Begun in 2020, the works consisted in :

- Planting 333 trees of various species (Holm Oak, Sweet Chestnut, Wild Cherry, Almond, Walnut, Field Maple, Hornbeam, Service Tree, Chequer Tree, Alder, etc.) in 1188 ml of rows between plots and reinforcing existing rows. The trees are planted at 8-metre intervals with the rows 30 metres apart in order to leave room for agricultural machines to pass between them. The planting operation extended over a total surface area of 18 ha.
- Protecting the saplings from wild animals (chestnut wood stakes) and drought (mulching with shredded wood).

GOVERNANCE ADOPTED

In the framework of the Territory Committed to Nature (TEN) initiative, GAEC Les Rocs receives the support of several partners: the Pays de Pouzauges local authority grouping provides financial and technical support for carrying out the agroforestry developments and monitoring the ecological indicators of the Nature 2050 programme with the help of trainees from the Nantes IUT. The CPIE Sèvre and Bocage environmental initiatives centre, a stakeholder in the TEN initiative, advises the GAEC on the selection of tree species and the configuration of the tree-planting operations.

Other national partners such as the French Agroforestry Association are authorised to provide the project leaders with highly useful information on choosing tree species, carrying out the works and fund seeking.

SCHEDULE

	PROJECT LIFESPAN		
	2020	**2021**	**2021 - 2050**
Works	1st planting phase	2nd planting phase	
Life of the project		GAEC Les Rocs winner of the General Agricultural Competition for Agroecological Practices in the « Agroforestry » category	
Monitoring and assessment			Monitoring the indicators of the Nature 2050 programme

Planting of trees between plots
© Pays de Pouzauges

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- Increasing the resistance of the farming system to climate hazards : protecting the fields and cattle from increasingly and intense frequent droughts and very high temperatures.
- Improving grazing quality by means of shady areas and thus the health of the herd.

BENEFITS FOR BIODIVERSITY

- Creating refuges for beneficial organisms and birds : enabling the return of field birds and small raptors and enhancing the habitat network by means of new ecological corridors.
- Fertilising the soil.
- Diversifying the tree species by selecting those most resistant to droughts.

OTHER BENEFITS

- Protection of agricultural plots from desiccating winds.
- Creation of carbon sinks and therefore mitigation of climate change.
- Restoration of the bocage landscape to improve the well-being of inhabitants and the attractiveness of the local area for tourism.
- Development of tree production on the farm, enabling the associates to save money on firewood and animal bedding while diversifying their sources of income.
  For example, the shredded wood produced is used in the collective boilers of the Pays de Pouzauges local authority grouping.
- Integration of the GAEC in a territorial ecosystem restoration process led by the local authority.

MONITORING INDICATORS

Adaptation to climate changes

- Evolution / maturity of the ecosystem : measurements to assess the health of the soil and the natural abundance rate of Nitrogen 15 in the leaves
- Pluviometry monitoring
- Other weather monitoring (extreme climatic events and participative monitoring of temperatures)

Biodiversity

- Insect
- Soil invertebrate monitoring
- Potential Biodiversity Index
- Botanical surveys of grassland

Other

- Influence of the project
- Jobs created
- Photographic monitoring

LEVERS FOR SUCCESS

TECHNICAL ASPECTS AND PROJECT DESIGN

- **Configure the rows in function of needs :** the trees were planted at regular intervals, 8 metres between each tree and 40 metres between each row to facilitate access for machines.
- **Plant to adapt :** the configuration of the rows is optimised in function of the sun path so as to maximise the shade cast on the pastures in summer.
- **Make use of volunteer helpers :** GAEC Les Rocs organised participative worksites for planting the saplings.

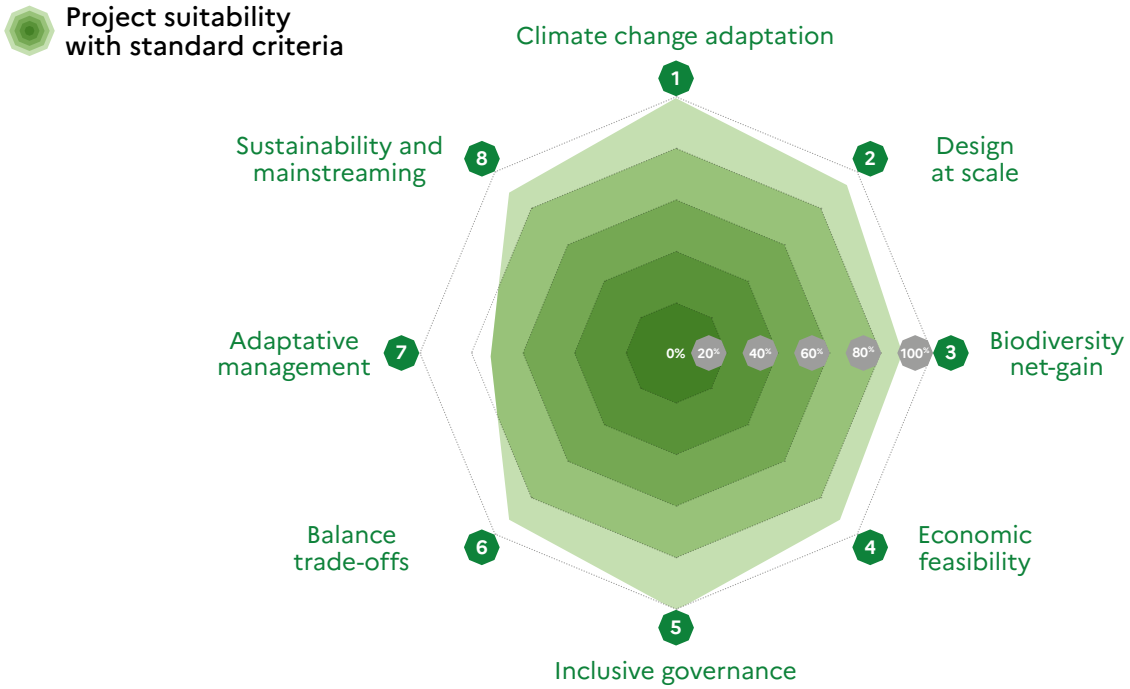
STAKEHOLDER COMMITMENT

- Planting between fields involves accepting to reduce the productive surface area and therefore planning with the GAEC associates how to maintain the economic equilibrium of the farm.
- The local authority undertook the creation of an educational trail around the agroforestry plots to raise the awareness of walkers and school groups about the benefits of agroecological practices and to show the diversity of species.

MONITORING AND REPLICABILITY OF THE ACTION

- The GAEC Les Rocs associates are now training other farmers in the agroforestry unit of the CIVAM agricultural initiative centre.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

- Webpage (in French) of the Nature 2050 programme

CONTACT DETAILS OF THE PROJECT LEADER

- **Antoine Biteau, Jean-Marie Roy, Vincent Frapper**
  nature2050@cdc-biodiversité.fr

DATE

March 2023
January 2024

DATE AND FACT FILE EDITOR

Jean-Baptiste Rallu
Albane Droal

www.secondRegard.fr - Coordination : Direction de la communication - Septembre 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

CDC BIODIVERSITÉ

artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

PARTIAS REGIONAL NATURE RESERVE

2017 - 2050

Mélézin
© A Merdrignac

IDENTITY CARD

GEOGRAPHICAL LOCATION

Puy-Saint-André (05)

TARGET ADAPTATION ISSUE(S)

- **Diversification of tree species to combat forest dieback**

HABITAT(S) CONCERNED

Forest ecosystems

TYPE(S) OF NBAS

Preservation of ecosystems : adaptation of a mountain forest to climate change

PROJECT LEADER(S) AND ASSOCATED PARTNER(S)

- **Birds Protection League – Provence-Alpes-Côte d'Azur (LPO PACA)**
- Puy-Saint-André municipality
- Provence-Alpes-Côte d'Azur region
- Serre-Chevalier ski resort
- Nature 2050 Programme – CDC Biodiversité

FUNDERS AND BUDGET

- Nature 2050 Programme - CDC Biodiversité : 30 000 €

In addition, the Partias RNR and CDC Biodiversité will cover the cost of maintaining and monitoring the project until 2050.

LPO Agir pour la biodiversité

Boreal tit
© D Cerdan

PROJECT OBJECTIVES

- **For adapting to climate change :** improve the forest resistance to heat waves and parasites and prevent soil erosion.
- **For biodiversity :** diversify and renature the forest massif by restocking with Swiss Pine and conserving local biodiversity, in particular heritage flora and fauna.
- **For the local area :** preserve silvicultural resources and develop eco-tourism activities.

REGULATORY CONTEXT OF THE PROJECT

- Regional nature reserve
- « Massif du Pelvoux » listed site

CONTEXT AND ISSUES

The Partias Regional Nature Reserve is a 685-hectare mountain area rising from an altitude of 1600 m to 2900 m in the Briançonnais region (Hautes-Alpes department).

LPO PACA and the municipality of Puy-Saint-André have been appointed co-management bodies by the Provence Alpes-Côte d'Azur region. The first management plan for the period 2011 - 2016 identified the conservation of forest species as a priority.

The Reserve is home to the Swiss Pine, a hardy and rare conifer adapted to high mountain habitats, growing at altitudes of between 1700 and ,500 m. This central European mountain species is threatened by pressure from sheep grazing, its slow growth rate and competition with Larch, a species favoured for forestry. Its disappearance has a negative impact on the biological diversity of mountain forests.

ACTIONS IMPLEMENTED

Begun in 2018, the work involved :

- Diversifying the forest massifs by restocking with Swiss Pine (planting 3 000 saplings over 7 hectares through a 10-day participative worksite involving 148 volunteers). Llamas and horses carried the equipment to the area. To reduce the pressure of pastoral activities, a programme of mediation and support for livestock farmers was developed to facilitate the colonisation of the upper part of the forest (where grazing is forbidden for at least 20 years).
- Tagging 300 Swiss Pines out of the 3 000 trees planted in late 2018, i.e. 10 %, to monitor their reestablishment.
- Restore the ropes demarcating the anti-disturbance areas for Black Grouse

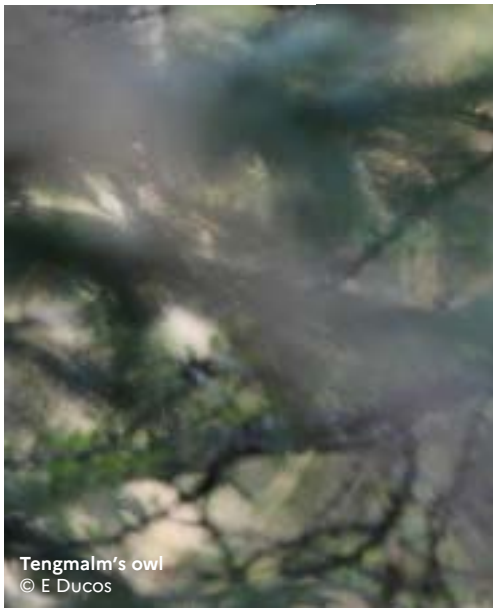
GOVERNANCE ADOPTED

In the long term, the Partias RNR will be responsible for managing, maintaining and monitoring the planted trees. The RNR is also supported by CDC Biodiversité via the Nature 2050 programme and its scientific partners for defining and monitoring indicators until 2050, in addition to funding the action. From the outset, the project has been firmly rooted in the local area, supported by a wide range of contributions from local residents, businesses (in particular Compagnie des Alpes), associations and public partners.

SCHEDULE

PROJECT LIFESPAN

	2018	**2019**	**2021**
Work	Planting 3000 Swiss Pines over 7 ha.		Restoring ropes demarcating anti-disturbance areas
Monitoring and assessment		Monitoring marked trees and Nature 2050 programme indicators until 2050.	



Tengmalm's owl
© E Ducos

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- Preventing soil erosion.
- Diversifying tree species and thus improving the resilience of the forest massif to climatic conditions.

BENEFITS FOR BIODIVERSITY

- Increased habitats for populations of heritage species, in particular Black Grouse.
- Reduced disturbance from sheep farming and tourism.

OTHER BENEFITS

- Improving the massif's long-term carbon sequestration potential.
- Maintaining forest cover to disperse wolf populations and thus facilitating cohabitation with pastoral activities.

MONITORING INDICATORS

Adaptation to climate changes

- Ecosystem evolution/maturity : measurements to assess soil conditions and the natural abundance of Nitrogen 15 in leaves

Biodiversity

- Temporal monitoring of common birds (Vigie Nature)
- Song and bioacoustic counts and surveys of Black Grouse burrows
- Monitoring of wintering areas and Black Grouse populations
- Introduction to SPRING (Strengthening Pollinator Recovery through Indicators and Monitoring) projects
- Monitoring small mountain owls
- Monitoring mammals using camera traps
- Studying ground fauna with INRAE
- Hoverfly survey to determine the state of health of the RNR's habitats

LEVERS FOR SUCCESS

TECHNICAL ASPECTS AND PROJECT DESIGN

- **Choosing species adapted to the habitat :** Swiss Pine is not the most resistant species to climate change, but it is the most adapted to mountain habitats. The plants come from a nursery in the Hautes-Alpes, from the Bois des Ayes (8-10 years old) and Piedmont in Italy (3-4 years old).
- **Taking local issues into account :** the planting area was chosen on the basis of avalanche paths, grazed or forestry plots and the habitats of Black Grouse, which feed on Swiss Pine needles and can therefore find refuge there in winter. Priority was given to well-lit forest edges and wooded slopes.
- **Pooling equipment :** for this type of participative work, you need pickaxes and heavy-load carriers provided free of charge by local organisations (CPIE, SIVM de Serre Chevalier, ONF, etc.).
- **Communicating extensively to recruit volunteers :** the best information vector for recruiting volunteers is the network of partners or by email, LPO volunteers and word of mouth. Communication via posters in the municipality, the distribution of flyers, through the press and social networks also proved effective in mobilising volunteers.

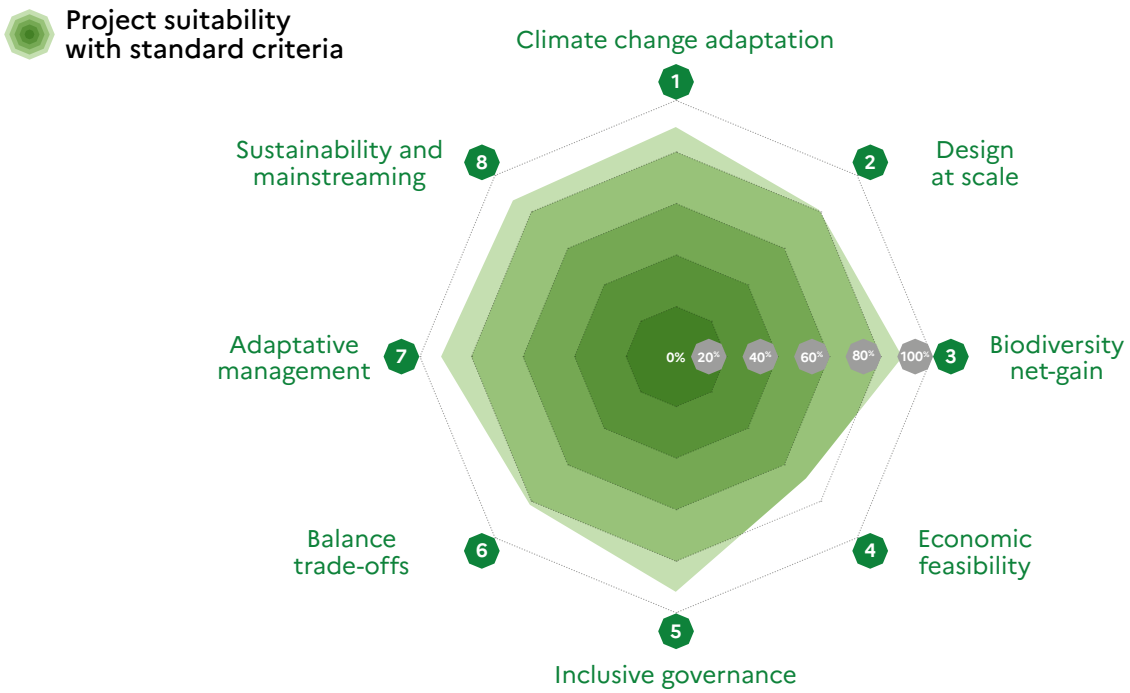
STAKEHOLDER COMMITMENT

- **Public consultation :** sharing and raising awareness of forest issues with the general public and explaining the Nature 2050 ecological restoration project.
- **Visitor awareness :** alerting groups to the risk of Black Grouse disturbance in both winter and summer.
- **Reconciling uses :** organising consultation meetings with livestock farmers to reduce the pressure from sheep on planted trees.

