Tip sheet no. 3





Pollution of water and living environments

Reducing risks through natural water retention measures









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GLOSSARY

AAC	Water catchment area
ADASEA	Departmental association for the development of farms' structures
ADOPTA	Association for the operational development and promotion of alternative techniques
APCA	Permanent assembly of chambers of agriculture
ARB	Regional agency for biodiversity
AREAS	Association for research on runoff, erosion and land management
BRE	Rural lease with environmental clauses
CEN	Conservatory of natural areas
CEREMA	Centre for studies and expertise on risks, the environment, mobility and planning
CIMS	Multi-service intermediate crops
CIPAN	Intermediate crops that trap nitrate
CNPF	National centre for forest ownership
CRPF	Regional centre for forest ownership
CRTE	Contract for a successful ecological transition
CTE	Territorial water contract
WFD	Water framework directive
DDT(M)	Departmental directorate for territories (and the sea)
DRAAF	Regional directorate for food, agriculture and forestry
DREAL	Regional directorate for the environment, planning and housing
ENS	Sensitive natural area
EPAGE	Public water management and development agency
EPTB	Public territorial basin establishment
EAFRD	European agricultural fund for rural development
FNCOFOR	National federation of forest municipalities
GEMAPI	Management of aquatic environments and flood prevention
GEPU	Urban rainwater management
GIEE	Economic and environmental interest group
GRAIE	Rhône-Alpes research group on infrastructure and water
HAP	Polycyclic aromatic hydrocarbons
INRAE	National research institute for agriculture, food and the environment
IWA	International Water Association
LIFE	European funding for action on the environment and climate
MAEC	Agri-environmental and climate measure
MASA	Ministry of agriculture and food sovereignty
MESR	Ministry of higher education and research
MTEBFMP	Ministry of ecological transition, biodiversity, forestry, sea and fisheries
OFB	French office for biodiversity
IOW	International office for water
ONF	National forestry office
OPUR	Urban pollutants observatory
ORE	Real environmental obligation
CAP	Common agricultural policy
PAEC	Agro-environmental and climate project
PAT	Territorial food project
PLU(i)	Local urban development plan (inter-municipal)
PNR	Regional natural park
PPC	Water catchment protection perimeter
PPRI	Flood risk prevention plan
PSE	Payment for environmental services
PSG	Simple management plan
SAGE	Water development and management plan
SCIC	Cooperative society of collective interest
	· · ·
SCOT	Territorial coherence plan International union for conservation of nature
IUCN	
WSL	Swiss Federal Institute for research on forest, snow and landscape



ZAC	Concerted development zone
ZHTA	Artificial buffer wetland
ZSCE	Area subject to environmental constraints



Combating pollution through natural water retention

What is environmental pollution?

The WFD defines pollution as " means the direct or indirect introduction, as a result of human activity, of substances or heat into the air, water or land which may be harmful to human health or the quality of aquatic ecosystems or terrestrial ecosystems directly depending on aquatic ecosystems, which result in damage to material property, or which impair or interfere with amenities and other legitimate uses of the environment".

Two types of pollution are distinguished: point source pollution, where the source(s) and point(s) of discharge are precisely located, and diffuse pollution, where the sources and points of discharge cannot be located.

Pollutants found in aquatic environments mainly originate from human activities carried out in the catchment area or beyond. They reach aquatic environments through direct or indirect discharge after following various pathways: circulation in the air and atmospheric deposition, collection by sewerage systems, runoff from impermeable or non-impermeable surfaces, infiltration into the soil and subsoil. During this process, they may be transformed, degraded, retained or adsorbed, and sometimes released later, or simply transferred into water and reach aquatic environments: surface water and/or groundwater.

A wide variety of substances are involved: nutrients (or "macropollutants", such as nitrates and phosphates), organic matter, salts, micropollutants (e.g. pesticides, residues from medicines or household products, etc.) and metals (including heavy metals). However, other pollutants must also be considered: microorganisms and parasites, waste ranging from macro-waste to microplastics, suspended matter and hot water discharges. PFAS (per- and polyfluoroalkyl substances), known as "forever chemicals", are also present in water in France and in Europe.

Once in aquatic environments, a variable proportion of these pollutants can be retained, degraded and self-purified by the environment. The remaining proportion is transported downstream of the catchment area, where it can be gradually purified, slowed down and stored in sediments or reach the marine environment.

