



Interreg Care-Peat

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Restoration plan document for the “La Guette” (France)

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1. Scientific context, objectives and expected results

In North-West Europe, most of the peatlands are disturbed locally by human activities. Whatever the activity carried out (extraction, forestry, agriculture), the first step is to drain these wetlands, causing a decrease in the level of the water table. Peatlands naturally function as a carbon sink (C) for the atmosphere. However, the lowering of the water table caused by the drainage leads to increased mineralization of the peat due to the increased availability of oxygen over a greater peat thickness. The ecosystem can then become a source of C for the atmosphere and participate in global warming.

Restoring disturbed peatlands could therefore be an effective means of mitigating the effects of anthropogenic disturbances on the climate. Restoring peatlands contribute to the sustainable storage of C in the soil and thus mitigate climate change. Until now, peatland restoration success was estimated mainly with flora and fauna criteria. The criterion "storage of C" should become more and more important. Little is known on this subject and the transfer of knowledge towards site managers is very poor. Managers are probably less aware of restoration action leading to the recovering of the C storing capacity than actions promoting biodiversity. This is why, through the setting up of 5 pilots in the North-West European region, the CARE-PEAT project aims to highlight good management practices for the restoration of C storage capacity of peatlands.

The La Guette peatland (Neuvy sur Barangeon, 200 km south of Paris) is one of the five European sites on which a pilot would be installed. This site is drained by a ditch located along a road at the outlet of the peatland. This disturbance leads to a drop in the water table level and an increase in the water table fluctuations favourable to the appearance of banal pioneer species (*Molinia caerulea*, *Betula* spp) at the expense of typical peatland species (*Eriophorum angustifolium*, *Rynchospora alba*) including *Sphagnum*, a major producer of peat. Restoration works were carried out as part of a regional project. The results showed, on reduced surfaces, the positive effect of adding *Sphagnum* on C fluxes and vegetation. The objective for this pilot is to increase the scale of the restoration tested in the previous project by stripping peat on the first 5 cm and adding *Sphagnum* in patches in 2 zones of approximately 20 m x 30 m. The stripping of the peat will induce the growth of several plant species of interest. The expected results are an increase in floristic diversity typical of peat and plant species of interest, beyond the quantities present before the management action, as well as an increase in the capacity to store C through a significant increase of the *Sphagnum* percentage cover.

2. Strategy, tasks and calendar

The project's strategy is to set up pilot sites in various countries of North-West Europe, in which innovative actions to restore carbon storage capacity will be implemented. These pilot sites will serve as demonstrators for disturbed peatland site managers. It is expected that the restoration of the C storing capacity of peatlands will be accompanied by an improvement in biodiversity.

On the site of the La Guette peatland, restoration works are envisaged to be done at the beginning of 2020. The stripping of the peat (uprooting of the plants and about 5 cm of peat), followed by an addition of *Sphagnum* in 2 areas of 600 m². The 2 areas chosen will differ by the water level (one area being wetter than the other) to test the *in-situ* effect of the water level on *Sphagnum* growth. Once completed, C fluxes measurements (carbon dioxide and methane) will be conducted to estimate a greenhouse gas (GHG) budget. This budget will be compared to the one measured in a control area to assess whether the restoration action is effective in storing C. Peat cores will also be collected regularly to measure soil C stocks and highlight variations. The variations in stock will be compared to GHG budget.

3. Technical actions

3.1. Experimental stations

The experimental stations will be implemented in 2 zones of the peatland to have 2 different hydrological contexts. In each zone, 2 areas of 600 m² will be delimited: 1 area that will be restored (stripping + *Sphagnum*) and 1 control area zone (Control in Fig.1). In total, 1,200 m² will be restored and 1,200 m² will be used as control (Fig. 1).