MONITORING AND REPLICABILITY OF THE ACTION

- **Long term management :** drawing up a 2021-2030 management plan for the RNR with monitoring actions for the Nature 2050 project.
- **Monitoring saplings :** of the 3000 saplings, we chose to monitor 300 (117 large 8 to 10-year-old saplings and 183 small 3 to 4-year-old saplings). In 2022, 70% of these saplings were still alive. The small saplings proved to be more robust in the face of challenges such as the weather, animals and disease.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

- Webpage (in French) of the Nature 2050 programme
- Webpage (in French) of Réserves Naturelles de France
- Webpage (in French) of LPO des Hautes Alpes

CONTACT DETAILS OF THE PROJECT LEADER

- **Antenne LPO des Hautes Alpes**
  04 92 21 94 17

DATE

March 2023
January 2024

DATE AND FACT FILE EDITOR

Jean-Baptiste Rallu
Albane Droal

www.secondRegard.fr - Coordination : Direction de la communication - Septembre 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

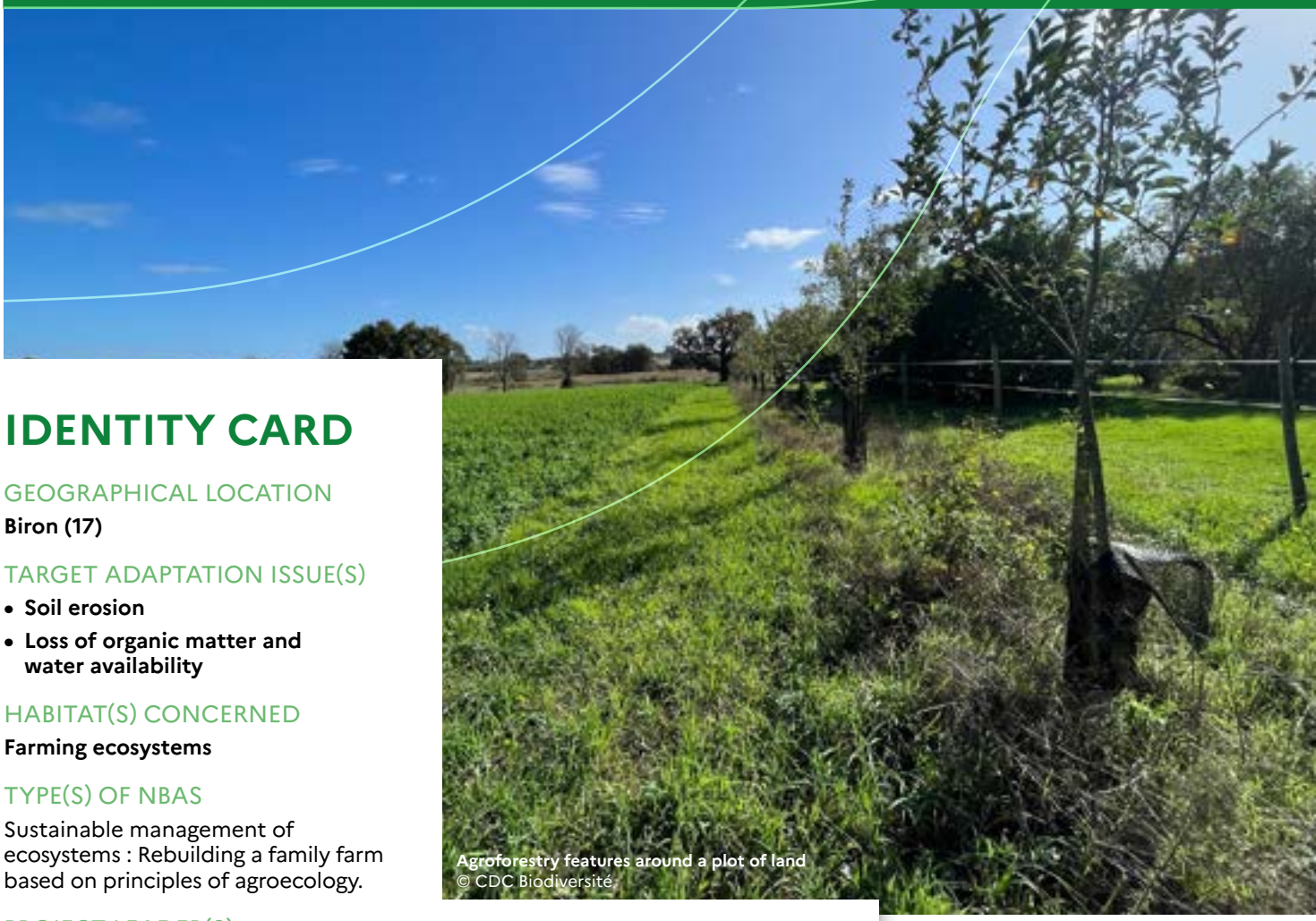
CDC BIODIVERSITÉ

artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

SŒURS DU MAINE
2019 - 2050



Agroforestry features around a plot of land
© CDC Biodiversité

IDENTITY CARD

GEOGRAPHICAL LOCATION
Biron (17)

TARGET ADAPTATION ISSUE(S)
- **Soil erosion**
- **Loss of organic matter and water availability**

HABITAT(S) CONCERNED
Farming ecosystems

TYPE(S) OF NBAS
Sustainable management of ecosystems : Rebuilding a family farm based on principles of agroecology.

PROJECT LEADER(S) AND ASSOCATED PARTNER(S)
- **Sœurs du Maine**
- Nature 2050 Programme – CDC Biodiversité
- Chamber of Agriculture
- Agricultural training institutions
- Charente-Maritime Organic Farmers' Association (GAB 17)
- Birds Protection League (LPO)
- « Farmer of the Future » competition 2019

FUNDERS AND BUDGET
- CDC Biodiversité Nature 2050 Programme : 16 650 €
- Departmental Council : 6 432 €
- Region : 5 880 €
- Own funds : 27 436 €

Total budget : **56 398 €**

In addition, the cost of maintaining and monitoring the project until 2050 will be covered by the Sœurs du Maine and CDC Biodiversité.

Fruit trees
© CBC Biodiversité

PROJECT OBJECTIVES

- **For adapting to climate change :** preventing soil erosion and securing water resources.
- **For biodiversity :** encouraging functional and heritage biodiversity and creating habitats conducive to the development of beneficial organisms.
- **For the local area :** improve the landscape and living environment and diversify sources of income for the farm.

REGULATORY CONTEXT OF THE PROJECT

- Territorial Contract for Quantitative Water Management

CONTEXT AND ISSUES

The farm is located in the river basin of the Seudre, in the heart of the Saintonge agricultural area in the Charente-Maritime department. The farm grows field crops and vines and has been converting to organic farming since 2019.

The effects of climate change and conventional, even intensive, farming practices are having an ever-greater impact on the ability to ensure sustainable, resilient agricultural production. Whether in terms of soil erosion, loss of organic matter or water availability, the signs are alarming and require adapting agricultural practices.

The objectives of the project are to develop a resilient agroforestry farm that can diversify traditional production, foster functional biodiversity and create a pleasant living environment in which trees play their full part in the agricultural landscape while acting as a climate regulator.

ACTIONS IMPLEMENTED

The farm's overall plan is to gradually set up an agroforestry system based on planting trees including (fruit trees, birch, timber, etc.) to support existing production during the transition to organic farming and to develop new produce (fruit juice, birch sap).

The works, which started in 2019, have involved :

- Gradually setting up anagro-forestry system (fruit trees, birch trees, timber, etc.) both to consolidate existing production during the transition to organic farming and to develop new produce (fruit juice, birch sap),
- Planting 3042 saplings of around 30 different species over 43 hectares to create a variety of landscapes,
- Creating and setting up discontinuous linear features; hedges; intra-plot planting; intra-plot fruit trees and copses.

GOVERNANCE ADOPTED

In the long term, the management, upkeep and monitoring of the planted trees will be the responsibility of the owners. The farm is supported by CDC Biodiversité via the Nature 2050 programme and its scientific partners in defining and monitoring indicators until 2050, in addition to co-financing the action.

The transition to environmentally friendly agriculture is being supported by the Charente-Maritime Organic Farmers' Association (GAB 17), the association Prom'haies Nouvelle-Aquitaine, the Chamber of Agriculture, the local agricultural education institutions and the Birds Protection League (LPO).

SCHEDULE

	PROJECT LIFESPAN			
	2019	**2020**	**2021**	**2020 - 2050**
Works	Starting work (tilling and staking)	1st planting phase (hedgerows, birch trees and 50% fruit trees)	2nd phase of planting (remaining fruit trees, agroforestry development and alignment of trees)	
Monitoring and assessment				Monitoring indicators of the Nature 2050 programme

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- Improving the resilience of farming systems to climatic variations by improving the water storage capacity of soils and their organic content.

BENEFITS FOR BIODIVERSITY

- Increasing the number of habitats favourable to biodiversity.

OTHER BENEFITS

- Diversifying the farm's traditional production by introducing fruit juice-and sap-producing trees into the system.
- Producing timber for local use.

MONITORING INDICATORS

Adaptation to climate changes

- Ecosystem evolution/maturity : measurements to assess soil condition and the natural Nitrogen-15 abundance rate in leaves

Biodiversity

- Biodiversity monitoring: earthworms, pollinators, beetles
- Soil analysis
- Monitoring of spontaneous flora

ctive sheaths
C Biodiversité

LEVERS FOR SUCCESS

TECHNICAL ASPECTS AND PROJECT DESIGN

- **Soil preparation :** For the hedgerows and intra-plot features, deep subsoiling was carried out on the planting line. The existing vegetation was then destroyed before preparing the seedbed for planting the grass strip. For fruit trees, birch trees and tree rows, the soil was worked in planting holes using a mechanical shovel, without mixing the soil horizons, and with the addition of composted manure.
- **Mulching :** Wood chips or straw from the farm at the foot of each tree**.**
- **Intra-plot planting :** Two lines of trees spaced 4m between rows and 5m between plants, replicated every 42m. The rows are planted on an 8m wide grass strip with a 36m cultivation area. There are two fallow areas on either side of the cultivation plot.
- **Planting of hedgerows :** Fruit trees planted every 5 m on a 10 m wide grassy strip. Three-layered double hedges (conifers, Scots pine, birch).
- **Tree species :** The species chosen are adapted to the soil and climate conditions and are selected to provide complementary uses (timber, firewood, hardiness and multiple fruiting periods) and to promote biodiversity.
- **Protection from wild animals :** 1.2 m high sheaths held by two 1.5 m acacia stakes were set up. Sheep fat (a natural repellent) was sprayed on fruit trees and hedgerows (Hornbeam, Service Tree, Wild Cherry, Small-leaved Lime, etc.). Electric fencing.
- **Maintenance :** Medicinal and aromatic plants are grown in the strips under the trees to reduce the need for manual weeding.

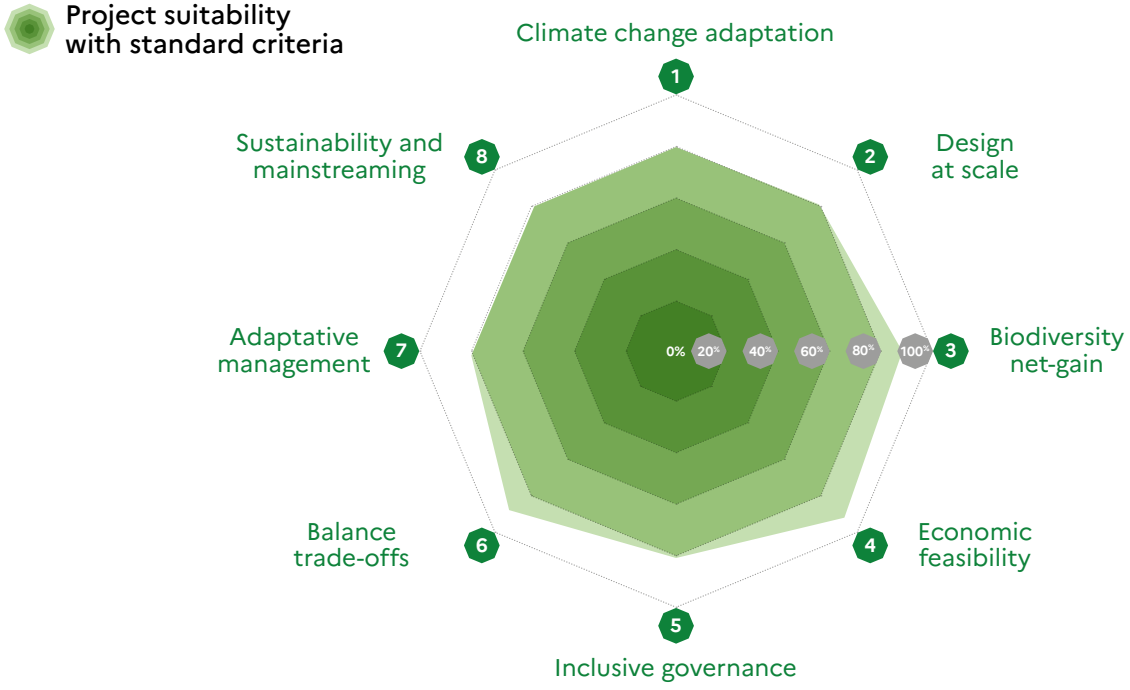
STAKEHOLDER COMMITMENT

- **Training :** project with the Saint Antoine Agricultural Highschool to create training courses for adults.

MONITORING AND REPLICABILITY OF THE ACTION

- **Promoting the project to the general public :** Ultimately, Isabelle wants to share her passion, her profession and her vision of eco-responsible farming by opening her farm to tourists, local stakeholders and schoolchildren.
- **Progressiveness :** The farm is striving to maintain its financial stability, currently supported by wine production, while adopting agroecological practices.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

- Webpage (in French) of the Nature 2050 programme

CONTACT DETAILS OF THE PROJECT LEADER

- **Isabelle Bossis**
  Nature2050@cdc-biodiversite.fr

DATE

March 2023
January 2024

DATE AND FACT FILE EDITOR

Jean-Baptiste Rallu
Albane Droal

www.secondRegard.fr - Coordination : Direction de la communication - Septembre 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

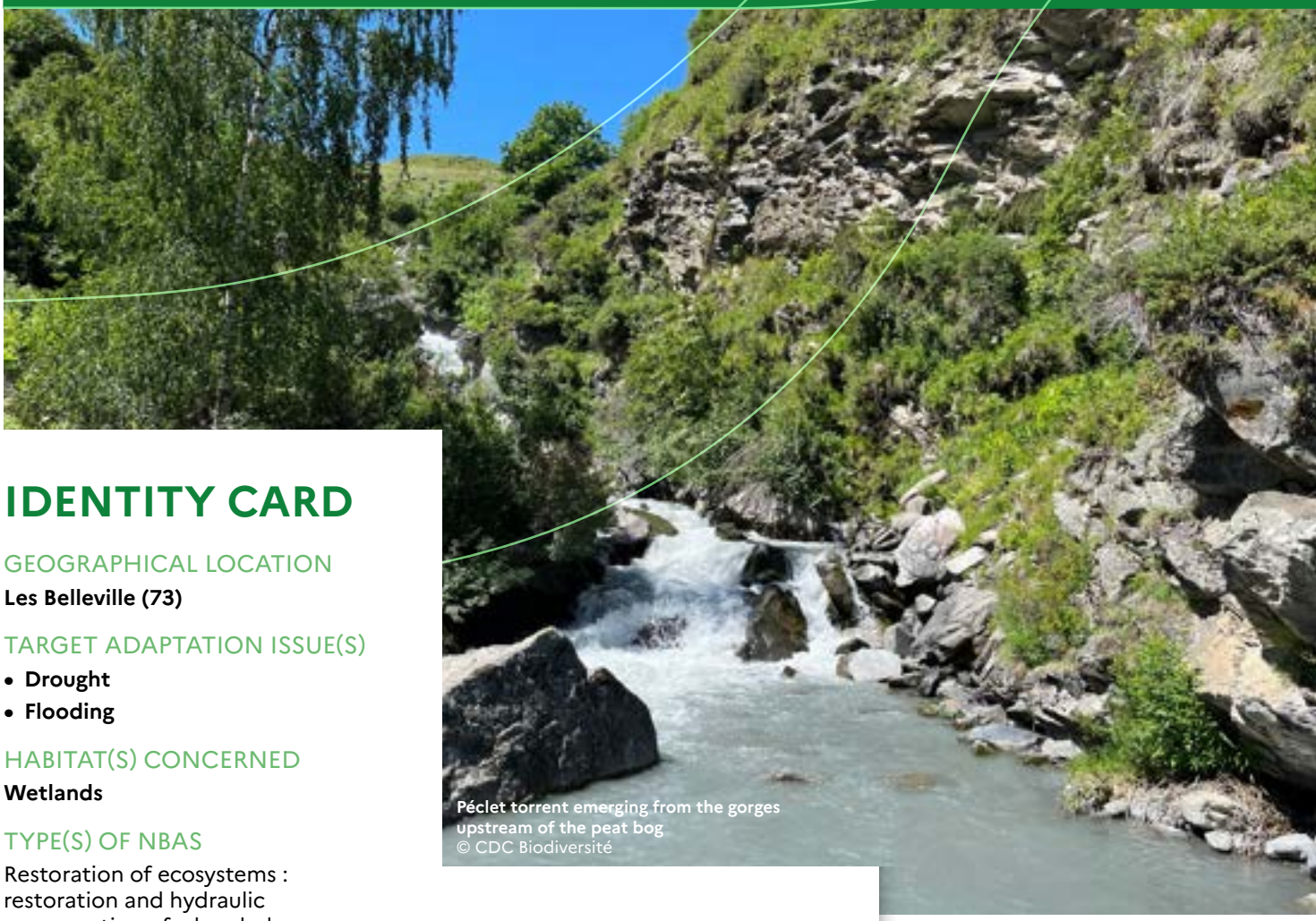
CDC BIODIVERSITÉ

artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

PLAN DE L'EAU BOG
2018 - 2050



Péclet torrent emerging from the gorges upstream of the peat bog
© CDC Biodiversité

IDENTITY CARD

GEOGRAPHICAL LOCATION
Les Belleville (73)

TARGET ADAPTATION ISSUE(S)
- **Drought**
- **Flooding**

HABITAT(S) CONCERNED
Wetlands

TYPE(S) OF NBAS
Restoration of ecosystems : restoration and hydraulic reconnection of a bog below the Menuires ski resort.

PROJECT LEADER(S) AND ASSOCATED PARTNER(S)
- **Savoie Natural Areas Conservancy (CEN Savoie)**
- Les Belleville municipality
- Cœur de Tarentaise local authority grouping
- Nature 2050 Fund
- Savoie department
- Egis Eau

FUNDERS AND BUDGET
- Rhône-Mediterranean-Corsica Water Agency
- Nature 2050 Fund
- European Union Biodiv'Alp Fund
- Interreg Europe ALCOTRA
- Auvergne-Rhône-Alpes region

Total project budget : **184 740 €**

Plus the cost of sustaining and monitoring the project until 2050, to be covered by CEN Savoie and the Nature 2050 Fund.