For more information: <u>Pollutants in aquatic environments - Eaufrance, public information service on water.</u>

Current trends

Pollution can be understood through changes in the quantities or the types of contamination released in the environment.

With regard to the main macropollutants, significant progress has been made since the 1990s in reducing the quantities of suspended matter, organic matter, orthophosphates¹ and ammonium discharged. Nitrate transfers to watercourses are stabilising if we look at the concentrations measured². Significant variations remain depending on the river basins in France.

¹ With regard to orthophosphates, the trend appears to be reversing, as one of the recent water analyses shows an increase in their concentration in certain catchment areas.

² https://www.eaufrance.fr/repere-pollution-des-cours-deau-par-les-nitrates-et-les-phosphates



With regard to micropollutants, heavy metal discharges have also fallen significantly since the 1990s. However, the picture is more mixed for pesticides: despite numerous bans on substances, pollution from pesticides in aquatic environments remains widespread³. Other micropollutants are also detected or quantified in aquatic environments: PAHs, phthalates, alkylphenols, medicines, etc.

The diversity of substances that may be present is difficult to grasp, and the resources devoted to monitoring micropollutants have increased in recent years to gain a better understanding of the situation. New substances are regularly added to the list of substances monitored.

Other types of pollution – particularly microplastics – are emerging, linked in particular to the massive increase in the use of plastics, but trends are not yet known.

In general, research into new pollutants and improvements in detection techniques are regularly updating our knowledge of water pollution in France.

More details: Water and aquatic environments, Key figures, 2020 edition - MTE

How can we prevent environmental pollution and reduce its impact, using natural water retention in the catchment area?

Pollution prevention primarily involves reducing pollutants at source (reducing or eliminating their use, substituting them with other solutions, changing processes, etc.).

Secondly, solutions for collection and treatment before discharge into the environment should be prioritised: on-site pre-treatment aimed at recovering valuable substances or materials (or even zero discharge and circular economy solutions), and wastewater collection and more or less extensive treatment.

However, some pollutant discharges may remain that cannot be treated, in which case self-purification of the environment can help reduce the remaining pollution. In this case, natural water retention measures can contribute to the complementary treatment, at least in part, or to the early retention of these pollutants, as well as to the interruption of their transfer to watercourses⁴: they involve practices that slow down runoff and the sedimentation of particles and organic matter, but also long-term retention that promotes self-purification processes, including phytopurification.

The ten most relevant natural water retention measures for preventing water pollution

The measures proposed in this document are direct modifications to ecosystems or changes and adaptations to practices that increase water retention in a catchment area by improving and restoring the water retention capacities of soils, aquatic ecosystems and aquifers.

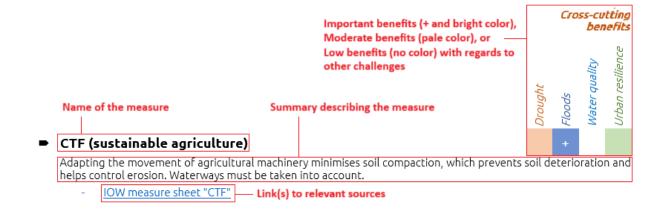
<u>These natural measures are known as multifunctional</u>, as they simultaneously address several societal challenges (flooding, biodiversity preservation, living environment, etc.), while preserving or restoring the ecological functions of aquatic environments.

At least ten natural measures are of particular interest for reducing the risk of pollution in aquatic environments and mitigating its impacts. They are listed in the fact sheets below, according to the following template:

³ Data and statistical studies, 2023. Chemical pollution of watercourses and water bodies in France from 2000 to 2020.

⁴ The consequences for associated terrestrial environments are complex phenomena that are not discussed here.





The measures are classified by type for ease of reading, but they can be implemented in different contexts.

Who are the tip sheets intended for?

The tip sheets are documents aiming at improving the understanding of the concepts of "natural water retention measures" and "nature-based solutions" by those involved in promoting and implementing them in France. They aim to facilitate the implementation of these natural measures by helping potential project owners identify which ones are best suited to their needs and learn about the possible implementation and financing options. They also contain examples of concrete cases that illustrate the benefits of these measures.

These tip sheets will be useful primarily to potential project owners (both decision-makers and technical agents) and, more broadly, to all stakeholders promoting natural water retention measures.



