
Preliminary study for the cleaning out of ditches and plans of water of the Hortillonnages of Amiens

English report



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Introduction

The Hortillonnages of Amiens, vast zone of swamps fitted out by the man for the vegetable farming and the exploitation of the peat, constitute a semi-natural environment of a big wealth and a big variety.

The site presents severe problems of silting up today. To mitigate this deficiency, Amiens Métropole introduced the implementation of a program of cleaning out on all the ditches and the private plans of water. Hydrosphere was held to realize the preliminary study to this project.

The first objective of the study is to draw up a precise inventory of fixtures of the situation, by taking in all the data which can allow to characterize the site, from a global point of view, then in great detail. The diagnosis of the initial state has to allow to draw up a complete cartography of the state of silting up of the network of ditches and to estimate the quality of the environment.

It is then a question, from this inventory of fixtures, of estimating the stakes, the priorities and the constraints of intervention, to elaborate a program of coherent cleaning out including the choice of the sectors of intervention as well as the choice of the techniques of cleaning out and the possible ways for the future of muds.

Finally, as far as this project joins in a complex statutory frame, a legal analysis is imperative. It will concern several points: The obligation of cleaning out of the owners, the legal means at the arrangement of Amiens Métropole to intervene on private grounds and finally authorizations necessary for the realization of the works

I. Object of the study

I.1. Presentation of the site

The Hortillonnages of Amiens result from the transformation of a vast zone of swamp, exploited to extract the peat and to create cultivated zones. The vegetable farming remained, until XXth century, the main employment of marshes used for vegetable farming. The truck farmers, the conscripts "hortillons", maintained areas, rieux, canals and ditches by cleaning out regularly the bottom of the bed. They went back up the mud on their plot of land and stuck it to banks. This maintenance presented several advantages: he allowed the good drainage of waters in rieux, intensification of banks subjected to a strong erosion, and the contribution of fertile ground for the cultures. For some decades, the site knows an important alteration. The descendants of hortillons not taking back the exploitation operation, the areas are gradually left in fallow lands or sold to private individuals to be fitted out in accessible pleasure gardens in boat. This evolution pulled a change in the nature of the occupation of the ground and an abandonment of the maintenance of ditches.

I.2. The problem of the silting up and the stakes in a good maintenance

Various parameters influence directly the sedimentation of particles (debit, direction and stability of the current, the turbulences, the shape and the depth of streams). The sedimentation is particularly favored by a flat topography, by weak debits, by industrial discharges and by phenomenon of erosion. In Hortillonnages, at least three of these parameters are combined : hillsides are very small, the speeds of drainage rather weak and the banks have a net tendency to affect.

The necessity of assuring the good maintenance of ditches answers hydraulic, ecological and patrimonial stakes.

I.3. Evaluation of the state of silting up and related stakes

I.3.1. Material and methods

The objective of the study is to supply to the committee of piloting combined by Amiens Métropole, the elements necessary for the decision-making of the cleaning out of ditches and plans of water deprived of the Marshes used for vegetable farming of Amiens.

Diagnosis of the initial state

The key stage of the preliminary investigations in this type of decision-making is the precise knowledge of the situation. The study thus opens on the diagnosis of the initial state of the site, which divides in two main parts :

- the diagnosis of the degree of silting up of the site

The diagnosis of the degree of silting up is introduced by a bathymetric campaign, aiming at to collect the measures of heights of water and sediments on all the ditches and the plans of water of Marshes used for vegetable farming. This phase has to succeed on the elaboration of a complete cartography of the site according to the degree of silting up, realized under Mapinfo.

- The diagnosis of the quality of the environment and the related stakes

A precise knowledge of the quality of the environment and the stakes in cause is fundamental to estimate the potential impacts of the operations of cleaning out. For that purpose, various analyses are made:

- 25 analyses of sediments concerning three series of parameters: the organic constituents(components), the major ions and the heavy metals.

- 20 analyses of water, including 5 complete analyses and 15 summary analyses.