Conservatoire d'espaces naturels Savoie

Water supply to the peat bog by the flood attenuation system
© CDC Biodiversité

PROJECT OBJECTIVES

- **For adapting to climate change :** improve the management of frequent floods and sediment transport for the bog.
- **For biodiversity :** restore the ecological and hydrological functions of the bog and conserve typical wetland biodiversity.
- **For the local area :** maintain environment-friendly summer and winter tourist activity.

REGULATORY CONTEXT OF THE PROJECT

- Prefectural Biotope Protection Decree
- Partnership zone of the Vanoise Park National
- Inventory of wetlands in Savoie

CONTEXT AND ISSUES

The Plan de l'Eau bog is located at an altitude of 1760 metres, at the source of the Doron de Belleville river, downstream from the confluence of the Le Lou and Péclet mountain streams. It is in the main alluvial zone of the Belleville Valley, at the foot of the Les Menuires ski resort, and extends over 11 ha. The site harbours very rich biodiversity with almost 350 plant species and nearly a hundred animal species identified. They include 16 protected-status species completely dependent on this type of mountain habitat including the Alpine Newt, Viviparous Lizard, Purple Small-reed and Varnished Hook-moss.

Historically, several developments have successively disturbed the hydrological functioning of the bog: the digging of drainage ditches, tapping of upstream spring waters to supply the winter sports resort and creation of tracks and walkways, combined with infrastructure to protect the riverbanks. These works have caused the partial drying out of the site and increased the risk of flooding downstream. It was notably the disconnection of the bog from the Le Lou and Péclet mountain streams that accelerated the encroachment of shrubs to the detriment of water meadows and their natural riches, while also accentuating the erosion of the riverbanks.

To respond to these issues, the commune of Les Belleville and CEN Savoie joined together to restore the bog. The project aims to improve the management of frequent floods and sediment transport, better distribute the water of the Péclet mountain stream to cope with the future impacts of climate change, and to maintain tourist activity while conserving biodiversity.

ACTIONS IMPLEMENTED

Begun in September 2021, the works consisted in :

- Reprofiling some of the drainage and other ditches over 750 linear metres to reduce the flow velocity and level of peat erosion
- Removing the trees and woody plants, proof of the encroachment of the site due to drying out
- Levelling off an earth embankment (1 to 1.5 metres high) to facilitate the overflow of floodwater into the bog
- Creating a diversion channel under the current track to reconnect the Péclet mountain stream, enabling the water to overflow into the bog and spread through it during flood events. To regulate the bog water level, cofferdams were set up that enable a discharge of 1 to 2m^3 of water per second in flood periods.
- Setting up an adjustable water distribution sill that can inhibit the flooding by up to 25%
- Placing blocks of rock to separate the flows of the mountain stream and diversion channel

The site was then rehabilitated, notably the tracks that had been damaged by the passage of machines, and the areas of earthworks were sown with local seeds to assist revegetation.

GOVERNANCE ADOPTED

The restoration of the Plan de l'Eau bog is a multi-partner project. It brings together various organisations, such as local authorities, including Les Belleville, the landowner. The Cœur de Tarentaise local authority grouping plays an essential role, being responsible for the management of aquatic habitats and flood prevention (GEMAPI) and reconciling economic issues in the area.

The project also involves stakeholders such as the natural area management body CEN Savoie, which is the contracting authority for the project and manages the site. The Vanoise National Park is actively involved in raising visitors' awareness of the importance of the bog.

Private companies, in particular Egis Eau, EID Rhône Alpes, Dymanique Hydro and BAL TP, are responsible for the operational implementation of the project. Finally, financing is jointly provided at differing levels by funders such as Interreg Europe ALCOTRA, the Rhône-Mediterranean-Corsica Water Agency, the European Union Biodiv'Alp Fund and the Auvergne-Rhône-Alpes region.

The Nature 2050 Fund also co-finances and supports the project for defining and monitoring indicators until 2050.

SCHEDULE

PROJECT LIFESPAN

	2020	**2021**	**2022**	**2022 - 2050**
Works	Preparative actions (scrub clearing, earthworks)	Works Submission of « Habitats Restoration » file in compliance with the Water Law	**Inauguration of the project :** rehabilitation and vegetation of earthwork areas	
Monitoring and assessment				Monitoring of the Nature 2050 programme indicators

Water supp
© CDC Bioc

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- Reduction of flow velocities within the bog and decreased erosion of riverbanks.
- Mitigation of downstream flooding risk.
- Restoration of the water storage role in the natural habitat.

BENEFITS FOR BIODIVERSITY

- Re-enhancement of habitats, maintenance of open habitats by re-characterising and developing ecological corridors in order to conserve tens of rare and threatened species.
- Assessment of the works' effects on targeted biological compartments and enhancement of knowledge about bio-indicator species or taxa.
- Diversification of aquatic habitats enabling the replenishment of spawning grounds.

OTHER BENEFITS

- Sequestration of 3875 tonnes of carbon.
- Reinforcement of the national policy to combat the disappearance of wetlands.
- Awareness-raising among local residents and tourists about climate change and biodiversity issues.

MONITORING INDICATORS

Adaptation to climate changes

- Evolution / maturity of the ecosystem : measurements to assess the health of the soil and the natural abundance rate of Nitrogen 15 in the leaves
- Hydrological dynamics of the water table – piezometers (RhoMéo I03)

Biodiversity

- Floristic quality Index
- Waterlogging indicator
- Fertility indicator
- Odonata population integrity
- Monitoring of woody vegetation

Other

- Photographic monitoring
- Communication/promotion of the project

ly to the peat bog by the flood attenuation system
iversité

LEVERS FOR SUCCESS

TECHNICAL ASPECTS AND PROJECT DESIGN

- **Improve knowledge of the habitat before the works begin :** the preliminary study of the sedimentary dynamics of the Doron provided knowledge about the river's morphology and made it possible to estimate its sediment transport capacity and to assess the erosion dynamics and the inputs of sediments to the wetland. Moreover, the updating of the site management plans by CEN Savoie over the years enabled reliable habitat mapping and some of the site's floristic and faunistic riches to be surveyed.

STAKEHOLDER COMMITMENT

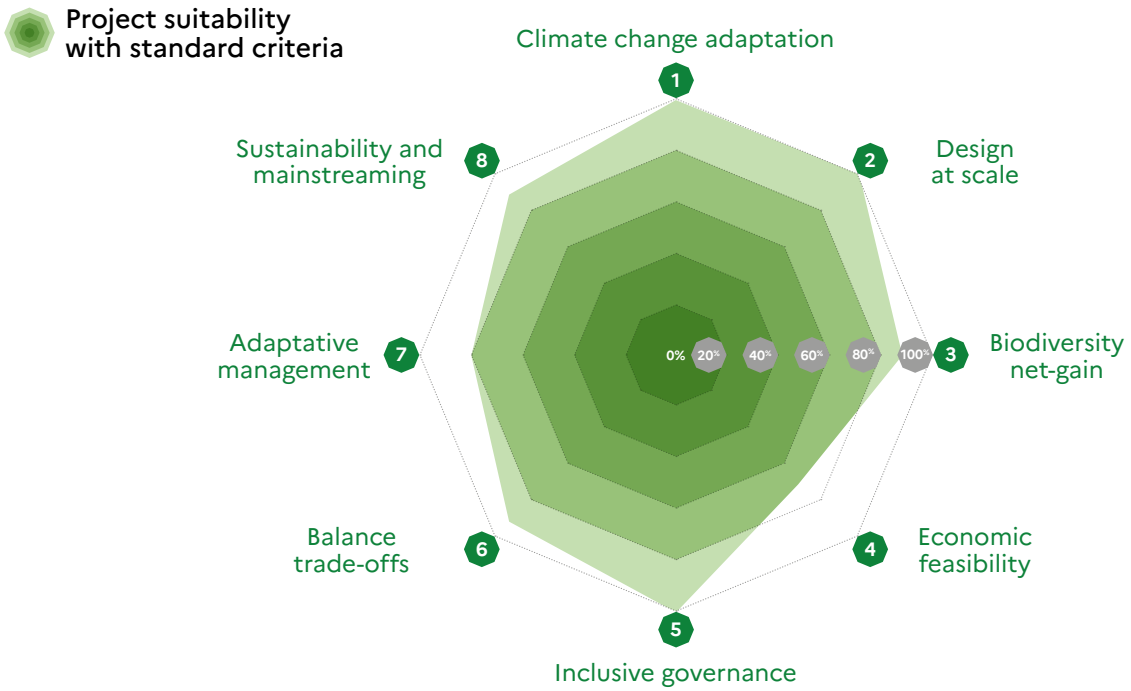
- **Reconcile uses :** the municipal authority, together with CEN Savoie and the mountain farmer using the bog, drew up biodiversity-friendly grazing management plans. The Cœur de Tarentaise local authority grouping oversaw the refurbishment of the walkways for the cross-country skiing tracks in order to maintain the attractiveness of the site for tourism.
- **Combine skills :** the two local authorities, respectively owner of the land and responsible for the management of aquatic habitats and flood prevention (GEMAPI) serve as prime contractors for the hydraulic reconnection project and provide the co-funding required by CEN Savoie for the reprofiling works.

The CEN provides its technical and scientific expertise for the conservation and operational management of the bog. The national park carries out its remits of environmental policing and natural science data sharing with the site managers.

MONITORING AND REPLICABILITY OF THE ACTION

- **Assessment :** the steering committee for monitoring the Wetlands Action Plan meets once a year to monitor the implementation of the management plan.
- **Sustaining the project over time :** its integration into the Nature 2050 programme will ensure the sustaining of monitoring until 2050. Maintaining the project in the long term is outside the financial framework of most funders and unusual for most elected officials. The support of European Union funds and financing of the day-to-day facilitation of the local area by the Water Agency enables large-scale actions to be undertaken. Finally, the implementation of this project could serve as an example to encourage the mounting of similar ambitious projects.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

- Webpage (in French) of the Nature 2050 programme
- Webpage (in French) of Plan de l'Eau Bog

CONTACT DETAILS OF THE PROJECT LEADER

- **CEN SAVOIE**
  04 79 25 20 32

DATE

March 2023
January 2024

DATE AND FACT FILE EDITOR

Jean-Baptiste Rallu
Albane Droal

www.secondRegard.fr - Coordination : Direction de la communication - Septembre 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

CDC BIODIVERSITÉ

artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

VERGERS DE RAULHAC
2018 - 2050

Vergers de Raulhac, Berry orchard
© CDC Biodiversité

IDENTITY CARD

GEOGRAPHICAL LOCATION
Raulhac, Neuvic (19160)

TARGET ADAPTATION ISSUE(S)
- **Drought**
- **Soil erosion**

HABITAT(S) CONCERNED
Agricultural ecosystems

TYPE(S) OF NBAS
Sustainable management of ecosystems: combining organic, sustainable agricultural production with the conservation of local biodiversity through agroforestry.

PROJECT LEADER(S) AND ASSOCATED PARTNER(S)
- **Vergers de Raulhac**
- Concours Arbres d'Avenir 2018 – PUR Projet, AccorHotels
- Nature 2050 Programme – CDC Biodiversité

FUNDERS AND BUDGET
- Concours Arbres d'Avenir (Trees of the Future competition) – Nature 2050 Programme - CDC Biodiversité subsidy : 16 650 €
- Autofinancement : 2 700 €

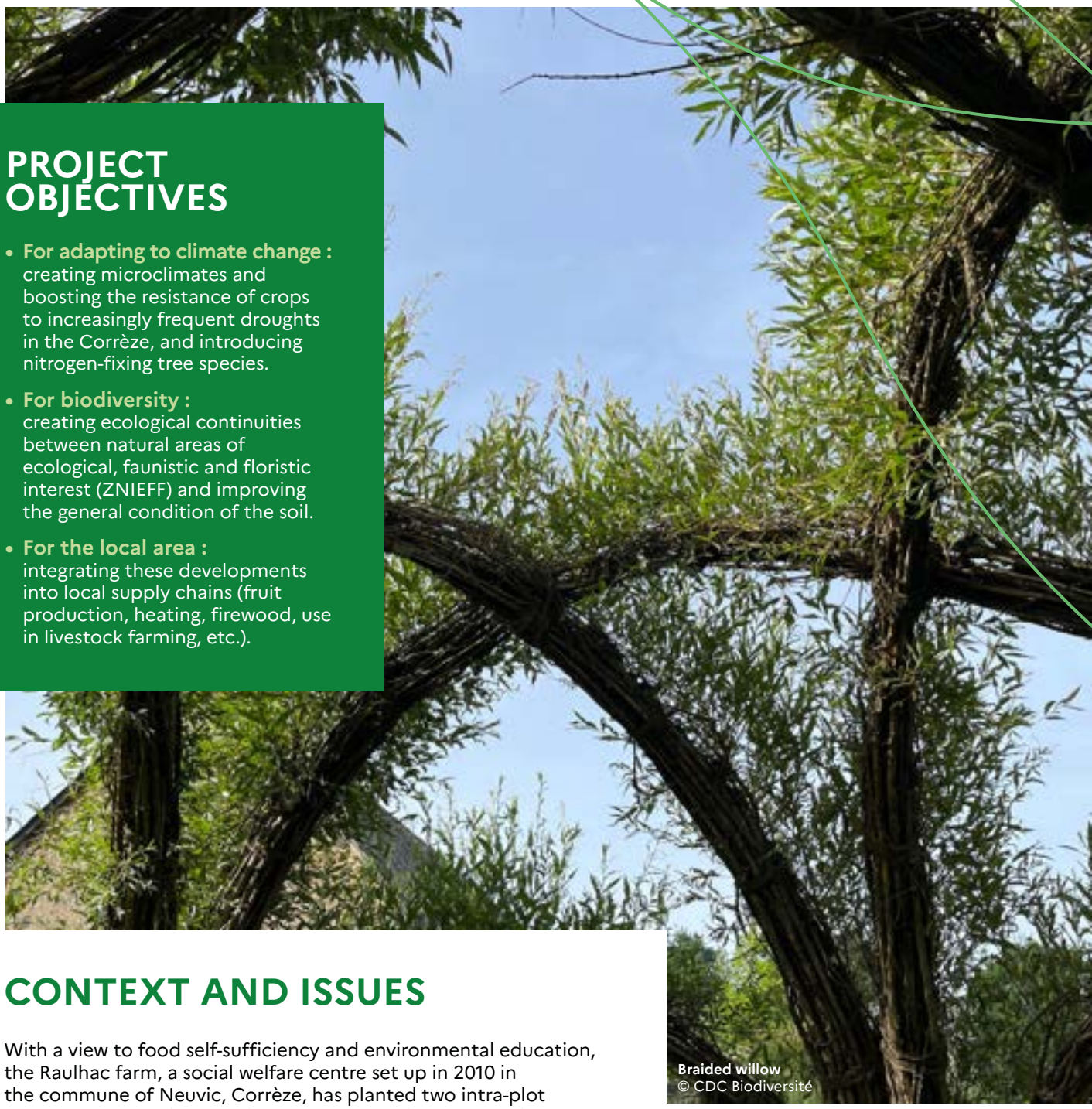
Total budget : **19 350 €**

Plus the cost of maintaining and monitoring the project until 2050, to be covered by the owners of Vergers de Raulhac and CDC Biodiversité.

les Vergers de Raulhac

PROJECT OBJECTIVES

- **For adapting to climate change :** creating microclimates and boosting the resistance of crops to increasingly frequent droughts in the Corrèze, and introducing nitrogen-fixing tree species.
- **For biodiversity :** creating ecological continuities between natural areas of ecological, faunistic and floristic interest (ZNIEFF) and improving the general condition of the soil.
- **For the local area :** integrating these developments into local supply chains (fruit production, heating, firewood, use in livestock farming, etc.).



Braided willow
© CDC Biodiversité

CONTEXT AND ISSUES

With a view to food self-sufficiency and environmental education, the Raulhac farm, a social welfare centre set up in 2010 in the commune of Neuvic, Corrèze, has planted two intra-plot agroforestry plots in a relatively unspoilt semi-natural setting (ZNIEFF) in Haute-Corrèze. During the 20th century, the rural exodus and the development of forestry led to the disappearance of numerous meadow orchards, deciduous trees, wetlands and peat bogs in the surrounding area, replaced by plantations of Douglas Fir and Norway Spruce bordering the hamlets of Raulhac and Forêt noire. The prospect of clearcutting these neighbouring plantations in the short- to medium-term prompted the Strumpler family to plant copses and hedges of fruit, forest and field trees around the agroforestry plots, which are themselves intended to produce fruit, hay and cereals for breadmaking. Together, they create the ecological habitats needed by beneficial organisms and a rural-landscape framework for their project to provide food, education and social welfare.

REGULATORY CONTEXT OF THE PROJECT

- **Proximity of two ZNIEFF :** Cheyssac wetland and Triouzoune valley
- Millevaches Regional Natural Park

ACTIONS IMPLEMENTED

Begun in 2018, the works consisted in :

- Planting 2 330 plants including an alternating mix of fruit trees, shrubs and bushes of various species suited to the soil and climate context (apple trees, berries, in particular blueberry bushes). The planting scheme included 2 200 linear metres of concentric arcs (800 trees), hedges and copses along the edges (1 300 trees, 4.8 ha) and 240 trees within the plot (700 linear metres, 1.5 ha).
- Planting intercropped cereal crops (buckwheat) after a rest period on plots previously used as hay fields

The project leaders also encourage biodiversity by creating flower meadows, insect shelters and bird perches on the farm. The farm's produce is compliant with organic farming specifications.

GOVERNANCE ADOPTED

In the long term, the management, maintenance and monitoring of the agroforestry facilities are the responsibility of the owners.

Les Vergers de Raulhac won the Arbre d'Avenir (Tree of the Future) competition in 2018, and CDC Biodiversité, via the Nature 2050 programme and its scientific partners, is helping to define and monitor the indicators up to 2050, in addition to co-financing the project.