Note: in the following pages, the term "pollutants" will be used generically, but the measures mentioned below may be more or less effective depending on the chemical composition of the products targeted.

Cross-cutting benefits

Most effective measures in an agricultural context



Permanent grasslands

Maintaining or establishing grasslands limits surface runoff and promotes the infiltration and retention of pollutants thanks to dense herbaceous vegetation. These permanent grasslands generally require few inputs, which reduces the pressure of pollutants on the environment.

- Patur'ajuste, technical data sheet Restoring grassland cover "naturally"
- OFB technical portal "Grasslands, a question of balance"

Buffer zones and hedges



The establishment of vegetated areas (herbaceous plants, bushes or trees) along the edges of plots or across drainage channels promotes water infiltration. When well positioned, these elements can also retain suspended matter and filter sediments and pollutants. The effectiveness of these measures depends on their width, the plant species selected and their continuity.

- OFB website "Buffer zones: definition and typology"
- Hedges Network France "Guide of recommendations for sustainable hedge management"

Crop rotation



Varying crops each season on the same plot improves the soil structure and, to a certain extent, limits erosion and increases its infiltration capacity. Effective rotation (in particular, longer rotations and the implementation of rotations that limit bare soil) can help reduce inputs and decrease the risk of runoff.

- Osaé fact sheet "Extending crop rotation and diversifying crop patterns"
- AREAS fact sheet "Field organisation"

Crop associatoion



Adding one or more additional species to a crop to cover soil that would otherwise be partially bare (e.g. between rows) reduces runoff and increases infiltration, allowing for better erosion and sediment control. Pollutant retention is improved.

- Osaé fact sheet "Crop associations"
- Osaé fact sheet "Grassing of vineyards"

Simplified cultivation techniques



These alternative cultivation techniques to ploughing and/or with minimal soil tillage significantly reduce soil erosion for certain types of soil and climate, as well as phosphorus and nitrogen losses.

- Osaé fact sheet on simplified cultivation techniques
- Osaé fact sheet: "Direct sowing under plant cover"

■ Cover crops⁵



⁵ The terminology used to refer to these intermediate crops has evolved over time: formerly known as green manure, nitrogen suppliers, then **CIPAN**, combating soil pollution by nitrates, they are now referred to as **CIMS**.



These cover crops, which are intercropped (planted simultaneously or during the development of the main crop) or intermediate crops (sown between the harvest of one main crop and the planting of the next), reduce runoff and nitrogen leaching outside the plots.

- Gerbeaud fact sheet "Intermediate crops, intercrops and cover crops"

Agroforestry



Agroforestry covers all agricultural practices that combine trees (in all their forms: hedges, rows, groves, etc.) with agricultural and/or livestock farming on the same plot of land.

- Osaé fact sheet: "Reintroducing grazing into perennial grassland crops"
- Agroforestry French Association: "Trees and hedges in Martinique's agricultural systems"

How can these measures be implemented?

Regulatory measures

■ [FR] Water catchment protection areas and environmentally sensitive areas are primarily intended to prevent occasional pollution of water resources.

OFB - Water Catchment Resource Centre Water and Health Report (Ministry of Health and Sports), 2009. Regulatory tools for the protection of water catchments (MTEBFMP).

- **■ [FR] Action programmes in nitrate-vulnerable areas** aim to reduce water pollution from agricultural nitrates and to prevent any new pollution of this type. These areas are defined by decrees issued for each major river basin.
- [FR] The SAGE (water management and development plan) and its regulations may impose conditions relating to the environment or agricultural practices.
 Gest'eau resource centre
- The European Commission's **"Zero Pollution" action plan** aims, among other things, to improve water quality and reduce losses of nutrients, pesticides and microplastics. This plan should soon be translated into regulatory provisions.

Action programmes

■ [FR] PATs (territorial food projects) enable the implementation of actions of this type as part of the transition to sustainable food systems.

France PAT portal

MASA - Support mechanism for the operational phase of PATs

- **[FR]** The **CRTE** (formerly meaning "ecological transition and recovery contracts") are designed to support the creation and/or strengthening of regional projects that are compatible with the needs for regional cohesion and ecological transition, including the development of agroecological practices. A new dynamic (and a name change) was introduced in 2024 to encourage these contracts.

