After-LIFE Conservation Plan

Holmegaard Mose

LIFE08 NAT/DK/000466

After-LIFE Conservation Plan

31/03/2014

LIFE Holmegaard Mose

Project location	Denmark, South Zealand
Project start date:	01/01/2010
Project end date:	31/12/2013
Total budget	891.706 €
EC contribution:	445.853 €
(%) of eligible costs	50%

Data Beneficiary

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1. List of contents

Figure 1 – The fate of the raised bog Holmegaard Mose has for 200 years been linked with Holmegaard Glasworks, the chimney of which is seen in the background.

2. Project history and situation analysis

Like every other Danish raised bog Holmegaard Mose was exploited for many years, mainly for fuel purposes. When restoration became an issue some 40 years ago no place in the bog could be considered undisturbed. However, a minor part of the western bog was less excavated than the rest, and in 1990 Storstrøm County started restoration activities here.

Storstrøm County was responsible for management of the bog according to a Special Conservation Order that was registered in 1987. However, the provisions of the Conservation order did not allow altering of the water regime, which soon was recognized as a major prerequsite for profound restoration.

The Danish Society for Nature Conservation (DSNC) initiated a comprehensive analysis of the physical and biological conditions of the bog, that was reported in 2003 with an addition in 2004. The latter, named "Scenario 3.1", was chosen as the most suitable base for a restoration of the bog that also included the water regime. And a few years later, in 2009, Scenario 3.1 was converted into an obligation for the management authority as to fulfill the by then revised Conservation Order. It was expressed, that realization of Scenario 3.1. likewise was a necessary effort in order to implement the first generation of the Natura 2000 plan for this specific area being protected according to the EU Habitats Directive (figure 2).

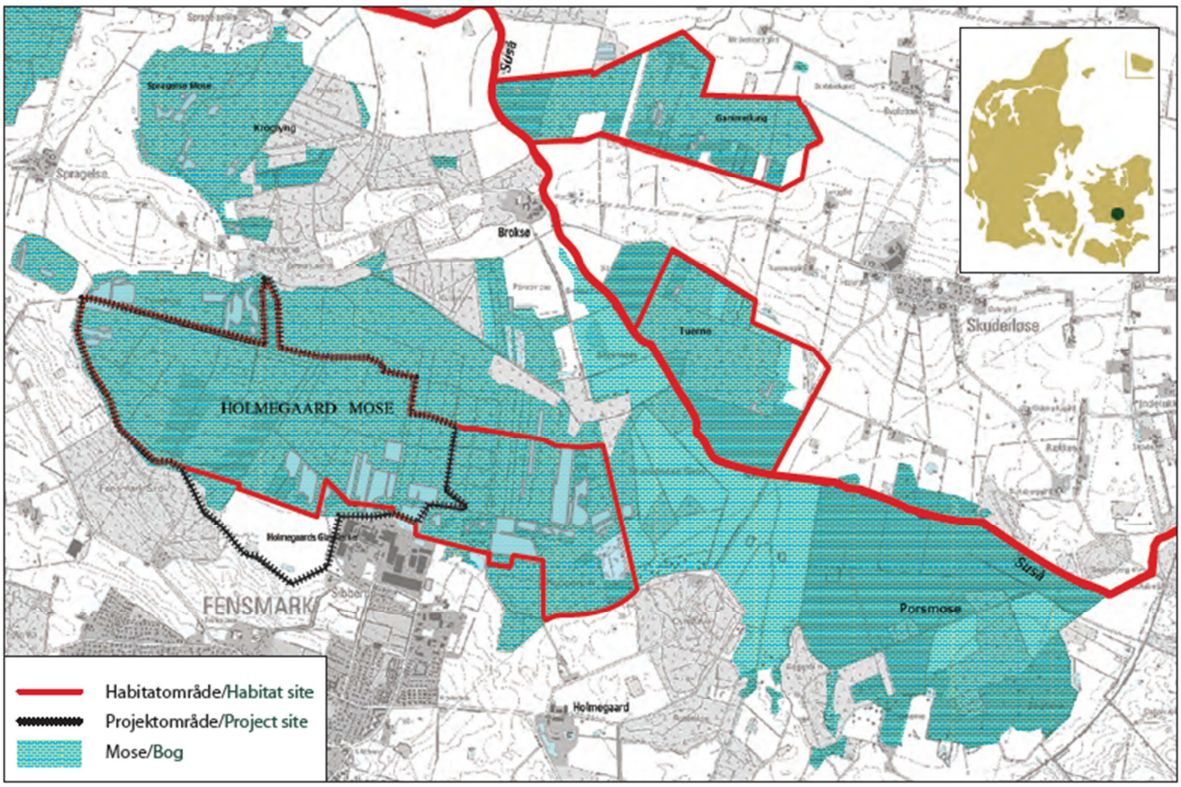


Figure 2 – Holmegaard Mose is the largest raised bog in eastern Denmark. It is one out of several bogs in the upper river Suså bassin. The LIFE project 2010 – 2013 dealt with approx. one half of the original raised bog – the western and central part. The red lines delimit protected areas (SCIs) according to the EU Habitats Directive.