At the same time, the Raulhac farm takes in young people all year round via children's social welfare subsidies, as well as holiday camps every summer. A partnership with the Neuvic agricultural high school enables them to develop awareness-raising initiatives (discovery trail of the orchard's agroforestry facilities, awareness-raising booklet, etc.) and to support the monitoring of the project carried out with the help of the Nature 2050 programme.

SCHEDULE

	PROJECT LIFESPAN			
	2018 - 2019	**2020 - 2021**	**2021 - 2022**	**2022 - 2050**
Works	1st phase of works	2nd phase of works Planting intercropped cereal crops (buckwheat) after a rest period on plots previously used as hay fields	Following on from the Nature 2050 programme : extension of the farm to continue planting on new land. Creation of a 24-page awareness-raising booklet on the farm's activities and biodiversity with a group of students from the local agricultural high school.	
Monitoring and assessment				Monitoring and assessment of the Nature 2050 programme's indicators of good ecological health

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- Soil regeneration and stabilisation via the root systems of trees and shrubs.
- Improved shade and windbreak effect on the farm.
- Stabilisation of fodder yields.

BENEFITS FOR BIODIVERSITY

- Safeguarding the local genetic heritage and plant resilience by encouraging the use of grafts of old apple-tree varieties.
- Increasing the pool of pollinating insects through the broad variety of shrubs and the ground cover.

OTHER BENEFITS

- Socio-economic : diversification of farm income by combining the sale of fruit and wood in a local supply chain.
- Climate change reduction : carbon sequestration via the planted trees.

Vergers de Raulhac, Blueberries
© CDC Biodiversité

MONITORING INDICATORS

Adaptation to climate changes

- Evolution/maturity of the ecosystem : measurements to assess the health of the soil and the natural abundance rate of Nitrogen 15 in the leaves
- Pluviometry monitoring and seasonal observation

Biodiversity

- Ecological assessment
- Bird survey
- Flora survey

Other

- Raising public awareness (receiving visitors for gardening and fruit-picking workshops)

LEVERS FOR SUCCESS

TECHNICAL ASPECTS AND PROJECT DESIGN

- **Protecting the plants from deer** by protecting the trunks and, when close to woodland, setting up 2-metre-high fences.
- **Protecting the roots from mole rats** by burying metal baskets of sufficient size to support the root system until it reaches maturity and by setting up nest boxes and piles of wood to encourage the proliferation of natural predators (birds of prey, snakes).
- **Managing water resources :** creating a pond and setting up a « drip » watering system suited to the local climate. The effect of drought will be limited by mowing the meadow late, maintaining grass cover on the strips and mulching the plants with wood shavings.
- **Helping the trees to become established by planting them young**, ideally at the seedling stage. If pests are too abundant, opting for more resistant (but more expensive) mature trees.

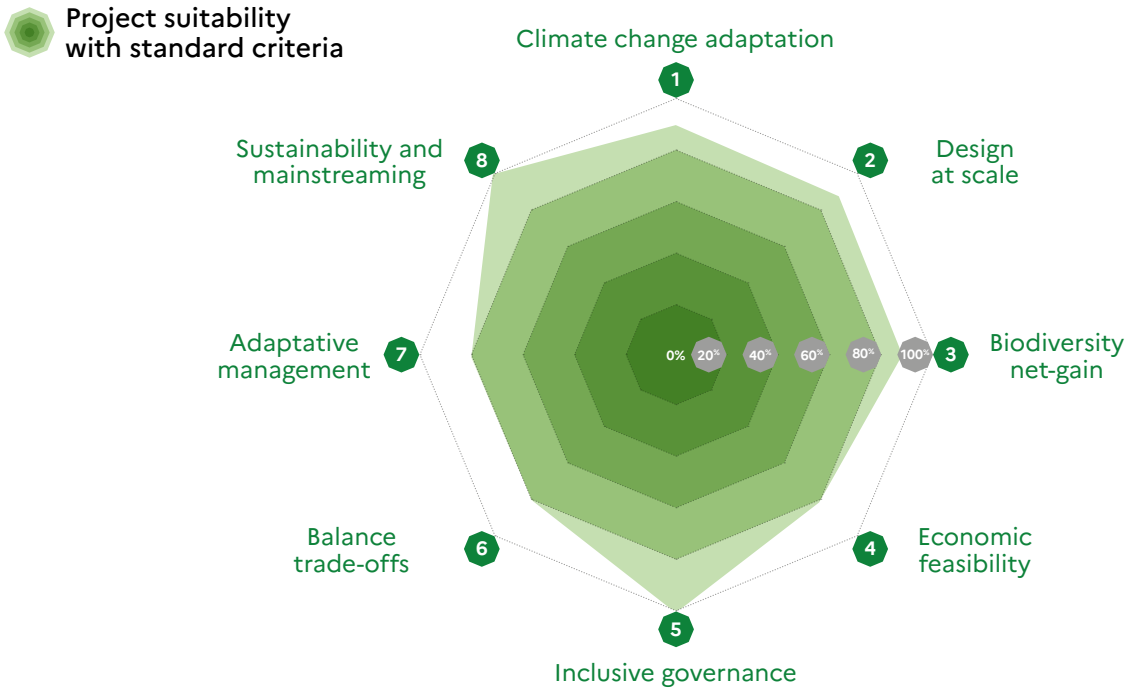
STAKEHOLDER COMMITMENT

- **Contacting a farmers' union :** for example, the blueberry growers' union offers training courses in Corrèze and Limousin on how to design an irrigation system that is more resistant to drought.
- **Finding out about the subsidies available :** the Corrèze department finances anti-insect netting, for example.
- **Working with local educational establishments** to facilitate flora and fauna surveys.

MONITORING AND REPLICABILITY OF THE ACTION

- **Experimenting** with different varieties to test their resilience in relation to soil characteristics and rainfall. The Vergers de Raulhac (sandy-loam soil) observed that Oleaster and Arbutus did not take well, while Alder showed better resistance.
- **Assessing in order to to adapt :** setting up a regular monitoring and assessment system supported by technical and academic experts ensures that the project is able to evaluate itself and adapt to improve its effectiveness.
- **Passing on experience :** encouraging the hosting of groups of young people and trainees to share knowledge about the innovative systems developed by the Vergers de Raulhac (anti-mole rat baskets, geoclimatic greenhouse, etc.).
- **Ensuring economic viability :** considering how to diversify the farm's activities by combining several types of agricultural production and possibly additional activities such as social welfare.
- **Enhancing self-sufficiency** and anticipating possible losses through cycles of bench or field grafting of fruit trees.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

- Webpage (in French) of the Nature 2050 programme
- Webpage (in French) of Raulhac

CONTACT DETAILS OF THE PROJECT LEADER

- **Gabrielle Strumpler**
  vergers@raulhac.org

DATE

March 2023
January 2024

DATE AND FACT FILE EDITOR

Jean-Baptiste Rallu
Albane Droal

www.secondRegard.fr - Coordination : Direction de la communication - Septembre 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

CDC BIODIVERSITÉ

artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

RESTORATION OF SPRING FENS IN THE BAC PÉGULLIER FOREST

2011 TO PRESENT

BAC PEGU, 2014
© Dumeunier

IDENTITY CARD

GEOGRAPHICAL LOCATION

Commune of Escouloubre, Aude department, Occitanie region

NATURAL RISKS TARGETED

- **Flooding**
- **Drought**

HABITAT(S) CONCERNED

Wetlands

TYPES OF NBAS

Restoration of degraded ecosystems

PROJECT LEADER AND PARTNERS

Aude Departmental Councily.

FUNDERS AND BUDGET

- Rhône-Mediterranean-Corsica Water Agency (50 %)
- Aude Departmental Council (50 %)

Total budget: 224 150 € exc. VAT

AUDE
Le département

PROJECT OBJECTIVES

- **For adaptation to climate changes :**
  restore the hydraulic functioning of the fens to enhance flood retention and low water support.
- **For biodiversity :**
  restore the hydraulic functioning of the fens and conserve biodiversity.

ENS BAC PEGUILLIER, 2010
© Dumeunier

CONTEXT AND ISSUES

The Bac Pégullier site is situated on the northern slopes of the Madres range in the Pyrenees, in a typical mountain context made up of woodlands and pastures. The site is at an altitude between 1600 m and 1800 m and is therefore covered in snow for much of the year. The climatic conditions are therefore very harsh and greatly influence the functioning of the site and natural habitats. The site consists of a mosaic of habitats divided into three sectors, with an upper zone covered by heathland, scarps, scree and Dwarf Mountain Pine, an intermediate zone covered by high forest of spruce and fir, and a lower zone covered by a mixture of spruce and fir and various types of broadleaf regrowth punctuated by numerous clearings or "sagnes", the local name for fens.

The specific feature of this site is the presence of about thirty spring fens of varying surfaces areas, totalling approximately 9 ha. Despite the very dense spruce plantations from the 1960s, the fens are still in a good functional and heritage condition; the actions of the management plan are aimed at improving the quality of this environment and therefore enhancing the functioning of the fens.

The area is subject to serious drought and flooding issues :

- In November 1999, flooding caused the deaths of 26 people in the Aude department.
- For many years, prefectorial decrees have drastically limited the use of water in the Aude.
- In October 2018, new floods killed 14 victims.

REGULATORY CONTEXT

- Fragile natural area
- Natura 2000
- Protection forest

ACTIONS IMPLEMENTED

In 2010, aware of the utility of these natural habitats positioned at the head of a catchment area, the Aude Departmental Council acquired these 63 hectares of forest in accordance with its jurisdiction concerning fragile natural areas. It then decided to carry out wetland restoration operations to attempt to recover better ecological and hydraulic functioning of these habitats and to conserve biodiversity. Indeed, the site harbours heritage animal species such as the Pyrenean Desman and Viviparous Lizard, and plant species characteristic of wetlands such as the Round-leaved Sundew, wich rely on the good quality of wetlands. The fens are connected together and flow into a stream that joins the River Aude several kilometres downstream.

The Departmental Council commissioned an initial management plan in 2011-2012. In 2014 the works to restore the fens began by felling and removing the spruces growing in two of the most accessible fens (approximately 1.2 ha). The works were performed in such a way as to minimise the impacts on these fragile habitats (horse-drawn haulage). The works were carried out in September (at low water) and continued from 2015 to 2017.

GOVERNANCE ADOPTED

The Aude Departmental Council is the contracting authority and owner, and through its fragile natural areas jurisdiction able to carry out the actions required with service providers chosen for their capacity to minimise their impacts on the natural environment.

CALENDAR

	PROJECT SCHEDULE
2012	Drawing up of management plan
2013	Authorisation for the works from the departmental land and sea management directorate (DDTM)
2014 - 2017	Restoration of 4 ha of fens
2015 - en cours	Botanical surveys
2019 - 2022	Hydrological study of the wetlands of the northern Madres

ENS BAC PEGU fin travaux tourbière, 4 - 28 septembre 2015
© Dumeunier

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- **Flooding and drought :** the fens acquired better functionality for retaining the water at the head of the catchment area and supporting the low water of the rivers downstream. An upcoming study of the department's wetlands is set to confirm this.

BENEFITS FOR BIODIVERSITY

- 9 fens rehabilitated (4 hectares). The surveys revealed a rich flora with a typology characteristic of wet meadows and fens in terms of phytosociological analysis.

MONITORING INDICATORS

Biodiversity

- Botanical monitoring operations before and after the project (after 3 years then over longer periods) carried out by the NGO "Fédération Aude Claire".

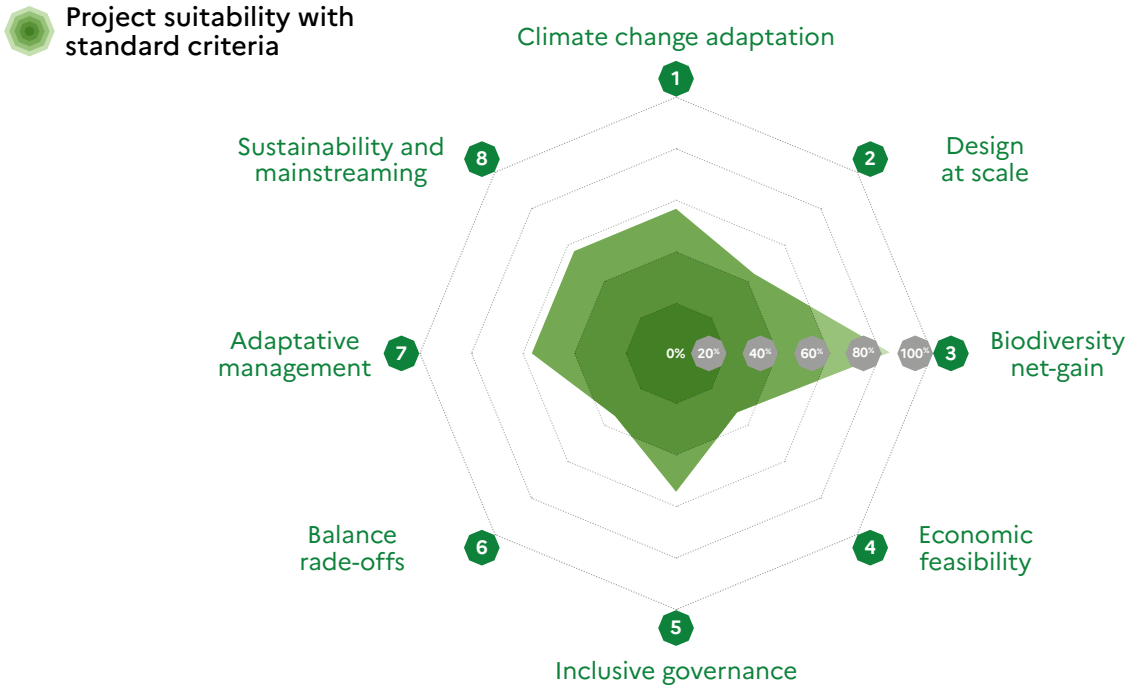
LEVERS FOR SUCCESS

- **Technical skills :** skilled service providers and project manager, a horse-drawn haulage company with experience of these habitats.
- **Partnerships :** good working relations between the horse-drawn haulage and wood removal companies and regular assessment meetings organised by the Department's unit in charge of fragile natural areas (ENS).

RECOMMANDATIONS

- **Develop** considerations and actions on a broader scale, for all the heads of catchment area in the upper valley of the Aude, in order to achieve a better impact on flooding and droughts.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

- https://espacesnaturelssensibles.aude.fr/sites/default/files/media/downloads/BAC%20PEGULLIER%20BD.pdf (in French)
- Video on the works carried out (in French): https://www.youtube.com/watch?v=knmlqFxbXFA

PROJECT LEADER

- **Vincent Dumeunier**
  Environmental Unit
  Aude Departmental Council,
  +33 (0)4 68 11 66 69

DATE

August 2023

FACT FILE EDITOR

Justine Delangue

www.secondRegard.fr - Coordination : Direction de la communication - Juin 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

UICN | Comité Français

artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

ECOLOGICAL RESTORATION AND FLOOD PREVENTION ON THE PULNOY GRÉMILLON STREAM

2017 - 2021

Restauration d'une zone humide
© Veoprod et Grand Nancy

IDENTITY CARD

GEOGRAPHICAL LOCATION

Communes of Essey-lès-Nancy and Pulnoy, Meurthe-et-Moselle department, Grand-Est region

NATURAL RISKS TARGETED

- **Flooding**

HABITAT(S) CONCERNED

Continental aquatic habitats

TYPES OF NBAS

Sustainable management and restoration of degraded ecosystems

PROJECT LEADER AND PARTNERS

Grand Nancy Metropolitan Authority

FUNDERS AND BUDGET

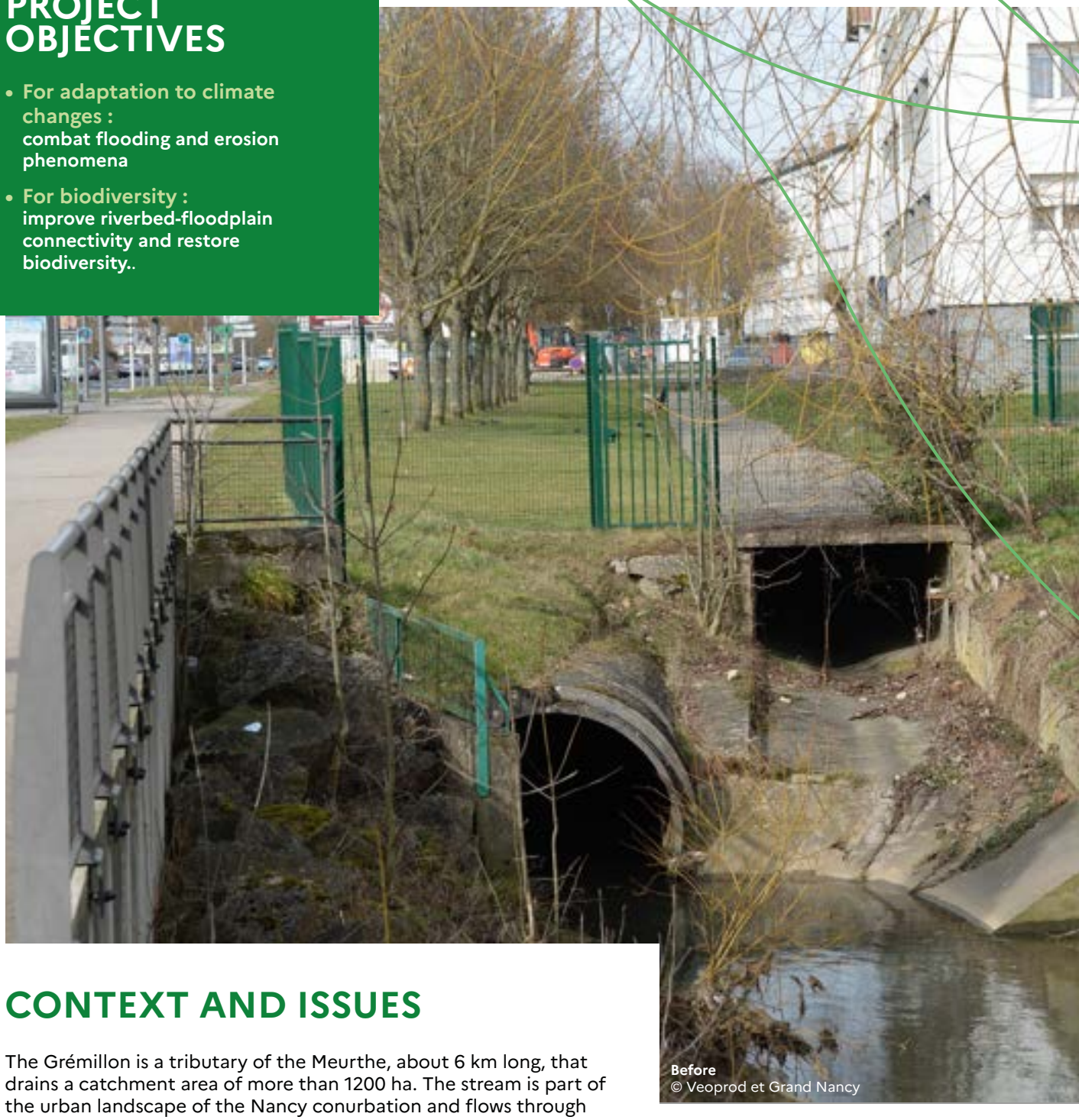
- Grand Nancy Metropolitan Authority (55%)
- Rhine-Meuse Water Agency (35 %)
- Grand-Est Region (10 %)

Total budget : **3 571 432 € exc. VAT**

métropole GrandNancy

PROJECT OBJECTIVES

- **For adaptation to climate changes :**
  combat flooding and erosion phenomena
- **For biodiversity :**
  improve riverbed-floodplain connectivity and restore biodiversity..