 The CRTE National Agency for Territorial Cohesion
- **■ [FR] The AAC action programmes** are primarily aiming combating diffuse pollution from agriculture. *Water catchment resource centre OFB*
- **[FR] Programmes or operations run by chambers of agriculture** to combat diffuse pollution exist in certain regions (e.g. Agri-Mieux). Programmes may also be run by trade unions or communities of municipalities.
- **■ [FR]** The **Ecophyto II+ plan** and its regional variations define actions aiming at reducing the use of plant protection products.

MASA - What is the Ecophyto plan?

EcophytoPIC, the web portal for integrated crop protection

■ **[FR] Contracts (basin, territorial, thematic)** financed by water agencies enable actions aiming at reducing diffuse pollution and preserving aquatic environments (technical actions, awareness-raising, animations, etc.).



Financial assistance

Several European programmes provide funding for projects that include natural water retention measures: EAFRD funds, the Interreg programme for agriculture, the LIFE programme and the Horizon Europe programme.

Europe in France website: European Structural Investment Funds
The LIFE programme - MTEBFMP
European Interreg website
Horizon Europe - MESR

- **■ [FR] Water agencies** offer aid for measures to combat agricultural pollution.
- **■ [FR] MAECs** enable agricultural stakeholders who implement environmentally friendly measures to be remunerated. Funding comes from the CAP. This requires the presence of a PAEC led by a local operator. *The 2015-2022 MAECs quideMASA*
- [FR] PSEs enable public or private stakeholders to compensate agricultural operators who implement environmentally friendly measures. PSE guides - MASA
- [FR] Hedge Pact: Part of the ecological planning programme and with a budget of €110 million from 2024, this pact provides support for planting, planting assistance and sustainable hedge management.
 ASP Hedge Pact
- Some associations also support agroforestry practices (hedge planting, etc.), such as the French_association Agroforesterie. Some practices can also be a source of economic value, such as hedges (wood chips, fodder supplement, etc.).

Land contractualisation

■ [FR] The **BRE** allows a limited list of practices likely to protect the environment to be included in the management of a site. The lessor or funding provider is a legal entity governed by public law or an association.

The BRE – 10 questions, 10 answers? - Cerema quide (2016)

■ **[FR] The ORE** is a form of protection attached to real estate, established for up to 99 years. The contract can be signed with a public authority, a public institution or a private legal entity acting on behalf of the environment. Water agencies can assist buyers and compensate for practices.

*Discover OREs - Cerema's methodological file**

Agricultural initiatives

- **[FR] GIEEs** are groups of farmers recognised by the State who are committed to a multi-year project to implement agroecological practices. Funding may be available depending on the case.

 Dedicated website APCA
- **Local stakeholders** can build local momentum to support agricultural producers in a given area in adopting natural water retention measures.

 Example of SCIC Terre de sources
- Individual initiatives may also lead to the implementation of measures due to their agronomic benefits.

Potential technical partners

Chambers of Agriculture, government departments responsible for agriculture (DRAAF) and ecology (DDT(M) and DREAL), agricultural advisory associations (e.g. ADASEA), agricultural cooperatives, river basin unions, PNR, CEN, drinking water unions and their delegates, hunting associations, etc.



An example: Restoring hedgerows in the Léguer river basin (22)

The Léguer river basin is one of the most bocage-covered areas in Brittany. However, this area has suffered a decline in its bocage network as a result of agricultural mechanisation and land consolidation operations. Faced with a **deterioration of the water quality** of the Léguer observed in the 1990s, local elected officials became aware of the need to preserve the hedgerows to halt this deterioration and to consider restoring them to improve water quality.



In 1999, the Léguer river basin committee began **raising awareness** among the population living in the river basin, before experimenting with the **restoration of hedges and embankments** in several pilot basins.

This work was then extended to the entire catchment area, leading to the restoration of more than 300 kilometres of hedges and embankments. This action is continuing today and aims in particular to **ensure the long-term survival** of existing hedgerows through urban planning tools and the enhancement of the bocage landscape.

Measure implemented: Buffer zones and hedges

Find out more: project details



Cross-cutting benefits

Most effective measures in aquatic environments

Reminder: "aquatic environment" measures can be implemented in urban, forest and agricultural contexts.

+ Prought + Erosion + Flood + Urban resilienc

Restoration and management of wetlands

Preserving and restoring the hydrological functions of wetlands helps slow runoff, promote infiltration and particle filtration, thereby contributing to natural water purification in the environment.

