

THE MONT IN ITS NATURAL SETTING



© P. Dontot

Restoring Mont St-Michel to its marine setting means reclaiming the wonderful scenery around the rock that has now deteriorated. For more than a century, due to the effects of polderization and tourism, the Mont approaches have gradually become spoilt. By removing the more deleterious constructions (seafront parking area, causeway, floating sluice-gates on the old dam), by turning the power of the water itself to good use, the operation will bring sustainable recovery to the priceless environment that gives its meaning to the monument.

In a few years from now, Mont St-Michel will have fully recovered the marine atmosphere it has lost, in a world of sands and waters blending together. This reclamation will have significant effects on the environment.

The rock will recover its bare beaches, covered and uncovered by the tides. The areas currently used for parking and the causeway will be returned to the natural environment, and the scenery at the site will be restored to its former glory.

This great project is first and foremost designed on the scale of Mont St-Michel and the bay, taking into account the specifics of this environment.

The modifications will have effects purposely limited to the scale of the Mont approaches (5 km²), with no change either to the great natural balances of the bay opening out into the English Channel (500 km²) or to the traditional activities of stock-farming, shellfisheries, shrimping, and bay crossing. Natural silting and erosion phenomena by the rivers in the outer bay will continue to evolve on the geological timescale.

In a flat bay in which only the verticality of the abbey should be standing out, the notion of horizontal scale is crucial. The pedestrian bridge and the dam form taut lines that are imperceptible amid the broader landscape. The project's strength also lies in not leaving its stamp on the future of the site in order to restore the desired landscape.

The notion of time is important too. It will take a number of years of repeated flushings before the marine setting is restored on a lasting basis: twenty years of studies and work to undo over a century of accelerated silting. The Mont approaches will then hold onto their marine appearance for a long time to come...

THE MONT IN ITS NATURAL SETTING

ENVIRONMENT AND LANDSCAPE, THE MONITORING PROGRAMME

Mont St-Michel, a masterpiece of the human heritage, is set in a no less outstanding natural environment, lying midway between land and sea, between freshwater and seawater, and the bay is home to a wide variety of precious ecosystems. This remarkable feature is consecrated by numerous listings and protections at national and international level, with two listings as a UNESCO world heritage site, an internationally important wetlands area (Ramsar Convention), a natura 2000 site (habitats and birds directives), listed sites, areas of national interest for their fauna and flora...



© P. Dontot

From the design stage on, the project was based on an environmental quality approach conducted in the period 1997-2002, notably including an inventory of the bay landscapes and the wealth of the fauna and flora in the zone covered by the project, and also an understanding of hydrosedimentary phenomena. Above and beyond regulations issues, the impact survey of 2002 helped to make the project more environmentally friendly. In 2003, government authorizations set out a huge environmental monitoring programme to monitor how the site evolves and to optimize management of the works.

Today the environment remains a central concern as the operation goes ahead; this long-term monitoring programme is following it step by step in order to preserve the richness of the site.

It is now underway.



© Copramex

THE MONT IN ITS NATURAL SETTING



© D. Fondimare

IN MOIDREY COVE...

Moidrey Cove, a former filled-in bend in the Couesnon, now a wetland meadow, in 2014 will have a network of channels running through it, to make it a reservoir for flushing operations.

PARSLEY FROGS

The cove shelters one of the main natural habitats in the Manche department of the parsley frog (*Pelodytes punctatus*), a protected amphibian that breeds in the natural wet depressions of the meadowland.

In advance of the digging of the water reservoir, compensatory measures were set in place back in 2005 by the Syndicat Mixte, in the shape of pools and shelters made in the western part of the site, to encourage the colony to move over before the water works got underway.