Before
© Veoprod et Grand Nancy

CONTEXT AND ISSUES

The Grémillon is a tributary of the Meurthe, about 6 km long, that drains a catchment area of more than 1200 ha. The stream is part of the urban landscape of the Nancy conurbation and flows through the communes of Pulnoy, Seichamps, Essey-lès-Nancy and Saint-Max, where it is considerably channelised. The stream has been much altered during the course of urban development, resulting in multiple problems: floods, sinking of the riverbed, partial dislodging of water treatment infrastructure, erosion and undermining of riverbanks, loss of biological functionalities in the stretches passing through conduits. The Grémillon was identified as a "Heavily Modified Water Body" in the SDAGE for the Rhine-Meuse river basin.

REGULATORY CONTEXT

- Masterplan for the Development and Management of Water Resources (SDAGE)
- Nancy Metropolitan Area Green and Blue Network
- Management of aquatic habitats and flood prevention (GEMAPI)

ACTIONS IMPLEMENTED

Les travaux se sont décomposés en deux phases :

- **Phase 1 — sector of the Essey-lès-Nancy urban zone :**
  Restoration of the stream in the crossing of the urban zone, re-meandering, diversification of flows, removal of culverts to expose the watercourse to the open air, creation of a detention basin.
- **Phase 2 — Pulnoy sector :**
  In the urban zone: ecological restoration of the watercourse in the crossing of the urban zone (demolition of concrete sills and riverbanks), redevelopment and ecological restoration of the previously created Masserine reservoir;
  In the agricultural zone: restoration of the stream, re-meandering, diversification of flows, removal of culverts to expose the watercourse to the open air, development of a wetland, creation of a detention basin.

Since works ended, scientific monitoring of water quality has been implemented. In addition, work has been undertaken to reform the land tenure system between the communes and the conurbation for the sharing of maintenance of public areas. Finally, a cofferdam was constructed to improve the distribution of the stream's flows.

CALENDAR

	PROJECT SCHEDULE
2010 - 2012	Preliminary studies, Definition of project management programme
2013	Consultation for the project management commission
2014 - 2016	Study phases, Public inquiry, Concertation
2017	Start of works, Phase 1
2018	Start of works, Phase 2
2019	End of works
010 - 2021	Scientific monitoring of water quality + complementary works

GOVERNANCE ADOPTED

Several partners were involved in the project by means of a steering committee and a technical committee: Rhine-Meuse Water Agency, Grand-Est Region, Meurthe-et-Moselle Departmental Territorial Directorate ion, French National Agency for Water and Aquatic Environments (ONEMA), Meurthe-et-Moselle Departmental Federation for Fishing and the Protection of Aquatic Habitats. Regular consultations were held with local residents through the municipal authorities and with farmers via the Chamber of Agriculture.

After
© Veoprod et Grand Nancy

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- **Flooding :** two storm events in 2018 proved the efficacy of the detention basins: they filled up during the course of ten-year and hundred-year rains, while the works were underway.

BENEFITS FOR BIODIVERSITY

- **Species :** the water retention zones and helophyte plants along the stream are favourable for dragonflies & damselflies and for amphibians; bats use the stretches of riverine woodland to guide them to hunting grounds.
- **Ecological continuity :** the creation of water retention zones and improvement of riverbed/flood plain connectivity enhanced the spatial contiguity of the wetlands.

OTHER BENEFITS

- **Living environment :** improvement in landscape quality, the stream having been considered as a ditch for the departmental road before being rehabilitated. The developments carried out create meeting places for local residents, which encourages social interaction.

MONITORING INDICATORS

Biodiversity

- Assessment of hydromorphological quality with the setting up of the Carhyce protocol;
- Assessment of physicochemical quality with in-situ measurement campaigns;
- Assessment of biological quality with the calculation of an NGBI (Normalised Global Biological Index).

LEVERS FOR SUCCESS

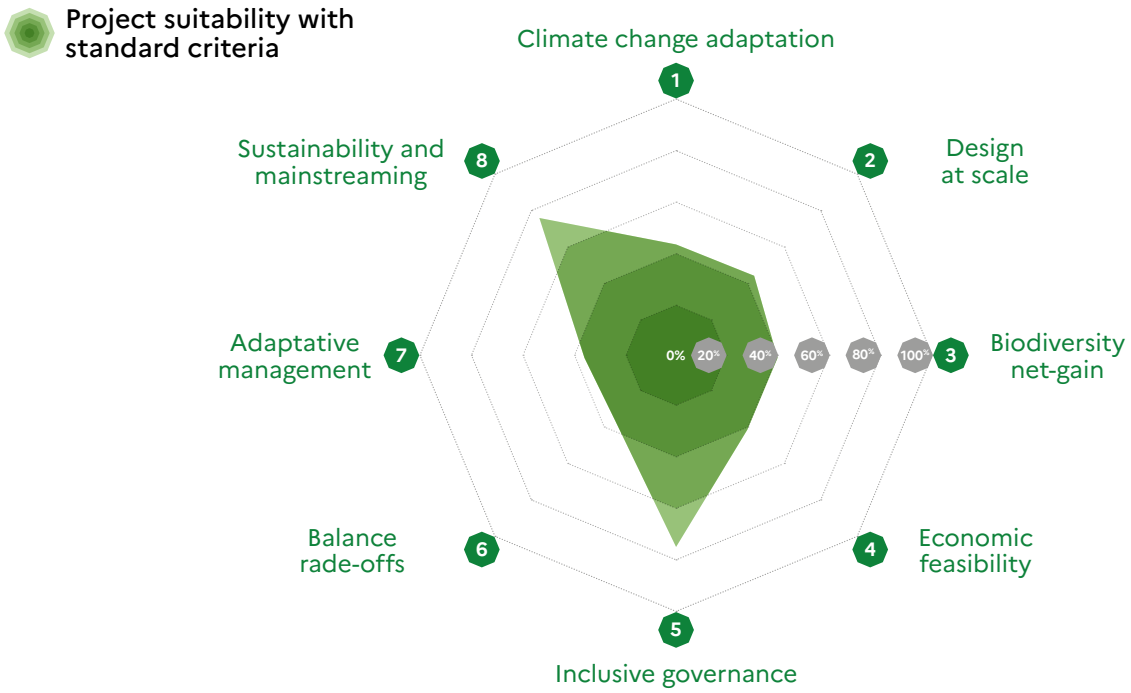
- **Communication :** public information meetings were organised in each commune before the start of works, and at each major step as they were being carried out. Various communication media to inform the public (press packs, posters, information on the Grand Nancy website ...) were produced throughout the works period.

- **Partnerships :** numerous technical partners were involved in the project, which favoured exchanges concerning the design of developments to achieve better integration and acceptance among local residents.

RECOMMANDATIONS

- Set up more in-depth monitoring of the benefits provided for biodiversity by the project.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

Two films (in French) are available via the following links:

https://youtu.be/2fvUxinEbpk
https://youtu.be/Ew4WdxU53OU

PROJECT LEADER

- **Stéphanie Rivat**
  Grand Nancy Metropolitan Authority
  stephanie.rivat@grandnancy.eu
  +33 (0)3 83 91 84 66

DATE

January 2023

FACT FILE EDITOR

Justine Delangue

www.secondRegard.fr - Coordination : Direction de la communication - Juin 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

UICN | Comité Français

artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

REPRISE PROJECT - RESTORATION OF ECOSYSTEMS FOR THE PREVENTION OF RISKS AND ECOSYSTEM SERVICES

2018 - 2021

Commune de Houaïlou
© Marine Aubert

IDENTITY CARD

GEOGRAPHICAL LOCATION

New Caledonia – customary districts of Leweo and Bas-Nindiah
Commune of Houaïlou

NATURAL RISKS TARGETED

- **Soil erosion, landslides**
- **Flooding**

HABITAT(S) CONCERNED

Forest

TYPES OF NBAS

Restoration of degraded ecosystems

PROJECT LEADER AND PARTNERS

Municipal authority of Houaïlou

FUNDERS AND BUDGET

- French Agency for Ecological Transition (ADEME) (56%)
- Eramet-SLN mining group (34%)
- ENERCAL hydroelectric company (5%)
- Municipal authority of Houaïlou(5%)

Total budget : **1 463 000€**

Commune de
WAA WI LUU

Before
© Marine Aubert

PROJECT OBJECTIVES

- **For adaptation to climate changes :**
  soil erosion mitigation and flood prevention.
- **For biodiversity :**
  facilitating the recovery of biodiversity.

REGULATORY CONTEXT

- Forêt domaniale
- Périmètres de protection des eaux de captages d'alimentation en eau potable
- Anciens sites miniers non réhabilités

CONTEXT AND ISSUES

On 22nd November 2016, exceptionally heavy rains led to serious floods and deadly mudslides, which caused the death of 8 people and approximately 10 million euros of damage in the commune of Houailou. This catastrophe mainly affected zones that had been degraded (by recurrent fires, scraper mining and invasive species), highlighting the importance of conserving and restoring ecosystems to protect them from natural risks and strengthen the resilience of local communities with regard to climate changes.

ACTIONS IMPLEMENTED

The REPISE Project, designed and led by the Houailou municipal authority in response to this need, is the winner of a national ADEME request for proposals concerning projects for "pilot sites for the recovery of biodiversity." Its aim is to restore terrestrial ecosystems in order to mitigate soil erosion, prevent the risks of drying out, landslides and floods, and facilitate the recovery of biodiversity. To achieve this objective, the municipal authority developed various restoration measures in zones identified as high-priority (catchments providing drinking water, former mining sites, places of cultural importance, etc.): relief renovation on scrape-mined areas, anti-erosion systems such as fascines (bundles of interwoven branches), regulation of invasive alien species, planting of some hundred forest species endemic or indigenous to the bioregion, and protection of the restored area from degradation by invasive ungulates and assisted natural regeneration in several areas.

Launched in April 2018 for a provisional duration of three years, REPRiSE is characterised by an innovative and participative system of governance that involves local communities in the co-management of the environment, together with institutions, technical partners and the industrial companies co-funding the project, with a view to sustaining the activities undertaken.

CALENDAR

	PROJECT SCHEDULE
2018 - 2021	- Uprooting of Pinus species - Planting of pioneer species (Kaori etc.)
	- Planting of sandalwood and coffee to create local commercial activity - Encourage and raise the awareness of the local population to develop this commerce
	Training (safety & security, firearm maintenance, etc.) and awareness-raising for hunters so as to regulate invasive forest species (Cervidae and wild pigs)
	Setting up of a conservation agreement with the customary authorities for the post-project phase

GOVERNANCE ADOPTED

The implementation of the project was based on 6 committees :

- **A steering committee** composed of institutional, technical, industrial and customary stakeholders. It validates the progress status and strategic directions of the project;
- **Three technical committees**, invasive ungulates, ecological and economic reforestation, monitoring and sustainability. They bring together the organisations involved in the monitoring and validation of intermediate technical deliverables;
- **A scientific committee** made up of diverse experts which is consulted to consolidate the definition of the operations plan and the design of the systems for monitoring gains in biodiversity and ecosystem services;
- **A monitoring committee** comprising the French Agency for Ecological Transition (ADEME), the State Forest, Agriculture and Environment Service, the French Biodiversity Agency (OFB) and Houaïlou Municipal Authority, which meets once a year to for validate the compliance of the operations undertaken and the project's contractual deliverables.

The participation of local communities in the various components of the project relies on the making up of mixed teams (men and women) and the inclusion of representatives of the various clans, young people and amateur hunters, all of whom are in the selection and monitoring of the high-priority restoration sites, restoration works, impact assessment and training in good hunting practice.

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- Reduced soil erosion
- Reduced risk of flooding

BENEFITS FOR BIODIVERSITY

- 40 ha reforested with local tree species suited to climatic conditions on 7 high-priority sites (4 catchments providing drinking water, 1 former mine, 2 areas of heavy land disturbance due to the omnipresence of pigs and deer species together with recurrent fires), and 2 demonstrational/educational sites (upstream of the private catchment of an agricultural high school and on the orienteering ground of a professional high school);
- 20 ha of proliferating Caribbean pine (*Pinus caribaea*) eliminated and replaced by some hundred endemic forest species as recommended by a botanist. Planting of about 20 species in each zone (such as the Blue Marble Tree (*Elaeocarpus angustifolius*), Koghis Kauri (*Agathis lanceolata*) or Large-flowered Crossostylis (*Crossostylis grandiflora*)).

OTHER BENEFITS

- Involvement of local stakeholders in the project (local communities, industrial companies, institutions)
- Capacity-building of local hunters and NGOs ;
- Reduction of fire risks due to human causes by the involvement of local people in the project.

After
© Marine Aubert

MONITORING INDICATORS

Adaptation to climate changes

- **Soil stability :** participative and scientific monitoring systems were set up to measure the evolution of soil stability (for example, the soil retention capacity of roots).

Biodiversity

- **Measurements** of the biological quality of rivers (for example, water turbidity) and forest ecosystems (for example, plant growth).
- **This long-term scientific** monitoring is based on the intervention of experts every 1 to 5 years (e.g., monitoring by remote sensing, bioindicators of benthic macroinvertebrates, standardised monitoring of herpetofauna, etc.)

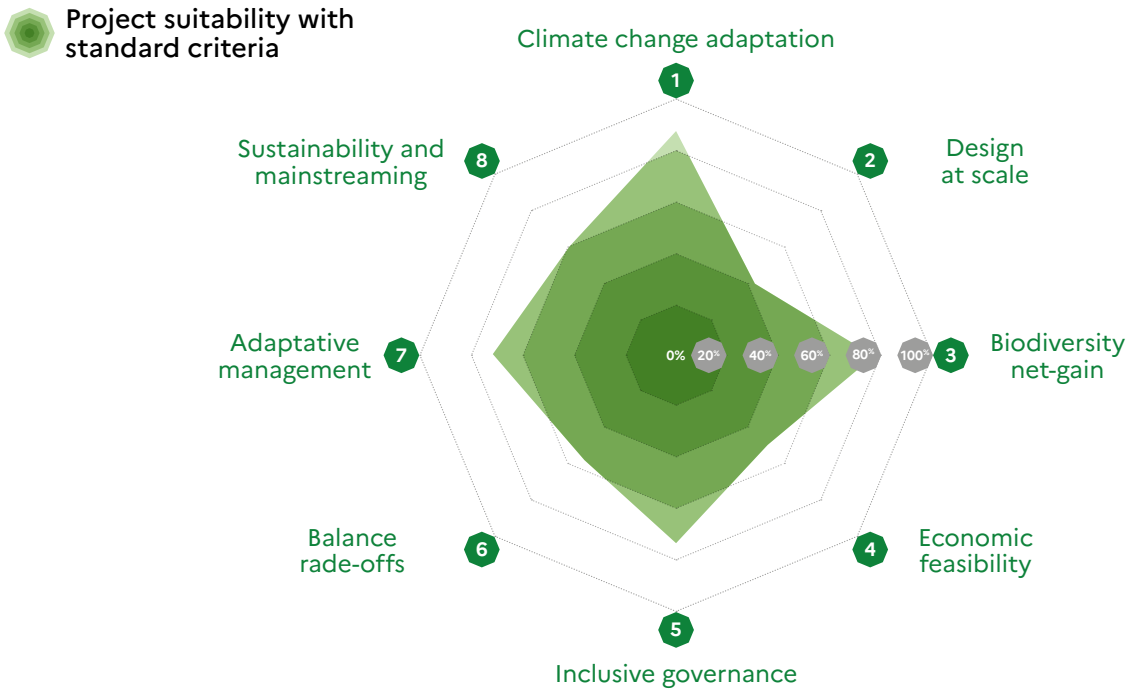
LEVERS FOR SUCCESS

- **Technical skills :** the skills of all the project partners (departments of the institutions responsible and industrial partners, public organisations supporting the project, etc.) enabled realistic and appropriate objectives and implementation methodologies to be defined.
- **Funding :** the success of the work carried out and the popularity of the project with local communities greatly contributed to convincing the private investors to provide the finances for the REPRiSE funding plan.
- **Governance/concertation :** the involvement of customary representatives in governance and the high level of concertation with local communities throughout the project enabled and maintained support for it among local people, who took the project onboard and actively participated in its implementation.