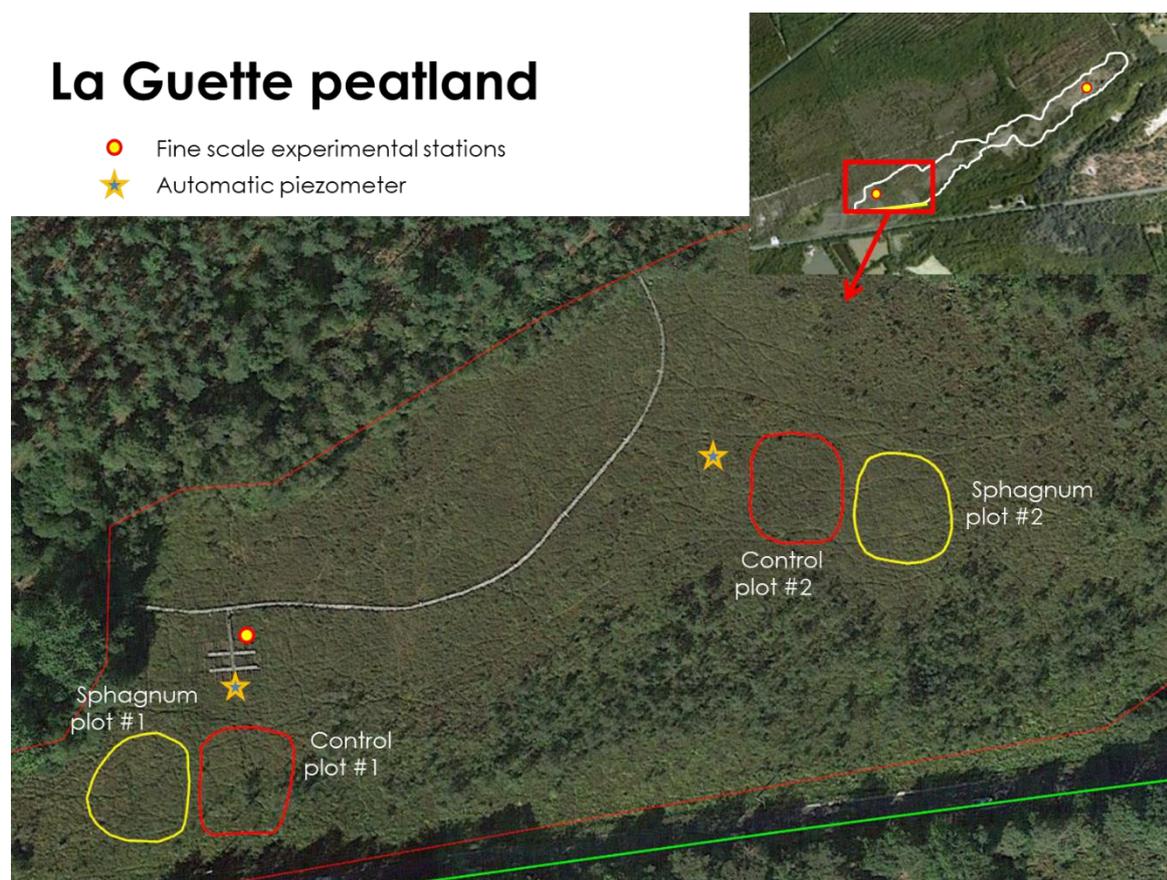


Figure 1. Location of the experimental stations of the CARE-PEAT project (CONTROL corresponds to a control area without restoration action).

The areas will have been previously defined by the UO and CNRS partners.

3.2. Peat stripping, ancillary works and caution to be taken

Step # 1: Prior to the stripping process, a thorough inspection undertaken by the UO and CNRS partners of the project of the areas will be carried out to remove the *Sphagnum* present and to keep them in humid zones close to the drainage ditch. These *Sphagnum* will be clearly identified so that they can then be re-planted in the areas to be restored.

Step # 2: *Molinia caerulea* litter will be torn off and set aside in bags to be used as stabilizing mulch when *Sphagnum* is implanted

Step # 3: The stripping will consist in cutting the aerial vegetation of the plants, the basal part of the *Molinia caerulea* tussocks and removing the peat on about 5 cm to limit the return of *Molinia caerulea* and remove a large fraction of the viable seed stock of this plant. This action will be carried out on 2 x 600 m², ie 1200 m². The extracted material will be spread in the lowest humid areas.

Precaution # 1: A preliminary inventory of the bryophytes in the restored area will be carried out, inducing, if necessary, adjustments of the restored sectors.

Precaution # 2: The work will be done with machines as light as possible to avoid disturbing the soil structure.

Precaution # 3: The agents in charge of the works will have to respect the vegetation around the areas to be stripped, since they could contain protected species.

3.3. Sphagnum addition

Step # 1: Once the stripping of the peat done, a maximum of 240 kg of *Sphagnum* moss (approximately 200 g per m²) will be collected from the entire site, with the help of UO and CNRS partners. *Sphagnum* previously set aside will be integrated into this stock and will not be lost.

Step # 2: The *Sphagnum* collected will be distributed by patches of about 1 m² in the stripped areas. The mass effect of a *Sphagnum* carpet keeps the carpet moist and increases the chances of *Sphagnum* survival. The number of patches will be adjusted according to the quantity of *Sphagnum* collected.

Step # 3: To stabilize and protect *Sphagnum* at the beginning of their implantation, the litter of *Molinia caerulea* set aside will be placed on *Sphagnum*.