- Patrinat reference document on "ecological actions that can be implemented in wetlands"

All measures that contribute to restoring the functionalities of aquatic environments promote the natural purification of pollutants found there. However, this approach is not sufficient to eliminate pollution from these environments and must only be used to complement preventive action on pollutant sources and transfer pathways.

Artificial Wetland Buffers (AWBs)

AWBs are areas of the rural landscape similar to wetlands such as ponds. They are man-made and are specifically located, designed, managed and maintained to intercept and mitigate the transfer of contaminants to aquatic environments.

They also aim to promote certain processes that reduce the pollutant load, such as degradation, denitrification, sedimentation and adsorption.

Resources:

- AWB Guide INRAE
- Fact sheet on "Artificial Wetland Buffers" (AWB) Loir-et-Cher government services

Riparian forests

+

Riparian forests act as natural filters: their roots capture pollutants (nitrates, phosphates, pesticides) contained in runoff, and their vegetation traps sediments before they reach the watercourse. It should be noted that due to their relatively narrow width (approximately twice the height of the trees), they have an edge effect rather than a true forest effect.

- OFB website "Preservation and management of riparian forests and semi-aquatic fauna"

How can these measures be implemented?

Regulatory measures

- [FR] Urban planning documents and PPRIs (flood risk prevention plans) help to preserve natural areas such as wetlands.
 Wetlands and urban planning
- **[FR] The SAGE and its regulations** may impose conditions relating to the management of aquatic or wetland environments.

 Wetlands in the SAGE

Financial aid and action programmes

■ [FR] Contracts (territorial, basin, thematic) financed by water agencies enable actions to restore the hydrosystem with financial participation from the agency.



- **[FR]** The **Green Fund, launched in 2023,** includes a focus on "Renaturation of towns and villages", including the restoration of the hydrographic network, wetlands and flood expansion areas. Support documents for the implementation of the Green Fund
- Several European programmes provide funding for projects that include natural water retention measures: EAFRD funds, the Interreg programme for agriculture, the LIFE programme and the Horizon Europe programme.

Europe in France website: European Structural Investment Funds Financing ecological actions in wetlands - IOW The LIFE programme (MTEBFMP) European Interreg website Horizon Europe (MESR)

- **[FR] Water agencies** offer **grants** or **calls for projects** aiming at preserving or restoring aquatic or wetland environments. In the case of AWBs, water agencies and local authorities can finance all or part of the work through a CTE (territorial water contract).
- **[FR] Calls for projects** from departments, regions and public institutions (e.g. OFB) provide opportunities to implement certain natural water retention measures.

 Aides-territoires platform

Local authorities' responsibilities

■ [FR] GEMAPI competence enables competent local authorities to take action to restore the hydrosystem.

Potential technical partners

Public basin establishments (EPTB, EPAGE, basin or river syndicates), OFB, INRAE, nature conservation associations (e.g. CEN), fishing federations and associations, universities and research centres, PNR, decentralised departments of the Ministry of Ecology (DDT(M), DREAL), water syndicates.

An example: the artificial wetlands of Rampillon (77)



In 2010, four artificial buffer wetlands were created in a 355-hectare agricultural catchment area. They were equipped with instruments to monitor their effect on pollutant flows over time. The four wetlands represent 0.2% of the total area of the drained basin.

Analysis indicates an average reduction between inflows and outflows from the wetland of 15% for nitrates and 37% for phytosanitary products.

Measure implemented: Wetland restoration and management

Find out more: <u>special edition of Sciences Waters & Territories</u>, 2021



Most effective measures in an urban context

Cross-cutting benefits

+ Drought Erosion + Flood + Urban resilience

Integrated rainwater management

Integrated rainwater management involves promoting stormwater management as close as possible to the point of precipitation (temporary storage, evapotranspiration or infiltration), thereby allowing it to be transported slowly and intercepting the pollutants and sediments it contains. There are many tools available: green roofs, rainwater harvesting, permeable pavements, vegetated swales, channels and ditches, infiltration wells (or soakaways), infiltration trenches, rain gardens, filter strips, retention basins (wet), retention or storm basins (dry), infiltration basins.

! There is a risk of groundwater contamination if these measures are not implemented correctly. The underlying water table must be at least 1 metre below the bottom of the basins or other structures.