In the meantime DNA (Danish Nature Agency) from 2006 had replaced Storstrøm County as responsible for the management, due to a national structural reform which lead to a close-down of the regional counties. DNA made individual contracts with the landowners covering management of the western and central part of the bog.

In a proces parallel to revision of the Conservation Order, DNA prepared an application for a LIFE+ project to fulfill the obligations in the Natura 2000-plan for the raised bog. In this proces Scenario 3.1. was the conceptual base. The LIFE project was granted by the EU Commission in autumn 2009 and realized in the period 2010 – 2013.

2.1 LIFE Holmegaard Mose 2010 - 2013

The LIFE project was designed with three technical conservation C-actions: C.1: Raising of water level, C.2: Clearence of birch wood and C.3: Establishment of grazing facilities as a strategy for recurrent management. Also the project comprised initiatives for raising of public awareness and dissemination of project and results. Finally monitoring and networking with other projects were parts of the General Agreement (GA).

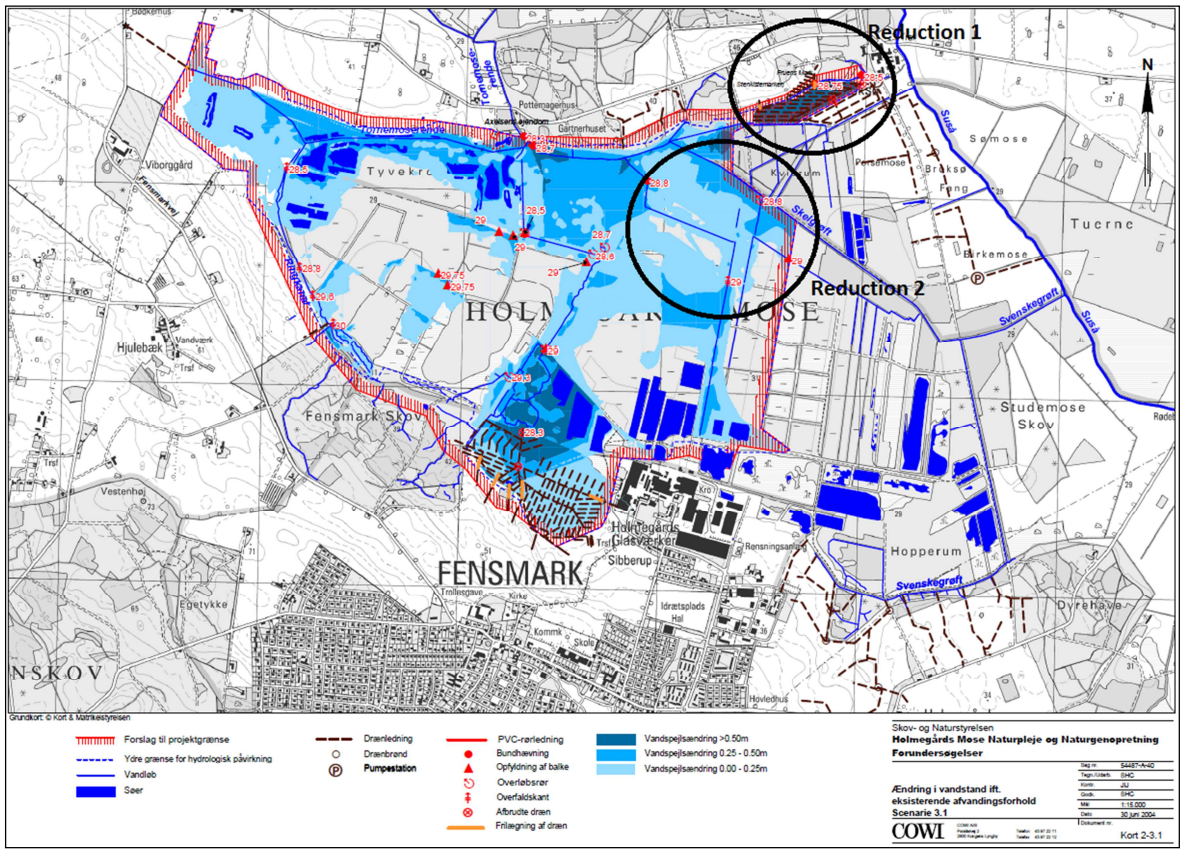


Figure 3 – Map showing the hydrological action under Scenario 3.1. Red symbols mark technical implementations. Blue colors symbolize heightened water table in three categories, 0 – 25 cm, 25 – 50 cm and > 50 cm. As shown by the two black circles, the actual effort was reduced in the northeast corner of the survey area. Reduction 1 was due to the fact, that actions in this area should conserve archaeological findings and had no impact on the hydrology of the raised bog. Reduction 2 was decided in the final phase of the project due to measurement of the nutrient content in the eastern crossing stream. The latter reduction is small in economical extent, but significant as to the areal impact.