DAY AND NIGHT CHASING AFTER PARSLEY FROGS

A followup took place in 2006 and 2007 to assess how effective the compensatory measures in Moidrey Cove had been over the two breeding seasons, extending from February to April. A research agency was posted day and night to observe potential breeding grounds in the cove in order to locate and count singing males and layings. The results show massive use of the new amenities, with a substantial increase in the number of eggs laid in Moidrey Cove: 53 layings in 2002 and 305 in 2007, 82% of which were in the new habitats. The population had moved away from the works area, thereby confirming the pioneering nature of the species.



© Althis

These results are to be complemented with monitoring over several more breeding seasons once the "criches" connections are made from Moidrey Cove to the Couesnon.

Alongside the monitoring of the Moidrey Cove parsley frog population, the hydraulic system for the temporary pools is also being monitored over a five-year period, in order to ensure that the modifications comply with the desired ecological, hydraulic and morphological specifications.

The parsley frog has also been observed on the edge of the forthcoming parking area. Its presence was taken into account back at the landscaping design stage, with the creation of wet meadowland areas inundated in winter and spring, and the maintenance of vegetation compatible with its ongoing upkeep.

The colonization of the watermeadows and ditches by the parsley frog will also come under study as soon as the works are completed.

OTHER POPULATIONS OF MOIDREY COVE

Lined with tidal channels, Moidrey Cove will be seeing a diversity of environments developing which offer very special conditions to take care of the fauna. There will be monitoring of numbers of amphibians using the cove, and also of reptiles and land invertebrates (insects, spiders, molluscs...) once the modifications have been completed.



Tree frog

THE MONT IN ITS NATURAL SETTING

FROM THE COUESNON TO THE BAY...



© Onema

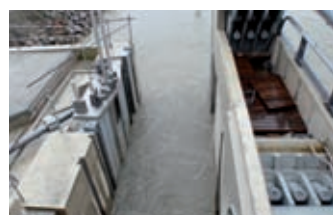


FISH

With the first flushings from the dam in mid-2009, an ichthyological survey over several years was launched. The aim is to define the project's impact on sedentary and migratory fish populations in the Couesnon, with respect to the new river water management scheme. One part of this survey deals specifically with how Atlantic salmon are passing the dam (Habitats directive).



© Fish Pass



The fish locks at the dam

The old La Caserne dam now demolished (1969) operated with floating gates. As they were closed to prevent the incoming tide moving upriver, this also hindered the migration of young European eels, the eelers letting themselves drift along with the tidal currents so as to have part of their development take place in river water.

The new dam and its hydraulic operation have modified the way fish can move upriver from the sea. To help declining populations of migratory species and eels to pass upstream, the new construction has two fish locks, one at either end.

SCIENTIFIC FISHING AT THE DAM



Between 2004 and 2007, from December till May, a research agency carried out some forty samplings in order to quantify and qualify fish swimming upriver, and to describe the conditions for passing the old dam in terms of tidal cycle, temperature, turbidity, luminosity, salinity...

This monitoring is being continued on the new dam in a very different hydraulic context. This will enable finetuning of sluice management (opening times and durations) with a view to making it easier for migratory species to pass.

THE MONT IN ITS NATURAL SETTING

IN THE BAY...

BENTHIC FAUNA (ORGANISMS LIVING ON THE SEABED)

Monitoring of benthic populations (filtering bivalves, small crustaceans, worms...) began in the autumn of 2009. The idea is to study their development in space and time in the vicinity of the Mont (distribution, biomass, density, diversity...) then, starting in 2014, in the channels created in Moidrey Cove. As these organisms are dependent on the beds on which they grow, the results of this monitoring will be correlated with the sedimentological and hydrosedimentary data obtained by other means.



© Copramex

Amphipod crustaceans

© Audrey Hemon



Brent geese



Dunlin

BIRDS

A number of species concerned by the birds (natura 2000) directive are regular visitors to the area impacted by the project: Limicolae, ducks, geese, sea birds...