RECOMMENDATIONS

- **Plan to replicate** the project in the Houailou commune, over a more extensive area and with revised objectives for concerted long-term management of the environment.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

The results were communicated throughout the project at various levels: promotion of the restoration works on social media, local media coverage of official ceremonies or events, publication of articles on the project in the municipal newsletter and an illustrated progress report every four months for the stakeholders. Communication media aimed at young people, the general public and/or private organisations were also produced, in order to assist with the replication of the project: a cartoon, a documentary and a technical brochure.

https://radiococotier.nc/2021/04/24/les-12-travaux-de-wa-wi-luu/. (in French)

https://www.youtube.com/watch?v=bn7KR6KH-1Q (in French)

The REPRISE project has spread though the region. This is shown by the Oceanian Regional Project of Territories for the Sustainable Management of Ecosystems (PROTEGE), which is an initiative aimed at promoting sustainable and durable economic development in response to climate change within the European Union's Pacific Overseas Countries and Territories (POCTs), based on biodiversity and renewable natural resources.

https://protege.spc.int/fr

PROJECT LEADER

- **Jean-Luc Datim**
  Deputy General Secretary, Houaïlou Commune
  sga@mairie-houailou.nc

DATE

June 2023

FACT FILE EDITOR

Justine Delangue

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

CAP-PHOENIX PROJECT, POST-FIRE RESTORATION OF THE FOREST MASSIF

2018 - 2021

Guanaes
© Lucia Guanaes

IDENTITY CARD

GEOGRAPHICAL LOCATION

PACA region, Var department, Port-Cros National Park: Cap Lardier, Cap Taillat and Cap Camarat

ADAPTATION ISSUES TARGETED

Forest fires

HABITAT(S) CONCERNED

Forest

TYPES OF NBAS

- Ecosystem restoration
- Sustainable ecosystem management

PROJECT LEADER AND PARTNERS

Port-Cros National Park

FUNDERS AND BUDGET

- TotalEnergies Foundation (52%)
- Interreg Maritime (28%)
- Conservatoire du littoral coastal protection agency (10%)
- Port-Cros National Park (7%)
- PACA region (3%),

Total budget : **577 150€**

Parc national de Port-Cros

PROJECT OBJECTIVES

- **For adaptation to climate changes :** understand and promote the resilience of natural habitats to fire risk, in the context of climate change and share knowledge and involve people in fire risk awareness.
- **For biodiversity :** Support the regeneration of degraded natural areas

Before
© Lucia Guanaes

CONTEXT AND ISSUES

The Cap Lardier site suffered a major wildfire from 24 to 27 July 2017, over more than 500 ha, causing the loss of an extensive Mediterranean forest heritage. Wildfires are a major threat not only to the local population, but also to local biodiversity. In this region of the Mediterranean coastline, climate change is already causing severe stress to Mediterranean vegetation and forest ecosystems, particularly due to increased periods of drought and summer heatwaves. These changes are potentially the cause of the dieback observed in certain deciduous trees, particularly oaks, and are likely to increase the frequency and severity of wildfires in the area.

REGULATORY CONTEXT

- National park
- Coastal protection agency land

ACTIONS IMPLEMENTED

Actions to prevent the risk of fire have been implemented on the site of Cap Lardier to increase resistance to fire, while encouraging the regeneration of diverse post-fire populations, in particular :

- supporting the natural dynamics of the native species best adapted to the passage of fire (Holm Oak, Cork Oak and other deciduous trees of the maquis) over almost 300 ha, with monitoring of this recovery;
- the development of experimental plots in a 4-hectare area of windfall and completely burnt pinewood to support the transition to oak woodland (more resistant to fire), while reducing the encroachment of pioneer species (mainly conifers, in particular Aleppo Pine and Maritime Pine) and invasive pyrophyte alien species such as mimosa, prickly pear and Japanese honeysuckle, by mechanical clearing or sylvopasture grazing by donkeys, aadapting the grazing pressure according to the target species.

CALENDAR

	PROJECT SCHEDULE
2018	Completion of emergency works - Setting up habitat monitoring and survival diagnostics (reptile habitats) - « Eco-guards » initiative
2019	Definition of landscape guidelines and establishment of a landscape observatory - Development of an experimental plot to support the transition to oak woodland (soil preparation and seedlings) - Controlling invasive alien species (uprooting/work access scheme - Setting up habitat monitoring protocols (typology, mapping, multi-taxon monitoring, flora) - Workshops with local stakeholders - Information for local communities (panels, videos)
2020	Definition of landscape guidelines/establishment of a landscape observatory - Setting up of an experimental plot - Workshops with local stakeholders - Information for local communities (conferences) - Cap Lardier, a reference site for post-fire Natura2000 site managers (best practice files, webpage, French and EU technical workshops)
2021	Definition of landscape guidelines/establishment of a landscape observatory - Setting up of an experimental plot - Cap Lardier, a reference site for post-fire Natura2000 site managers (best practice files, webpage, French and EU technical workshops)

GOVERNANCE ADOPTED

Propriétaire du site : Conservatoire du Littoral

Site owner : coastal protection agency

Scientific partners : National Mediterranean Botanical Conservancy of Porquerolles, CEN PACA, CEFE, Aix-Marseille University

Public partners : Municipality of Ramatuelle and La Croix Valmer, Municipality of the Golfe de St Tropez community, Syndicat mixte Porte des Maures, Région SUD, Department of Var , DDTM

Private forst partners : Association de la Suberaie Varoise, Centre régional de la Propriété Forestière

Corporate sponsorship foundations : Fondation Total

No specific governance structure was set up for this project. The bodies and committees are those of the Port-Cros National Park, in particular its Scientific Council.

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

Fires : reduction in the intensity and scale of fires.

BENEFITS FOR BIODIVERSITY

Recolonisation by plant species was observed nine months after the fire. These measures enabled a number of additional plant species (Geranium columbinum, Ranunculus bulbosus, Plantago coronopus, Pinus pinea and Pinus pinaster) to become established. The opening up of the environment is favourable to certain animal species, in particular Hermann's Tortoise and the Ocellated Lizard.

OTHER BENEFITS

Soil erosion : limiting the risk of soil erosion from autumn rainfall in 28 ha of high-risk areas (exposed soils and steep slopes) by laying coconut fibre netting on the ground and creating networks of fascines (using burnt wood from raw materials available on the site) to trap fine sediments and seeds and encourage the recolonisation of plant species.

MONITORING INDICATORS

Adaptation to climate changes

No monitoring as yet on the effect on fire reduction. First results will be visible in 10 years.

Biodiversity

Dendrometry monitoring : setting up 200 permanent sample plots to monitor the dendrometry of the stands, in order to assess the state of the forest stands still in place, regrowth and the accumulation of the various deadwood zones.

Flora monitoring : carrying out an impact study of the various management methods implemented, to monitor enabling the recovery of vegetation in the burnt areas.

Fauna monitoring : multi-taxon monitoring protocols for sample plots, enabling comparison of habitats (reptile populations, invertebrates and vascular flora) before/after the forest fire.

After
© Lucia Guanaes

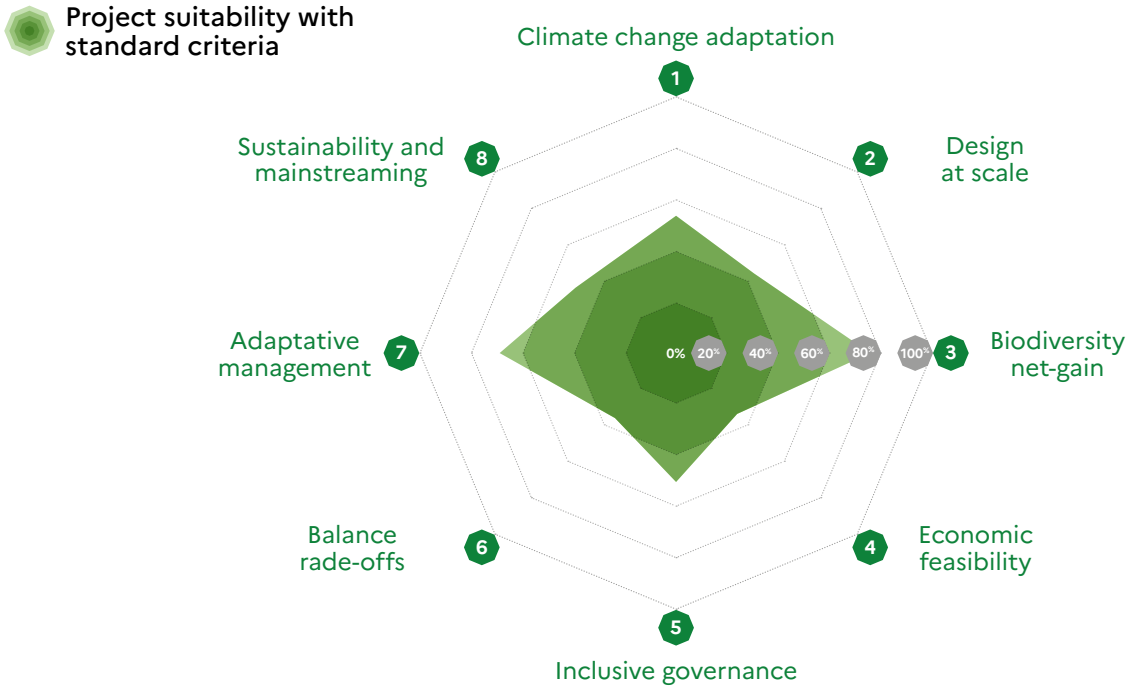
LEVERS FOR SUCCESS

- **Scientific and technical expertise :** the project brings together a wide range of stakeholders (university, laboratory and research institute) and many disciplines (herpetology, entomology, botany, forestry, etc.).
- **Citizen involvement :** the participation of local residents in the restoration work, either through financial donations or by taking part in the work on a voluntary basis, has been a driving force behind the project's success.

RECOMMENDATIONS

- **The methodology** used in this project could be considered for other sites that have been damaged by wildfires.
- **Technical workshops** for French and European Union natural area managers are planned, as well as the publication of decision-support fact files based on the experiments carried out on the various pilot sites.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

Press releases on the project's progress were disseminated to local residents and visitors.

PROJECT LEADER

- **Serantoni Eric**
  Port-Cros National Park, Port Cros, 83400 Hyères
  eric.serantoni@portcros-parcnational.fr
  04 94 12 89 19

DATE

July 2023

FACT FILE EDITOR

Justine Delangue

www.secondRegard.fr - Coordination : Direction de la communication - Juin 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

UICN | Comité Français

artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

MED-FORESTE PROJECT, PREVENTION OF WILDFIRE RISKS

2019 - 2022

Sylvopastoralisme asin
© Laëtitia Ferrer

IDENTITY CARD

GEOGRAPHICAL LOCATION

Port-Cros National Park, department of Var
Franco-Italian cross-border scale

ADAPTATION ISSUES TARGETED

Wildfires

HABITAT(S) CONCERNED

Forest ecosystem

TYPES OF NBAS

Sustainable management and conservation of ecosystems

PROJECT LEADER AND ASSOCIATED PARTNERS

- Port-Cros National Park
- Partners : National Association of Italian Municipalities of Tuscany, French National Forest Office (ONF), Liguria Region, Institute of Biometeorology, National Association of Italian Municipalities of Liguria, Regional Forestry Agency for the Development of the Territory and the Environment of Sardinia

FINANCEURS ET BUDGET

- European Regional Development Fund (ERDF): 85 %
- Port-Cros National Park: 15 %

Total budget : **242 631 €**

Parc national de Port-Cros

Before / Parc national de Port-Cros
© Laëtitia Ferrer

PROJECT OBJECTIVES

- **For adaptation to climate changes :**
  Evaluate the feasibility, impact and benefits of setting up sylvopasture systems with grazing donkeys to replace or complement mechanical scrub clearance operations on combustible biomass.
- **For biodiversity :**
  Reduce pressure on the environment with an input of organic matter to the soil

REGULATORY CONTEXT

- National park
- European Interreg programme

CONTEXT AND ISSUES

The MED-Foreste project was initiated out of a desire to take action at Franco-Italian cross-border scale to meet the common challenge of preventing the risk of forest fires. The Franco-Italian cooperation area is one of the main tourist destinations in Europe, due to its natural and cultural heritage, which must be preserved. In the context of climate change, defining new preventive actions will make it possible to act on the causes of fires, by making forests more fire-resistant. The project aims to improve the capacity of public institutions to anticipate and manage fire risks by experimenting with, implementing and comparing various sustainable fire prevention measures.

ACTIONS IMPLEMENTED

The Port-Cros National Park's participation in the MED-Foreste project enables it to reconcile fire prevention actions and maintain biodiversity. Its actions within the project include the following :

- the implementation of an experimental test of «eco-clearing» using sylvopasture with grazing donkeys, in areas of the park that are particularly vulnerable to the risk of fire (containment zone on the island of Porquerolles, Cap Lardier at La Croix-Valmer, affected by a major fire in 2017). Forest sample plots were set up to assess the combustible biomass after the donkey grazing.
- the implementation of work access schemes to strengthen scrub clearance (around DFCI trails, backshore pinewoods, etc.) and the fight against invasive alien pyrophyte species (mimosa, prickly pear, Japanese honeysuckle).

The aim of this work is to demonstrate the effectiveness and benefits of scrub clearance using grazing, which is more sustainable and environmentally friendly than the usual techniques (mechanical, controlled burning, etc.).

CALENDAR

	PROJECT SCHEDULE
2019	Preparatory activities - Creation of strategy, methodology and monitoring of results shared by the partners - Detailed executive planning of interventions
2020	Staff training (donkey herding, etc.) - Work access scheme to combat invasive alien species - Preliminary flora surveys
2021	Implementation of grazing - Post-grazing flora surveys - Work access schemes to clear brushwood - Deliverables
2022	End of the project action

GOVERNANCE ADOPTED

5 steering committees were set up between 2019 and 2021. The governance bodies are those of the European Interreg MED Programme.

After / Parc national de Port-Cros
© Laëtitia Ferra

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- Protection against forest fires over approximately 4ha

BENEFITS FOR BIODIVERSITY

- Protection and development of fauna and flora of open environments;
- Protection of the soil.

MONITORING INDICATORS

Adaptation to climate changes

- Reducing the risk of wildfire : modelling the spread of a potential fire with or without treatment

Biodiversity

- Using the flora monitoring files to determine variations in the plant system concerning species abundance and diversity.

Others

- Realisation of an environmental impact study of the project works,
- Production linked to grazing (donkey milk...)
- Perception of recreational value by users and locals

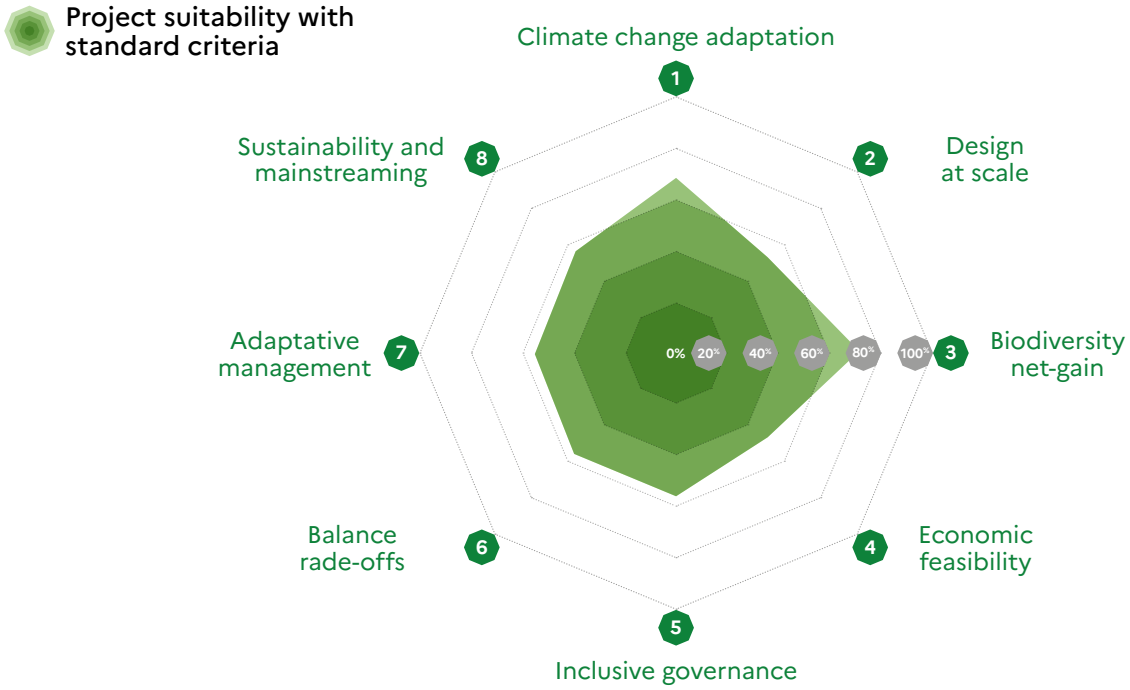
LEVERS FOR SUCCESS

- **Technical skills :** implementing the experimental sylvopasture - test requires good knowledge of Mediterranean flora and the risk of forest fires, as well as mapping skills.
- **Funding :** this is a major lever, as it has enabled the hiring of a project manager dedicated to this project.

RECOMMENDATIONS

- Training for operators,
- Depending on the possibilities, choose to outsource the management of the donkey-silvopastoralism.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

- A decision-support manual for elected representatives and forest managers (to come)
- Press releases and posts on social networks will be produced throughout the project to publicise these initiatives.