Step #4: To avoid too much peat erosion during rainfall and soil temperature increase, *Molinia caerulea* litters taken from the whole site will be spread in the restored area

Step # 5: To give *Sphagnum* a growth support, 5 sticks (e.g. bamboo) will be installed in each patch.

Precaution # 1: The sampling must be extensive and do not destroy pre-existing sphagnum stations. Depending on the development of step # 1, in consultation with the project's UO and CNRS partners, the quantity of *Sphagnum* collected could be readjusted.

3.4. Removable walk-board

Step # 1: To avoid the destruction of the site by repeated trampling in the same places, 20 light and removable wooden walk-boards will have to be built (see example below, Fig. 2).

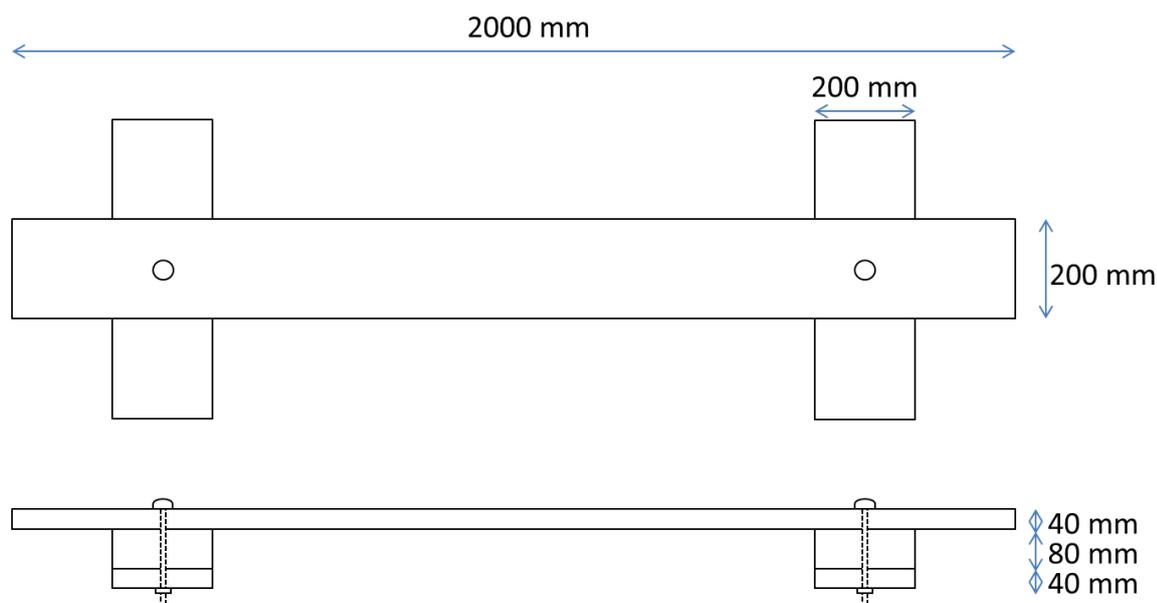


Figure 2. Example of a 2 meters long light removable walk-board. The elements are made in wood joined by a bolt and a screw that goes through all the elements.

4. Potential additional restoration works: re-organisation of the 2014 hydraulic works

In 2014, hydraulic works were performed to try to restore a good hydrological functioning of the site. It consisted in placing dams in the drainage ditch and in creating meanders (total length: 80 m). The objective was to increase the flow path and to decrease the flow speed to reduce the speed at which the water leave the ecosystem. In 2016, a traffic accident damaged most of the hydraulic works. With the help of the road service of the Cher county council, these damages were fixed with temporary material that are still in the field.

Since the beginning, the road service of the county council was skeptical about the effect of the hydraulic works on the quality of the road. They suggested that the more frequent waterlogging induced by the hydraulic restoration induce a decrease of the quality of the road. They had to implement many maintenance operation to keep this road in a good state.

To improve the situation, meetings with the Cher county council were organized. It was suggested that the hydrological restoration should be modified to improve the quality of the road and to make durable the hydrological restoration works. A drain may be rebuilt close to the road. Then an impermeable bank should be built between the drain and the peatland. Finally, within the peatland the hydrological works should be rebuilt all along the bank (total length: 500 m).

The cost of the drain rebuilt would be taken by the county council road service. The cost of the hydrological restoration should be taken the CNRS-UO. At the time of the first discussion with the road service of the Cher county council, CNRS-UO had no money to do that. However, when CNRS received the first quotes to do the restoration works initially scheduled in CARE PEAT (cf part 3), it appeared that available fund maybe available. The first works are due in November 2020. Depending on the final cost of these works, if enough money is available, CNRS-UO may start the administrative procedure to implement the re-organisation of the 2014 hydraulic works.