Launched in 2010, this monitoring is to focus on how this space is used by the various bird populations in the vicinity of the Mont as the works and sedimentological or

topographical changes evolve over time. The digging of a pool of water in Moidrey Cove ought to have a positive impact on bird life by encouraging water birds to settle, as the cove is located on a major flight corridor along the Couesnon. Part of the monitoring will focus more particularly on this issue.

SEALS

In the bay, two species are covered by the Habitats (natura 2000) directive: the harbour seal, which breeds there each year, and the grey seal, which passes through. Altogether, there is a colony of around forty animals, mostly harbour seals. These species use resting places on land in the bay (sand banks), some of which (those furthest to the east) are close to the project's footprint.

As of 2010, the survey will be monitoring the topographical evolution of these resting places and their utilization. Special attention will be paid to the impact of the works and the constructions.



Harbour seal



Grey seal

© Audrey Hemon

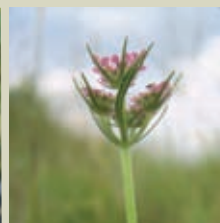
TRANSFER OF PLANTS



Crested dogtail



Scabiosa maritima



Tordylium maximum



Narrow-leafed clover

The project includes demolition of the 1879 causeway. However, some thermophile* plant life has settled on this dyke which is quite original for the area, one such being a variety of crested dogtail (Crételle hérissée), a grass that is protected in Lower Normandy and observed here since 2004.

Early in 2008, to preserve this plant life heritage, the Syndicat Mixte launched a scheme to transfer this species and three other rare plants (narrow-leafed clover, Tordylium maximum and Scabiosa maritima) to favourable sites nearby. This transfer will be backed up with the sowing of seeds gathered on the causeway by the National Botanical Conservatory of Brest.

* A plant growing in hot sunny spots.

THE MONT IN ITS NATURAL SETTING

WATER QUALITY

Monitoring of water quality in the Couesnon is a key feature of the environmental and hydrosedimentary monitoring programme. Indeed, there are multiple interactions, whether it be with the sedimentary processes or with the fauna directly dependent on this aquatic environment: benthic populations, fish, bird life, seals... As part of the regulations and byelaws, several parameters are monitored:

Effects of the building and operation of the construction works on the quality of water in the Couesnon, variations in salinity and turbidity upstream from the dam with the seawater inlets, collection and pretreatment of run-off water from the upcoming parking area, the end of vehicles and the associated pollution on the causeway...

© Thomas Jouanneau



© Hydroconcept

STRICT MONITORING OF VARIATIONS

Since January 2008, the physical and chemical quality of water in the Couesnon has been monitored by taking sets of samples at 8 measuring points between upstream of Moidrey Cove and Mont St-Michel. These measurements involve certain physical and chemical parameters such as water temperature, salinity, turbidity, pH value, phosphates, nitrates, hydrocarbons and pesticides.

NO POLLUTION OBSERVED DURING CONSTRUCTION OF THE DAM

The first year of monitoring (2008) enabled the initial status of quality of water in the Couesnon to be established (prior to commissioning the dam) and the impact of the construction work to be monitored. No pollution relating to work on the dam was detected in the river (hydrocarbons...). The variations in turbidity were also closely studied, with regard to issues for fish (heritage migratory species such as eels and salmon).

MONITORING OF NOISE LEVELS

Monitoring of the effects of the building works on the environment include sound emissions, with thresholds to be observed. If necessary, noise abatement measures will be taken in order to ensure peace and quiet in the vicinity of the works. Also, the impact survey has laid down noise level targets, notably with an expected improvement on the site in connection with the new traffic arrangements in the La Caserne sector (hotels, restaurants...) and the Mont St-Michel access road.

LIMITING NOISE POLLUTION FROM MACHINERY



© Orfea acoustique

Noise level measurement campaigns are organized in line with the works schedule in order to target sensitive periods of activity. Measurements taken around the dam works and inquiries among the local population have shown the noise impact to have been fairly limited. However, when the old dam was demolished late in 2008, contractors were asked to take steps to limit the disturbances in terms of working hours, operation of machinery etc.