- Astee guide "Sustainable rainwater management solutions"

Trees in towns and wooded parks



Maintaining or planting trees and wooded parks in urban areas can help reduce water pollution by intercepting and retaining elements such as nitrogen and phosphorus.

- ARB Centre Val de Loire toolkit "Let's get green!"
- OFB guide "Rain trees"

How can these measures be implemented?

Regulatory actions

- [FR] Urban planning documents and sanitation plans: inclusion of provisions in the PLU(i) (local urban planning plan), SCOT (territorial coherence plan) and sanitation regulations. Certain provisions can be included in these planning documents to ensure sustainable rainwater management, particularly retention and infiltration, but also to support the greening of urban infrastructure and preserve natural areas.
- **▶ [FR] The SAGE and its regulations** may impose conditions relating to the management of pollution in aquatic environments.
- **[FR] Rainwater zoning** helps prevent the degradation of aquatic environments during rainy weather and identify "areas where measures must be taken to limit soil sealing and ensure the control of rainwater and runoff flow." It is integrated into the PLU(i) (local urban planning document).
- The European Commission's **"Zero Pollution" action plan** includes a target to improve water quality and reduce nutrient, pesticide and microplastic losses. This plan will be translated into regulatory provisions.

Financial aid and action programmes

- **■ [FR]** The **national action plan for rainwater management** aims in particular to reduce the impact of rainwater on water quality.
- **[FR] Calls for projects** from departments, regions and public institutions (e.g. OFB, water agencies) provide opportunities to implement certain natural water retention measures with the aim of reducing pollutants.
 - <u>Aides-territoires platform</u>
- **■ [FR] Water agencies offer assistance** for rainwater management aiming at preventing and controlling pollution.
- **■ [FR]** In 2022, the government launched a €500 million programme to **renature cities**, including measures to promote rainwater retention and infiltration in urban areas. The aid is provided by various organisations. *Urban renaturation: aid programme*



■ **[FR]** The **Green Fund, launched in 2023,** contains a focus on "Renaturation of towns and villages", including the greening of public spaces and soil de-sealing.

Support documents for the implementation of the Green Fund

Local authorities' responsibilities

- **■ [FR]** The **GEPU** competence leads to action to slow down, retain and infiltrate rainwater in towns, promoting pollution control.
- Other local authorities' responsibilities may enable them to implement natural water retention measures that are also beneficial for pollution prevention: urban planning, water and sanitation, environment and heritage, roads, urban development, land use, territorial strategy, water and waste.

Potential technical partners

Urban planning agencies, specialised associations (e.g. ADOPTA, GRAIE), decentralised departments of the Ministry of Ecology (DDT(M), DREAL), Cerema, IOW.

An example: Infiltration basins in Saint Priest (Rhône) – The green ZAC (joint development zone) project



When new business parks were created on an existing site, a **shared infiltration solution** was implemented. It consists of creating shared infiltration basins. The treated water leaving the retention basins is then directed to infiltration areas consisting of a long strip of gravel.

Measure implemented: Integrated rainwater management

Find out more: <u>Graie compendium "Exemplary operations for</u> rainwater management"

See also: <u>Focus on rainwater management in the Thau basin</u>



Cross-cutting benefits

Most effective measures in a forest context



Afforestation

Afforestation reduces runoff and retains heavy metals, organic pollutants and atmospheric nitrogen, and can target any previously unwooded area, in particular:

- Areas upstream of watersheds to promote infiltration and reduce water pollution at the headwaters of the watershed,
- Areas that were previously bare or heavily eroded in basins feeding water catchment areas, slowing down water flow and reducing pollutant concentrations downstream of catchment areas.

! The gain varies depending on many parameters, including the previous land use in the areas to be afforested, the tree species planted, climate change, etc.

- IOW measure sheet "Afforestation"

Continuous cover forestry



This method of forestry management, which does not involve clear-cutting, ensures the presence of a canopy, limits the production and mobilisation of sediments and reduces nitrate leaching.

- Forest MOOC for change "Mixed forestry with continuous cover"

Appropriate log removal



Adopting forest machine operating methods that limit their impact reduces soil sensitivity to erosion and the mobilisation of pollutants caused by the passage of forestry machinery.

- WSL fact sheet "Soil protection when using forestry machinery"
- Syndicat mixte de la Loue fact sheet "Logging techniques in wetlands"

How can these measures be implemented?