Implementation of the technical actions were carried out throughout the project period as the actions were interdependent. However, the major fellings were realized before the end of 2011, whereas the major hydrological effort was conducted in autumn 2012. Grazing of the cleared areas by sheep was an element of the previous management and was continued as such and expanded in the LIFE-project, although to a lesser extent than planned. A detailed description is given in the Final Report.

The hydrological C.1 action in LIFE Holmegaard Mose had three main components:

1. Delaying drainage of the ombrogenic water from the bog
2. Raising the runoff treshold of the minerogenic water which flows around and through the bog
3. Purification of minerogenic water (surface water and groundwater) before it runs through the bog

The third of these components was modified during implementation in order to improve the effect. Not only drainage water from the fields but also overflow from rainwater tanks and to a minor extent sewage that formerly flew unfiltered through the bog was now redirected and irrigated on the meadow south of the bog. Also the first component was increased in extent as leaks in baulks and walls between peat cuttings were sealed, not only sporadically but over longer distances by insertion of plastic membranes.

The second component, on the other hand, was not fully implemented, as seen and explained in figure 3. The hydrological effort in total therefore covered a smaller area than expected, approx. 70 hectares, some 20 hectares less than planned. See more below in section 2.2.

The clearings (C.2 action) were realized in accordance with the modified GA and approx. 100 hectares of birch wood were cleared, see figure 4. The cleared area in the western and central part of Holmegaard Mose now amounts to 145 hectares with the exception of a few hectares of scarse birch wood on the wettest and most vulnerable part of the bog. These areas will be cleared as a part of the coming effort.

Establishment of grazing facilities (C.3 action) was reduced due to a change in strategy during the project. Instead of 80 hectares of fenced area the actual fencing amounts only to 31 hectares. This is also further outlined below.

Dissemination activities were carried out according to modified GA. The resulting outcome was a leaflet (2 versions), an information stand at two entrances to the bog with four posters each (2 versions) and a web-page. As the EU Commission did not grant all the requested dissemination elements, DNA added even some activities to the LIFE project: a viewing tower, a boardwalk and two marked hiking routes (3 km and 5 km) through the bog.

Monitoring was carried out as a biological survey every year of the project consisting of registration of botanical parameters (e.g. coverage of sphagnum, woody plants and purple moor grass besides listed plant species from 87 test plots) and surveillance of selected animal species (2 species of Annex II on the Habitats Directive and butterflies as a group). In addition installation of 8 water level data loggers was realized in 2012. The loggers subsequently can monitor the water level at selected spots.