- 1 hydrobiological analysis according to the protocol of the Global Biological Normalized Indication (IBGN)

- evaluation of the ecological and landscaped sensibilities divided in several parts(parties):

- aquatic Vegetation: the sensitive, rare or threatened sorts are listed. Their distribution is mapped.

- Fauna and Flora (aquatic vegetation excludes) - Natura2000: the study concerning the fauna and the sensitive flora of the site, as well as the distribution of environments concerned by the document of objectives Natura2000 is made by ECOSPHERE.

- Landscape: The landscaped analysis of the site as well the evaluation of the potential impacts of the operations of cleaning out is realized by the Cabinet GREUZAT.

I.3.2. Evaluation of the degree of silting up

The network was completely canvassed, and the ditches of origin are not any more all in water. A typology was established to distinguish the dry ditches (filled or banked up), the wet ditches (in the course of comblement) and ditches in water according to their height of water. The established cartography translates well the critical situation in which are at present Hortillonnages. 23,3 % of ditches were already filled or banked up and numerous ditches are in process of comblement: 5,9 % are "wet" and 13,8 % present a height of lower water in 30cm. Without intervention, the site will continue to degrade.

Concerning plans of water, the situation is very variable. Some are regularly very well maintained and cleaned out, the others are in process of comblement. We observe mostly zones of preferential silting up in notches, around islands or in the entrance of important currents stemming from Avre, from the Somme or from the public "rieux".

I.3.3. Evaluation of the quality of the environment

Quality of sediments

Analyses showed some problems of pollution by heavy metals. Several stations present contents in heavy metals superior to the standard "ground" of the order of January 8th, 1998. It is mainly the lead which raises problem, notably near the discharges of pluvial water.

Quality of the water

Analyses are interpreted according to the classes of general quality defined in the System of Evaluation of the Quality of the Water (SEQ water) finalized by Agencies of the Water in 1998. The obtained results translate a good general quality of waters of the Hortillonnages. But it is necessary to underline that these analyses were made during dry period. The sources of pollution stemming from discharges of streaming water were thus subtracted. It is thus strongly possible that the quality of the water is degraded during the rainy episodes.

Hydrobiological quality

Hydrobiological analyze was made August 17th, 2005 on a ditch of 2m of wide presenting various representative characteristics of ditches deprived of Hortillonnages. The estimated station presents an invertebrates population diversified enough with 32 species. Polycentropodidae is harvested invertebrates most sensitive to pollution and constitute the group indicator of this station (GI 4).

These qualitative criteria raise the note IBGN in 12/20 and testify of a "passable" hydrobiological quality.

Ecological and landscaped sensibility

- fish sensibility

Certain ditches, rich in aquatic herbariums, constitute important zones of reproduction. The most sensitive ditches towards this stake were tracked down on the ground. 19 species of fishes were listed in Hortillonnages in 1977. Since, no complete inventory was made.

- Sensitive aquatic vegetation

The cleaning out having a direct impact on the hydrophytic vegetation, this one was the object of a precise statement on the ground. The present sorts in every ditch and in every stretch of water were identified. The rarest are *Ranunculus circinatus*, *Hydrocharis morsusranae*, *Najas marina*, *Potamogeton natans* and *Azolla fimiculoides*.

*- The problem posed by *Ludwigia grandiflora**

Ludwigia grandiflora is classified among the most intrusive plants of the French aquatic circles. And develops in the stagnant wet circles or in weak current and brightened up: ponds, swamps, streams, canals and wet meadows. From an ecological point of view, *Ludwigia grandiflora* enters competition with the local flora pulling a loss of variety of flora. The human activities are too affected by the proliferation of this plant. *Ludwigia grandiflora* was tracked down in several ditches and plans of water, exclusively in the part the West of Marshes used for vegetable farming, in right bank of the Somme. Its presence must be taken into account for the interventions of cleaning out, because *Ludwigia grandiflora* must be eliminated with precautions.

II. Definition of the program of cleaning out

II.1. hierarchical organization of the priorities of intervention

To determine sectors to clean out first and foremost, several objectives to achieve were defined and organized into a hierarchy:

1-Objective "hydraulics": restore a good drainage of waters within Marshes used for vegetable farming, notably to reduce the impacts of possible floods.