PROJECT LEADER

- **Serantoni Eric**
  Port-Cros National Park
  eric.serantoni@portcros-parcnational.fr
  04 94 12 89 19

DATE

July 2023

RÉDACTRICE DE LA FICHE

Justine Delangue

www.secondRegard.fr - Coordination : Direction de la communication - Juin 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

UICN | Comité Français

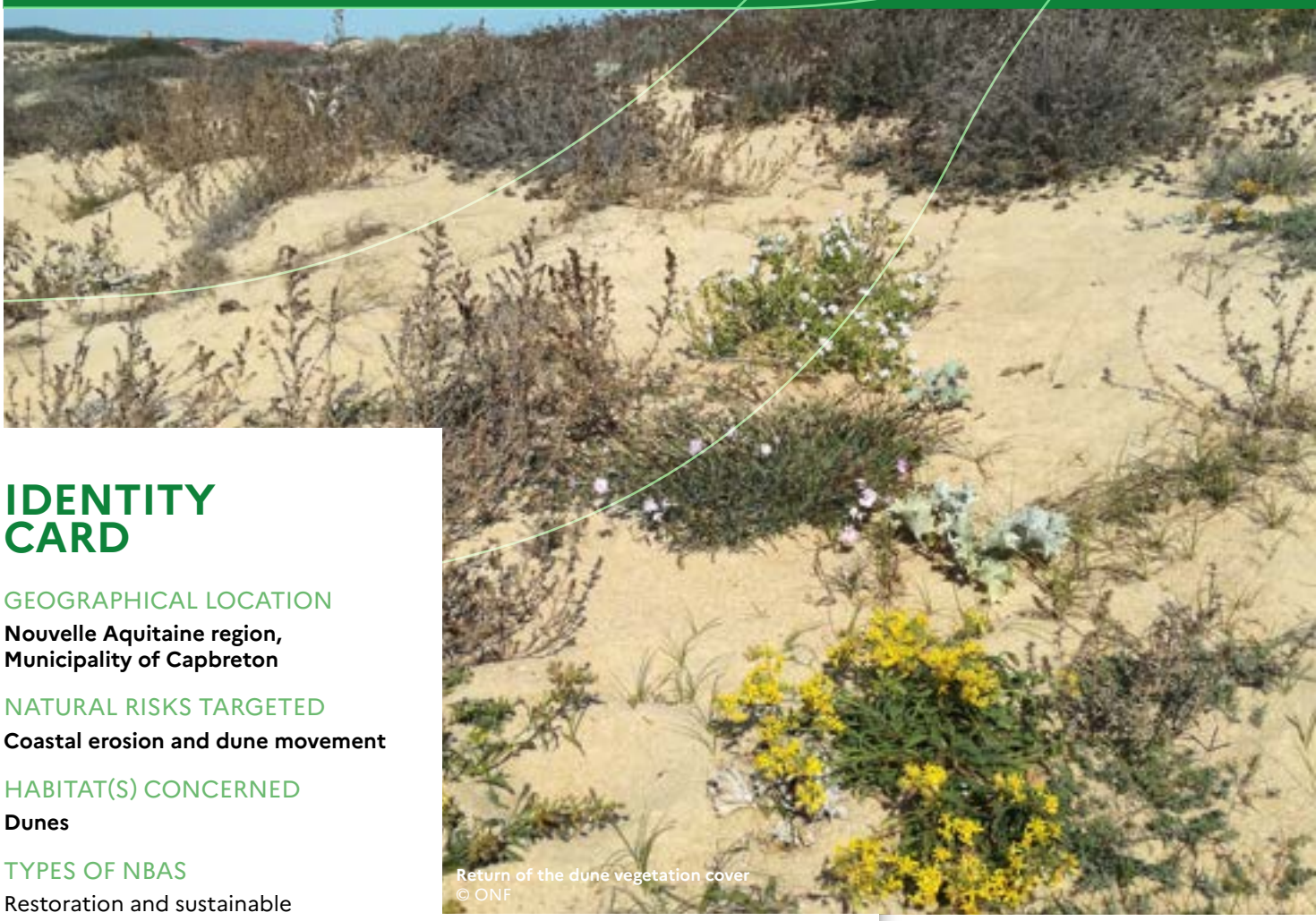
artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

REHABILITATION OF THE CAPBRETON DUNE SYSTEM

2015 - 2016



Return of the dune vegetation cover
© ONF

IDENTITY CARD

GEOGRAPHICAL LOCATION

Nouvelle Aquitaine region, Municipality of Capbreton

NATURAL RISKS TARGETED

Coastal erosion and dune movement

HABITAT(S) CONCERNED

Dunes

TYPES OF NBAS

Restoration and sustainable ecosystem management

PROJECT LEADER AND PARTNERS

Capbreton Municipality

Linked with the ONF (French National Forest Office) General Interest Mission to stabilise and protect coastal dunes at regional level, and with the GIP Littoral's regional beach plan development scheme and regional coastal strip management strategy.

FUNDERS AND BUDGET

- ERDF (16.79 %)
- State (20.63 %)
- Nouvelle-Aquitaine Region (24.43 %)
- Conservatoire du Littoral coastal protection agency (6.32 %)
- Campeole Fierbois campsite (8.53 %)
- Capbreton Municipality (23.29 %)

552 524 € exc. VAT

Capbreton
Cité Marine

PROJECT OBJECTIVES

- **Adaptation to climate change :** Resistance to coastal recession through the restoration and sustainable management of dunes
- **For biodiversity :** Restoring the biodiversity of dune flora and fauna

Before
© ONF

CONTEXT AND ISSUES

Capbreton's dunes lie between the beach and the densely urbanised seaside town, which puts a great deal of human pressure (trampling) on these fragile natural habitats.

Since the 1990s, the dunes became very exposed to wind as a result of a lack of management and chronic marine erosion. In the 2000s, dune movement began to cause the silting-up of urbanised areas (Santocha, Piste, Océanides (including a car park) and CCAS), generated by very significant inland sand movements.

REGULATORY CONTEXT

- Partly, on Conservatoire du Littoral and Natura 2000 sites in
- Remarkable coastal area
- Listed site

ACTIONS IMPLEMENTED

Faced with those problems of erosion and dune mobility, in 2012 the local authorities launched an initiative to restore the dunes. Following several public meetings and consultations with property owners, it obtained the agreement of the vast majority of dune owners. With the support of the French National Forest Office (ONF), in 2013-2014 it carried out a preliminary study, divided into two phases (an inventory and analysis of existing structures, followed by a proposal for the restoration of the dunes), the main aim being the stabilisation and restauration of these natural habitats. A further concomitant objective is to organise the flow and reception of visitors in the various sectors.

In autumn 2015, rehabilitation work was launched by the local authority in collaboration with the ONF. Using the existing dune profiles (« remodelled » by the wind), remodelling and reprofiling were carried out to limit wind erosion and make the habitat more resistant.
The topography of the dunes was thus smoothed to reduce the wind load and prevent sand being blown away.

The sand was stabilised by thatching it with branches to limit the action of the wind and by planting dune-structuring plant species such as marram grass (*Ammophila arenaria*).
Flows of pedestrians were channelled through the creation of a « dune path » to limit the trampling of the dunes and link the various beach access sites with each other and with the neighbourhoods behind them.

GOVERNANCE ADOPTED

Steering committees, to present and validate the project were held with the funding partners (European Union, State agencies, Region, Landes Department, Conservatoire du Littoral, etc.).

The local population was involved in the project and made aware of the need to preserve these habitats through public meetings, the municipal website and the setting up of citizen worksites during restoration and annual maintenance.

Pupils from Capbreton's primary schools took part in the planting of the Marram Grass and were made aware of the vulnerability of the site.

CALENDAR

	PROJECT SCHEDULE
2012	Public meetings Consultation with landowners
2013 - 2014	Preliminary study for dune restoration
2015	Remodelling of dunes Stabilisation of dunes • Dune thatching • Planting of dune plant species Creation and signposting of a « dune path »

After
© ONF

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- **Coastal erosion :** The project has led to a lasting reduction in wind erosion on the dunes.
- **Dune mobility :** the sectors threatened by dune recession (Beausoleil, la Piste, CCAS) are now under control.

BENEFITS IN TERMS OF PROTECTING, MANAGING AND RESTORING BIODIVERSITY

The control of wind erosion on the dunes has enabled the development of the flora, and in particular the recovery of a very rich heritage flora, characteristic of the southern Landes dunes. Many protected or heritage species that had disappeared since the 1990s, such as Astragalus baionensis, Fringed Pink and Woolly Hawkweed, have reappeared following the stabilisation work. Ruderal species are gradually being replaced by dune species.

OTHER BENEFITS ACHIEVED

The organisation of pedestrian flows and the improvement of beach access have improved conditions for visitors along the dunes. The dune walk that was created has made it possible to showcase these ecosystems, raise public awareness with educational panels along the way and limit illegal unauthorised paths. All the urbanised areas are now connected to the various authorised beach access points.

Moreover, the work carried out, while being a major investment, has reduced annual maintenance costs. Today, this maintenance, which costs the local community between €10,000 and €20,000 per year, is helping to preserve and stabilise 2.5 kilometres of dunes and protect the urban development just behind them.

Since 2017, actions to maintain the dune system have been an integral part of the local management strategy for Capbreton's coastal strip and are formalised in Axis 6.1 based on a flexible management method, i.e. actions to support natural processes in dune habitats. These actions are divided into two areas of action :

- Axis 6.1: implementation of a cooperation agreement between the ONF and the municipalities of Capbreton and Labenne
- Axis 6.2: implementation of actions assisting natural processes

The annual costs are between €20,000 and €30,000 in Capbreton and are 80%-subsidised by the local strategy funding partners.

MONITORING INDICATORS

Adaptation to climate changes

Erosion : A programme of maintenance work enabling the protection and stability of the Capbreton dunes. This work, which includes maintenance of the dunes (thatching and planting) and the path (repairing of enclosures and picket fences), is carried out by the municipality and/or by local residents. Since 2017, this work has been complemented by the planting of Christmas trees by volunteers supervised by the municipal authority and the ONF.

Biodiversity

Biodiversity : Botanical monitoring will be carried out in all sectors as soon as the project is completed. These annual surveys reveal monitoring changes in the richness of the dunes, particularly in the rehabilitated sectors.

Others

Usage and visitor numbers : Data on daily beach use provided by the town's technical services and by a video control station for the Santocha, la Piste and Océanides beaches from 2016 to 2020.

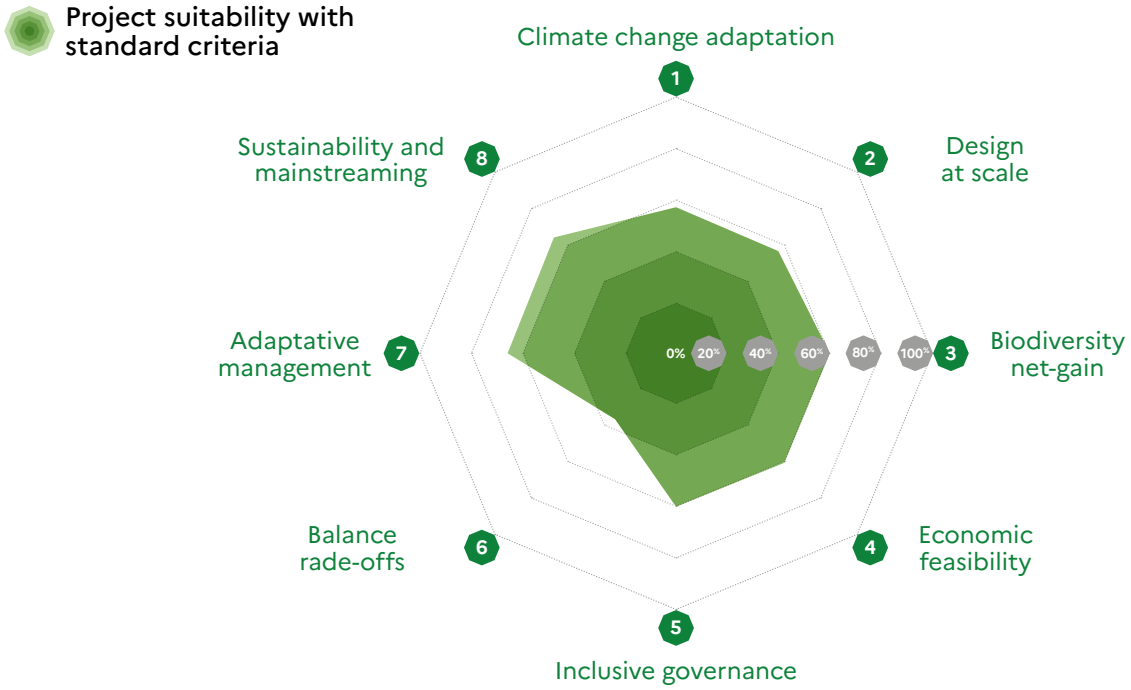
LEVERS FOR SUCCESS

- **Technical expertise :** The ONF is responsible for stabilising and preserving the natural dune areas which was one on the key points of the success of the project.
- **Funding :** The GIP Littoral beach plan scheme and the involvement of financial partners (European Union, State, Region, Department) permitted securing regional fundings.
- **Institutional and political support :** support from GIP Littoral and government agencies throughout the consultation phase (technical committees, steering committees, public meetings).

RECOMMENDATIONS

- **Property :** Take into account the security of land or at least the management of this land, particularly when juxtaposing public plots with private plots as here. Public meetings on the benefits of the project and contact with landowners by the local authority have been organised and authorisation agreements enabling work to be carried out on their plots have been signed.
- **Administrative procedures :** Take into account the time required for administrative procedures (Natura 2000 impacts, water law and public inquiries).
- **Reproducibility :** Flora surveys carried out annually Highlight the results of floristic monitoring which confirm that the seed bank present in the sands can be re-established after a long period of destabilisation. The techniques used can be reproduced on other large-scale restoration sites.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

Project webpage on the Capbreton municipal website :
https://www.capbreton.fr/infos-pratiques/environnement/le-littoral/la-strategie-locale/la-protection-de-la-dune/travaux-de-rehabilitation-du-cordon-dunaire.html

PROJECT LEADER

- **Eric Hamelin**
  Territory Unit Director, Capbreton Municipal Authority,
  dirpolter@capbreton.fr

DATE

Decembre 2023

FACT FILE EDITOR

Marion Poncet
IUCN French Committee
marion.poncet@uicn.fr

www.secondRegard.fr - Coordination : Direction de la communication - Juin 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

UICN | Comité Français

artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

RESTORATION OF UPSTREAM TRIBUTARIES OF THE CLAUGE RIVER

2015 - 2018

Clauge river restauration
© ONF

IDENTITY CARD

GEOGRAPHICAL LOCATION

Franche-Comté - Jura - Forêt de Chaux

NATURAL RISKS TARGETED

- **Drought**
- **Erosion**

HABITAT(S) CONCERNED

Rivers

TYPES OF NBAS

Restoration of ecosystems

PROJECT LEADER AND PARTNERS

Jura ONF

FUNDERS AND BUDGET

- Rhône Mediterranean Corsica Water Agency (80 %)
- ONF (The French National Forest Office) (20 %)

750 000 € exc. VAT

Office National des Forêts

Before
© ONF

PROJECT OBJECTIVES

- **For adaptation to climate changes :** Increasing the resistance of forest stands to the risk of drought.
- **For the local area :** Improving water quality and groundwater levels, reinforcing water availibity.
- **For managing natural risks :** Limiting erosion of the riverbed and banks, by slowing down the flow and replenishing the plateaux (“platières”) with sediments.
- **For biodiversity :** Restoring the river connectivity and its biodiversity.

REGULATORY CONTEXT

- Natura 2000 site ZSC FR4301317 : Forest valleys, rivers, streams, wetlands and temporary habitats in the Chaux forest
- Natura 2000 site ZPS FR4312005 : Chaux forest
- GEMAPI (Management of aquatic habitats and flood prevention), Doubs Valley river contract

CONTEXT AND ISSUES

The Chaux forest, the 2nd largest broadleaf forest massif in France, covers 22,000 ha of state and municipal forests. It flows across an alternation of silty plateaux (known locally as « platières ») and dales that drain into the Clauge and then the Doubs. It is classified as Natura 2000 under the European Birds and Habitats Directives.

Of the 413 km of waterways running through the forest plots, only 88 km are permanent. Major drainage and correction work on these small watercourses was carried out in the 1950s and 1960s to dry out the areas to be reforested and improve farming conditions. 50 years later, the growing awareness of natural habitats and water management in forestry practices, as well as the environmental policy of the National Forests Office (ONF), have led the managing body to reconsider former practices and their subsequent repercussions: lowering of the watertable in the valleys, regressive erosion and increased summer drought with localised oak dieback.

ACTIONS IMPLEMENTED

In May 2015, the ONF signed a partnership agreement with the Rhône Mediterranean Corsica Water Agency and the University of Franche-Comté to carry out restoration works on the upstream tributaries of the Clauge. These restoration works, on around 45 km of streams (three stretches of 15 km each), began in July 2015. They consisted in redirecting the flow into the former natural meanders of the stream. The work continued over the following summers. Three stretches of 15 km have now been completed.

- Complete filling in of drains and ditches in the upstream part of the streams at the edge of the plateaux
- Setting up of obstructions and counter obstructions elsewhere to allow the streams to return to their old bed and/or create a new bed

The length of the streams has been approximately doubled. The project has also improved the taking into consideration of the streams in forestry operations and the search for alternative solutions to conventional service tracks in order to preserve the restored streams and avoid crossing them.

Scientific and technical monitoring to assess the results of the project :

- Scientific monitoring by the University of Franche-Comté : piezometric monitoring (changes in the level of the watertable) and monitoring of aquatic insects;
- Dendrometry and forestry monitoring carried out by the ONF.

GOVERNANCE ADOPTED

Setting up a steering committee which meets twice a year to monitor the methodological, technical and scientific aspects of the work and its impact on flora and fauna.