Regulatory measures

- **[FR] The SAGE and its regulations** may impose conditions relating to forest management.
- **■ [FR]** Certain provisions may be included in **planning documents such as the PLU(i)** to ensure the preservation of natural heritage features such as woodlands.
- ► **[FR]** Private forest operators who own an area of 25 hectares or more must draw up and have approved a **PSG**, which guarantees sustainable forest management and logging. Private forest owners who own between 10 and 25 hectares may voluntarily have a PSG approved.

Forest management

- The implementation of natural water retention measures in forests can be integrated into the management of **public forests**. Forest operators can adapt their **forest management and harvesting practices**, in particular by drawing up a PSG to set environmental objectives.
- **Individual initiatives** may also lead private owners to implement measures. However, in this case, the consistency of measures across the catchment area is not quaranteed.

Action programmes

- **[FR]** Action programmes in **certain regions** for the forestry and timber industry, including reforestation measures.
- [FR] The Low Carbone label, established by the CNPF, and more generally carbon offset projects, can serve as a lever for afforestation or forest restoration.
 Low Carbon Label MTEBFMP



■ [FR] Natura 2000: if a site belongs to the Natura 2000 network, certain management requirements may apply, some of which may concern the maintenance of forest cover.

Financial assistance

- Calls for projects from departments, regions and public institutions (e.g. regional natural parks, water agencies) provide opportunities to implement certain natural forest water retention measures.
 All aid available on Aides-territoires
- Several European programmes provide funding for projects that include natural forest water retention measures, in particular the EAFRD, LIFE, Interreg and Horizon Europe programmes.
 Europe in France website: European Structural Investment Funds
 The LIFE programme (MTEBFMP)
 Fuscos as Interreg website.

<u>European Interreg website</u> Horizon Europe (MESR)

- **[FR] PSEs** enable public or private stakeholders to compensate agricultural operators who implement environmentally friendly measures. They can apply to natural forest water retention measures. *CNPF website: forests protect your water*
- Aid for afforestation in catchment areas from certain water agencies, departments, regions and local forest funds.
- [FR] Aid under the France Relance plan and in response to climate change, particularly for improving poor wildlife populations or restoring populations of scolytes.
 MASA website: France Relance: renewing French forests
- **[FR]** For private forest owners, the approved PSG provides the guarantee of sustainable management required by the Forest Code, enabling them to benefit from tax exemptions and government aid. *PSG procedures MASA*

Local authority responsibilities

- **■ [FR] Management of public forests**, in partnership with the ONF, which implements the provisions of the forest regime.
- **■ [FR]** The departments' **ENS** competence enables them to take action in forest areas. A portion of the development tax is used to finance these ENS.

Potential technical partners

ONF, CNPF and CRPF, forestry cooperatives, FNCOFOR, forestry experts, PNR, associations, universities, decentralised departments of the Ministry of Agriculture (DRAAF), hunting associations.

An example: Afforestation of water catchment areas in the 34

The Pays de l'Or urban community is home to a large agricultural plain. Despite an initial action programme, the quality of the groundwater has not improved sufficiently. The urban community has decided to carry out **afforestation** of 3.4 hectares and plant 2.2 km of hedges around two catchment areas.

The afforestation was carried out on public land belonging to the urban community or the municipality of Valergues, to avoid taking land away from agricultural use. A three-year monitoring programme for the survival of the forest plants has been included.



Measure implemented: Afforestation

Find out more: Planting trees and hedges to trap nitrates (34) – Banque des territoires



Available resources

- IUCN, 2019. <u>Nature-based solutions for water-related risks</u>

 Contextual information and feedback from France on the implementation of nature-based solutions to reduce water-related risks.
- IOW, 2020. Natural water retention measures: 10 experiences in mainland France
- Seine Normandy Water Agency, 2013. <u>Tools for effective runoff management in urban areas</u>
- OPUR (Urban Pollutants Observatory), 2020. <u>Infiltrating rainwater also means controlling pollutant flows</u>. <u>State of knowledge and technical recommendations for the dissemination of nature-based solutions</u>

The result of a collective effort between researchers and technical operators, this guide provides an overview of current knowledge and recommendations for improving rainwater infiltration practices, with a focus on their benefits for intercepting pollutants.



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Contact

If you have any questions or would like to share your experiences, please contact:

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