2-Objective "manners": allow the traffic in boat in ditches and plans of water.

3-Objective "ecological": protect and maintain a rich and original ecosystem in good condition.

4-Objective "heritage": Preserve the integrity of the site of Hortillonnages to protect its picturesque character.

To answer all or any of these objectives, several scenarios of intervention are proposed.

II.2. Definition of three scenarios of intervention

Scenario 1: Protect the functional existing network.

Ditches: this first scenario answers the need of a minimal intervention of cleaning out of certain ditches deprived to protect the functional. The objective is to restore a height of water of 80cm in all the ditches the height of water of which is included between 30 and 50cm of water (narrow ditches and impasses excluded)

Plans of water: the objective is to restore a height of water of 1m in the plans of water which play a real role of pond of settling, allowing an important discharge in sediments of waters which penetrate into the site of Hortillonnages.

The volume of sediments to be extracted for this scenario is of 6537m³ for ditches and of 18338m³ for plans of water.

Scenario 2: Protect the existing functional network and restore the potential features.

Ditches: this scenario aims at maintaining in state the functional network of Marshes used for vegetable farming and at restoring the network of ditches in the course of comblement, to find a

bigger feature for the traffic of waters and boats. The objective is to restore a height of 80 cm water in all the ditches the height of water of which is lower in 50cm (ditches impasses exread).

Plans of water: the objective is to restore a height of water of 1m in the silted up zones which hamper the traffic of the users, notably around islands.

The volume of sediments to be extracted for this scenario is of 10058m³ for ditches and of 30693m³ for plans of water.

Scenario 3: Protect and restore the whole typical meshing of Hortillonnages.

Ditches: it is advisable in this scenario to maintain the integrity of the site, its historic value and its picturesque character, by occurring on all the ditches of Hortillonnages, to avoid the abandonment of certain sectors. The objective is to restore a height of 80 cm water in all the ditches the height of water of which is lower in 50cm and in the wet ditches.

Plans of water : the objective is to restore a height of minimal water of 1m on all the plans of water. The volume of sediments to be extracted for this scenario is of 16598m³ for ditches and of 46172m³ for plans of water.

II.3. Choice of a mode of cleaning out

In view of the constraints of access to ditches, the technique the most adapted for an intervention in Hortillonnages is the shovel on pontoon. However, in certain too narrow ditches, he can be used a mechanic shovel since the bank. The cost of an operation of cleaning out by the one or other one of these techniques is 8 euro / m³ (*cost practised by the association of protection of the Hortillonnages of Amiens*).

II.4. The future of muds

In the site of Hortillonnages, the traditionally used practice is that of the deposit on bank. Formerly, the truck farmers assured themselves the cleaning out of ditches, went back up the mud extracted on their lands and stuck it to banks. The deposit on bank is obviously the simplest and the least expensive technique for the future of muds, but within the framework of a large-scale operation led by the community, the consideration of the quality criteria of sediments is indispensable. Now several stations showed contents in metals superior to the standard "ground" of the order of January 8th, 1998, what can raise problem for the deposit of muds on the bank. Additional analyses must be

made to define more précisément the polluted zones. On these zones, muds can be mixed with not polluted sediments, or will be exported to be depositing. If the costs are very important, the operation of cleaning out will not be made.

II.5. Potential Impacts

During an operation of cleaning out, sediments undergo numerous transformations (conversions) which can modify their characteristics and their behavior. This type of intervention can have a direct impact on the environment by the delivery in suspension of these sediments, or the loss, the change or the modification of aquatic environments.

II.5.1. Landscaped impact.

During the realization of the works, the landscape will temporarily be modified. The presence of the machines of construction site will bring an evident visual nuisance. After the works, the presence of the merlon of muds of cleaning out along banks is, in theory, the only witness of the progress of the works.