List of Natura 2000 Steering Committee member organisations:

- ONF Jura
- Mediterranean Corsica Water Agency
- University of Franche-Comté
- Franche-Comté Regional Environment, Planning and Housing Directorate (DREAL)
- Jura Departmental Directorate of Territories (DDT)
- Grand Dole conurbation inter-commune grouping
- The Saône-Doubs Public Territorial River Basin Institution (EPTB)
- Doubs-Loue Syndicat Mixte (grouping of different types of organisations)
- Jura Departmental Wetlands Committee (Jura Hunters' Federation)
- Jura Angling Federation
- French Biodiversity Agency (OFB)
- Franche-Comté Natural Areas Conservancy (CEN)

The French National Forest Office (ONF) and the Syndicat Mixte Doubs Loue are jointly responsible for the general management of this project.

CALENDAR

	PROJECT SCHEDULE
2015 - 2019	Restoration of stretch 1, 2 then 3 : • Filling in ditches and drains with wooden palisades covered with clay materials taken from the site • Logjams of deadwood fascines found on site • Restoration of former meanders with recharging by means of triple banks of aggregates

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

- **Low-water availability :** a two-week extension of the period when water is available in the soil in late spring and autumn. In response, the time when the upper water table is present increases by about a month in both seasons, i.e., two months over the whole hydrological year.
- **Erosion :** the works lifted the riverbed, reducing current speeds and sediment transport.

BENEFITS FOR THE PROTECTION, MANAGEMENT AND RESTORATION OF BIODIVERSITY

- Increase in the number and quality of temporary wetland habitats
- Return of certain s aquatic insects
- Increase in amphibian reproduction
- Effects on the forest stands have not yet been highlighted, due to the long reaction time.

OTHER BENEFITS ACHIEVED

Others benefits achieved : the dune walk that has been created has notably helped to highlight these environments and raise public awareness through educational panels along the route. Today, all the urbanized neighborhoods are connected to the various authorized beach access points. Moreover, although the work carried out represented a significant investment, it helps to limit annual maintenance costs. Today, this maintenance, which costs the community around €10,000 to €20,000 per year, ensures the preservation and stability of 2.5 kilometers of dunes and the protection of the urban areas located just behind.

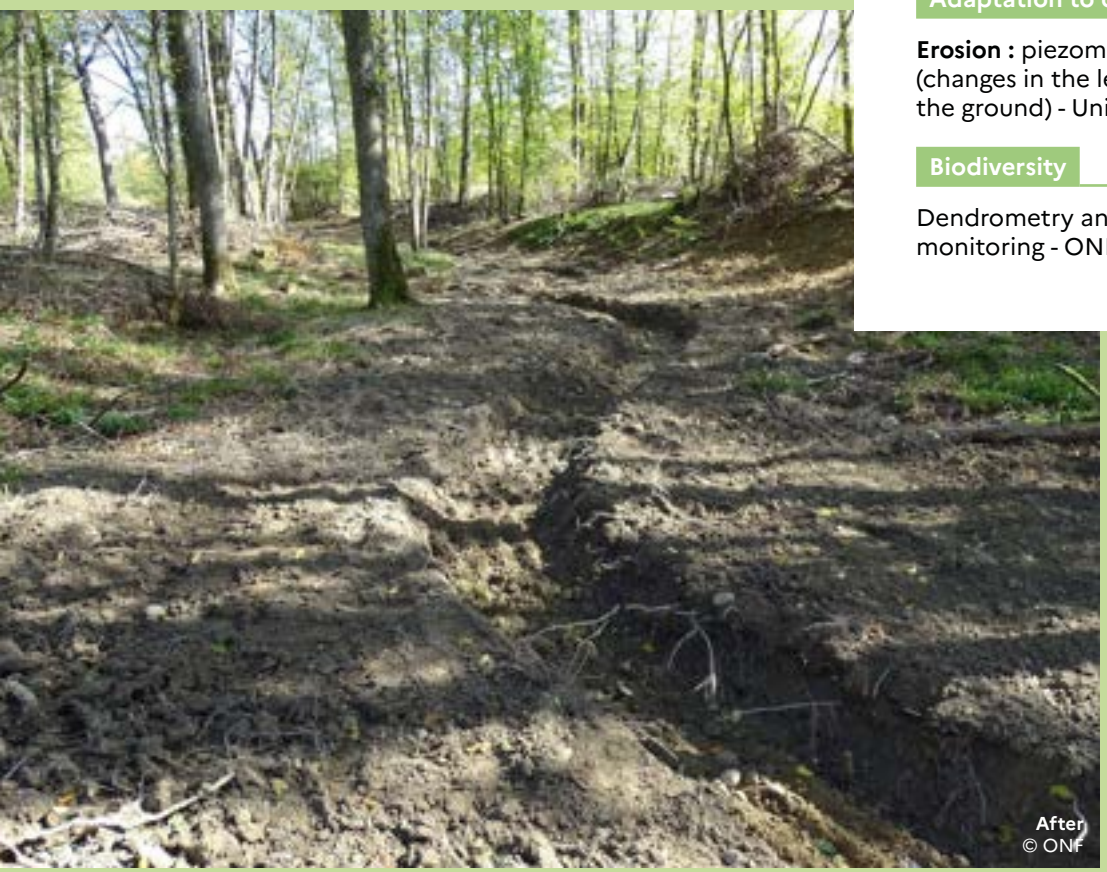
MONITORING INDICATORS

Adaptation to climate changes

Erosion : piezometric monitoring (changes in the level of the watertable in the ground) - University of Franche-Comté

Biodiversity

Dendrometry and forestry monitoring - ONF



After
© ONF

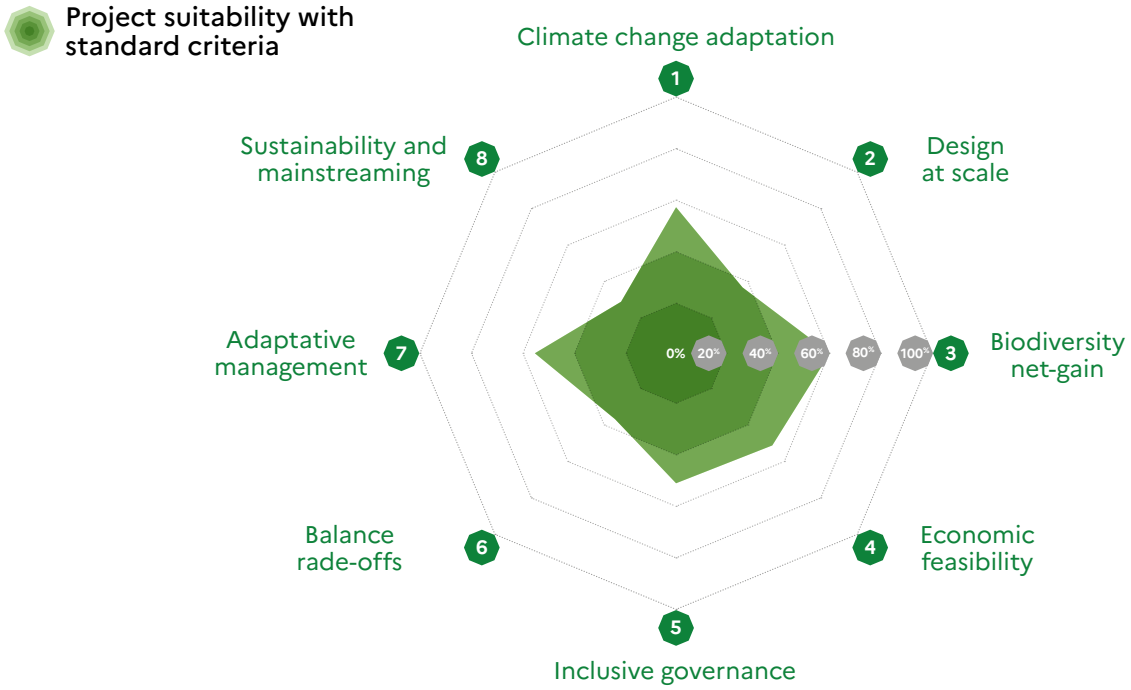
LEVERS FOR SUCCESS

- **Concertation :** the same organisation, the ONF is responsible for both managing the forest and project management for the works, which facilitates exchanges because they between different units of the same agency, particularly concerning the tree-felling. programme and the scheduling of restoration works.

RECOMMENDATIONS

- **Administrative procedures** : Take into account the time required for administrative procedures (Natura 2000 impacts, water law and public inquiries).
- **Technical expertise :** Develop the number of companies experienced in this type of work.
- **Reproducibility :** To expand and develop this project to enable the restoration of the 400 km of watercourses located in the forest massif so as to have a real effect on flooding, drought and erosion, etc.
  - Restoration of the Tanche, a tributary of the Clauge, pre-project study commissioned in 2021
  - Restoration of streams in the Doulonne river basin
  - The Doubs-Loue Syndicat Mixte wishes to pilot all future actions in the Forêt de Chaux catchment area as within the framework of the GEMAPI, which would root the project more firmly in the area

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

Project web page on the ONF website :
https://www.onf.fr/vivre-la-foret/+/39a::restauration-de-cours-deau-en-milieu-forestier.html

PROJECT LEADER

- **Hélène Gervaise**
  Natural Habitats Risk Project Manager – Water
  ONF - The French National Forest Office
  helene.gervais@onf.fr

DATE

Decembre 2023

FACT FILE EDITOR

Marion Poncet
IUCN French Committee
marion.poncet@uicn.fr

www.secondRegard.fr - Coordination : Direction de la communication - Juin 2024

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

UICN | Comité Français

artisan
Le climat change, adaptons-nous avec la nature

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

OFB
OFFICE FRANÇAIS DE LA BIODIVERSITÉ

PLANTING FLOOD CONTROL HEDGES IN THE LÈZE VALLEY

2009 - 2017

Flood control hedge
© SMIVAL

IDENTITY CARD

GEOGRAPHICAL LOCATION

Catchment area - Lèze valley (Ariège,Haute-Garonne)
Occitanie region

NATURAL RISKS TARGETED

- **Erosion, flooding**
- **Mud slides**
- **Water runoff**

ECOSYSTEM CONCERNED

Rivers

TYPES OF NBAS

Restoration and creation of habitats

PROJECT LEADER AND PARTNERS

SMIVAL (Syndicat Mixte Interdépartemental de la Vallée de la Lèze, an inter-departmental grouping of various organisations)

FUNDERS AND BUDGET

3.1M€ for PAPI Lèze (2006-2016), of which 317 k€ for hedges.

State, Occitanie region, Ariège and Haute-Garonne departments, Adour-Garonne Water Agency, European Commission

Vallée de la Lèze 31 09
Syndicat Mixte Interdépartemental
SMIVAL

PROJECT OBJECTIVES

- Reduce the risk of flooding and mudslides
- Reduce the river's energy and erosion potential
- Recreate a traditional heterogeneous landscape
- Increase biodiversity and restore connectivity

Before
© SMIVAL

CONTEXT AND ISSUES

300 km of hedgerows disappeared in 30 years (1980-2008) in the Lèze valley, i.e. a quarter of all hedgerows. As a result, the valley's slopes are exposed to recurrent flooding from mudflows, which reached their peak during the storms of May and June 2007.
To tackle this threat, the SMIVAL, which brings together the valley's 30 communes, implemented a public policy of planting hedgerows, enabling 30 km of hedgerows to be replanted over the period 2009-2017. These flood-control hedges, located at the bottom of the valley or on the slopes, help to intercept runoff and reduce the risk of flooding by delaying the spread of high-water peaks and holding back mudflows in steep plots.

REGULATORY CONTEXT

- GEMAPI (management of aquatic habitats and flood prevention)
- PAPI (flood prevention action programme, 2006-2016)

ACTIONS IMPLEMENTED

Living hedges made up of 3 to 5 rows of native trees, shrubs or bushes suited to the local soil, and to climatic and epidemic conditions. The hedges are planted on the floodplain, perpendicular to the riverbed, and are regularly spaced (every 300 to 500m). The trial site and planting programme were launched in 2009-2010 with the planting of 2 pilot hedges. In all, between 2009 and 2017, around 30km of hedges were planted across the Lèze floodplain and on the hillsides, at a rate of 5km per year.

GOVERNANCE ADOPTED

The implementation of the hedgerow planting project is supervised by a technical committee, co-chaired by the Prefect and the Chairman of SMIVAL.

As the project concerns cultivated areas, SMIVAL has involved the chambers of agriculture in all the steps relating to agricultural issues (consultation phase, definition of the land policy) and in proposing various types of agreements to owners and farmers.

In addition, several methods of involving stakeholders (farmers, local residents) have been used, such as the institutional consultation linked to the development of the Lèze PAPI, public meetings, local consultation workshops, field visits, the production of information, press releases, brochures, etc.

CALENDAR

	PROJECT SCHEDULE
2009 - 2015	Planting of young hedgerows (1 year to promote the development of a strong root system) 5km/year Weather and flood monitoring

Afterwards
© SMIVAL

BENEFITS AND CONTRIBUTIONS OF THE PROJECT

BENEFITS REGARDING TARGETED ADAPTATION ISSUES

2D hydraulic modelling (HERMEL et al., 2010) indicates that covering a floodplain with evenly spaced hedgerows over a 40 km stretch can delay the propagation of the high-water peak by 10% but would have a negligible effect on peak flow. Hydrological modelling of the entire Lèze valley (AGERIN 2006) indicates that transforming a landscape devoid of hedgerows into bocage would reduce peak flood discharge by around 40%.

BENEFITS REGARDING THE PROTECTION, MANAGEMENT AND RESTORATION OF BIODIVERSITY

It is clearly recognised that increasing the length of hedgerows (which are not used for forestry) is beneficial for biodiversity, both fauna and flora. However, no ecological monitoring was carried out during this project.

OTHER BENEFITS ACHIEVED

Educational benefit : a botanical trail has been set up by pupils from a local school. It enables local residents to learn more about the ecosystem in which they live.

MONITORING INDICATORS

Adaptation to climate changes

Feedback on rainfall disasters (meteorological monitoring and monitoring of mud flows and flooding of roads and properties) is collected every year. This tends to demonstrate the local effectiveness of hedges in preventing runoff, erosion and mudflows.

Biodiversity

To be developed

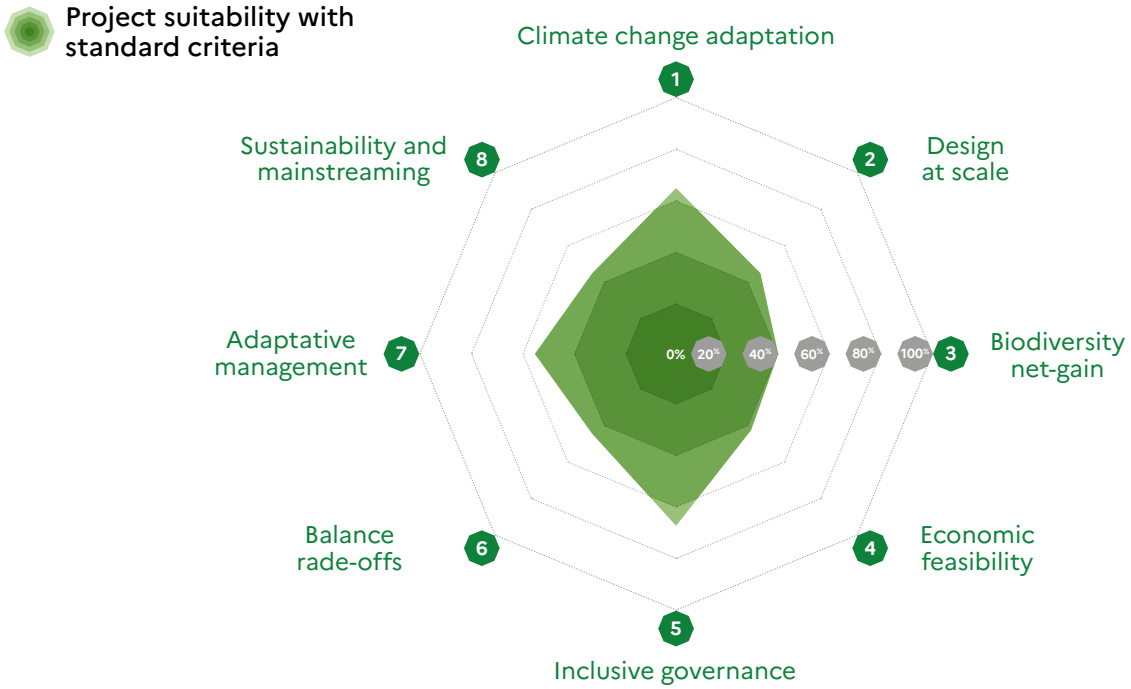
LEVERS FOR SUCCESS

- **Feedback :** The effectiveness of windbreak hedges against risk is a good mediation tool to engage farmers in creating these hedges, which lead to an increase in biodiversity..

RECOMMENDATIONS

- **Operability :** Develop biodiviersity monitoring. Particularly as Criterion 2 of the IUCN standard, which defines a project as a Nature-based Solution, implies measuring the net gain in biodiversity.
- **Reproducibility :** scale up and promote this project to enable the restoration and creation of linear hedgerows in areas where there are none and where flooding is increasingly severe and devastating.

ANALYSIS ACCORDING TO THE IUCN'S GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS



FOR FURTHER INFORMATION

- SMIVAL website (in French) :
  http://www.smival.fr/inondations/les-haies-brise-crue
- Presentation of project
  https://www.cerema.fr/system/files/documents/2018/11/7_Plantation%20de%20haies.pdf
- Feedback on mudslides
  http://www.smival.fr/images/documents/Poster_REX_coulees_de_boue_2009-2016.pdf

PROJECT LEADER

- **Thomas Breinig**
  Director of SMIVAL, Syndicat Mixte Interdépartemental de la Vallée de la Lèze
  t.breinig@smival.fr

DATE

Decembre 2023

RÉDACTRICE DE LA FICHE

Marion Poncet
IUCN
French Committee
marion.poncet@uicn.fr

www.secondRegard.fr - Coordination : Direction de la communication - Juin 2024

OFB OFFICE FRANÇAIS DE LA BIODIVERSITÉ

UICN Comité Français

artisan Le climat change, adaptons-nous avec la nature