II.5.2. Impacts on banks

Generally speaking the cleaning out of a ditch or stretch of water implies an impact in foot of bank. It is important not to clean out excessively in foot of bank, not to destabilize this one. In the case of a cleaning out by mechanic shovel since the bank, the impacts can be important because of the passage of machines. The deposit of muds on banks can also have negative effects (flora losses, contribution of nitrogen, phytotoxicity) .

II.5.3. Impacts on the aquatic environment

The dredging reshapes sediments and modifies the geochemical balances. The remobilisation of contaminants, during the operations of dredging, can damage the physico-chemical quality of the water and thus the ecosystem. Even if the impact of a dredging can seem local and temporary, the risks of eutrophication due to an excessive turbidity and the presence of hydraulic conditions. Unfavourable can spread its effects indeed beyond the concerned zone.

III. Statutory frame

III.1. The obligation of maintenance and cleaning out of the private owners.

The notions of " nature and property of streams " and of " responsibility of cleaning out " are clearly defined in the rule. The code of the environment clarifies that " the beds of the not state-owned streams belongs to the owners of both banks " (art. L215-2) and that " the waterside owner is held a regular cleaning out to restore the stream in his natural width and his depth " (art. L215-14).

III.2. Legitimacy of the execution of the works by Amiens Métropole: Declaration of General interest.

According to the article L151-36 of the Rural Code, the departments, the municipalities as well as their groupings and the mixed trade syndicates can prescribe or execute the works of cleaning out when their character of general or emergency interest is recognized. With a Declaration of general interest, Amiens Métropole can thus substitute itself for the owners deprived for the execution of the works.

III.3. The necessary authorizations

III.3.1. The authorization in conformance with the law on the water.

The Law on the water n°92.3 of January 3rd, 1992 established a regime of Authorization or Declaration to which may be subjected the installations, the operations, the works or the activities having an impact on the water (superficial, subterranean) or the aquatic circles. According to decree 93-743 of March 29th, 1993 concerning the wordlist of the operations subjected to authorization or to declaration in application of the article 10 of the law on the water of January 3rd, 1992, the project recovers from the column 2.6.0.

III.3.2. The notice of the local Commission of sites and landscapes.

The site of the Marshes used for vegetable farming of Amiens is, partially, registered on the national inventory of sites in conformance with the law of May 2nd, 1930 on the Natural Monuments and Sites. Consequently, to obtain the authorization to make the foreseen works of cleaning out, the notice of the Local Commission of Sites and Landscapes is required.

Conclusion

The study confided by Amiens Métropole to the company Hydrosphere had to allow to draw up an inventory of fixtures of the site of Hortillonnages to elaborate a program of cleaning out of ditches and private plans of water.

The phase of initial diagnosis allowed to put in evidence the critical situation of Marshes used for vegetable farming towards the silting up. This phenomenon constitutes a real problem which threatens the integrity of the site and the current manners. The cleaning out of the plans of water and the network of ditches turns out indispensable to protect the wealth of the site and the variety of its landscapes.

From the gathered data, three scenarios of intervention were elaborated, based on a hierarchical organization of the priorities (hydraulics, manners then holdings) and taking into account constraints (block, Jussie) and stakes in the site (sensitive aquatic vegetation, bum around of frayères). It is suggested intervening with a mechanic shovel on pontoon, or on bank for the most narrow ditches. The way retained for the future of the mud is the deposit on banks, but this solution cannot be applied in the sectors where the quality of sediments does not answer the standard "ground" of the order of January 8th, 1998. The polluted zones will be to define more exactly by additional analyses. These various solutions will be presented to the committee of piloting combined by Amiens Métropole, in October 2005.

Finally, the implementation of this program of cleaning out joins in a binding legal fram. Amiens Métropole will have to obtain a declaration of general interest to intervene on private grounds and authorization in conformance with the law on the water to be able to make the works of cleaning out. The political frame of the implementation of this program also risks to turn out complex. Indeed, numerous conflicts of interest risk to appear between the owners.

Besides, the major question which it remains to resolve is that of the modalities of maintenance of ditches cleaned out in the years to come. We can notably bend over the possibilities to widen the skills of the Property owners' syndicate of the Canals of Marshes used for vegetable farming.