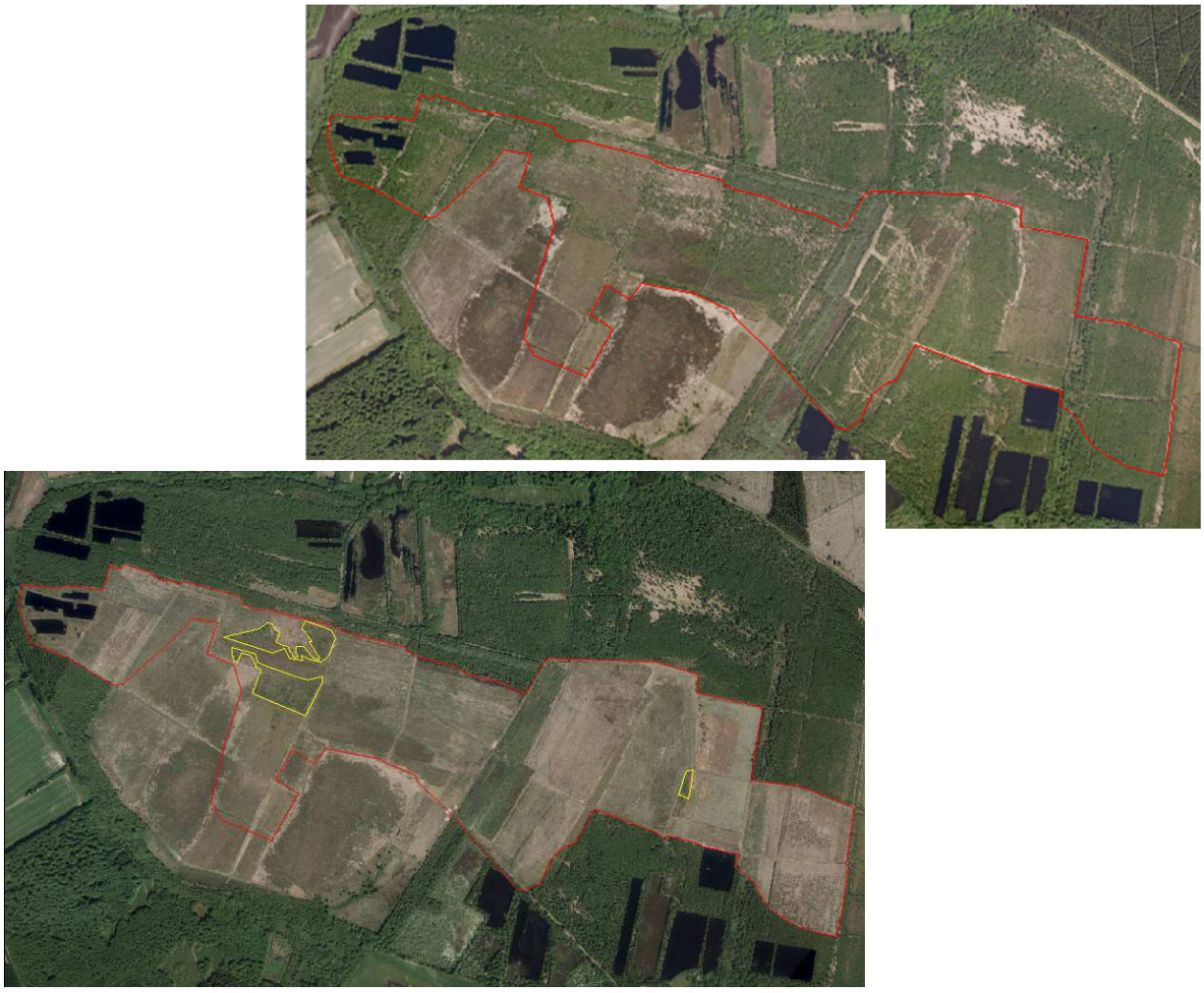


Figure 4 – Clearance effort in overview. Red line indicates total clearance area, yellow line scarce birch wood still present after the LIFE project. Upper photo shows the situation in summer 2008 before commencing the LIFE project. The greener the colour , the more densely is the birch forest. The lower photo reflects the situation in summer 2012 after finalizing the clearing effort. The photo also reveals that the vegetation is quickly recovering along the stream through the central part of the clearance area. A few years after the initial clearing this part is green again.

2.2 Current situation

2.2.1 Strengths

LIFE Holmegaard Mose 2010 – 2013 has been a major breakthrough in the effort to meet the demands of the Natura 2000-plan, i.e. obligations related to the Habitats Directive. The necessary prerequisite in this respect was heightening of the water table in the raised bog.
The finest indication of this improvement is the growth in coverage of peat moss vegetation, that could be documented in the biological monitoring during the LIFE project.

As water level monitoring was delayed and the water level data loggers were put up only after implementation of the major parts of the hydrology effort, it is not yet possible to show

any improvement by this mean. However, a baseline is present with regard to retainment of the ombrogenic bog water, as this were implemented in the last phase of the project after one year of water level surveillance. The possible effect of this measure can presumably be seen after the dry season 2014.

The improved water regime in the raised bog can be explained both by the actually performed hydraulic action and by reduced evaporation, as approx. 100 hectares of birch wood were cleared. However, it can be deduced that the hydraulic action had a positive effect in itself, because the growth in coverage of peat moss was also seen in parts of the bog, which was cleared several years ago, prior to the LIFE project.

Actually, a significant growth in coverage of peat moss can be seen not only in parts of the bog that were predicted to be wetter (figure 3), but in the cleared area in general. The possible explanation of this outcome, regarding the dryer parts, is a combined effect of reduced evaporation and improved light conditions. Based on the assumption that clearance of birch wood in itself has contributed to improved hydrology, it seems as if the effect in total of the project in terms of improving the water regime is fairly successful. It may be argued that the positive hydraulic effect comprehends the cleared area in total and not only the 70 hectares directly affected.

Although the biological monitoring program were not successful with findings of the Annex II species *Graphoderus bilineatus*, it is concluded in the final monitoring report, that clearings in the western part of the project area have improved some of the peat cuttings as potential habitats of the waterbeetle.

Based on the response from visitors in the bog, cooperating organizations as DSNC etc. it is the general conclusion, that the restoration and the dissemination effort as expressed in the LIFE project was well received by the public. It is noticed also, that the public facilities which were implemented as synergetic actions by DNA are frequently used.

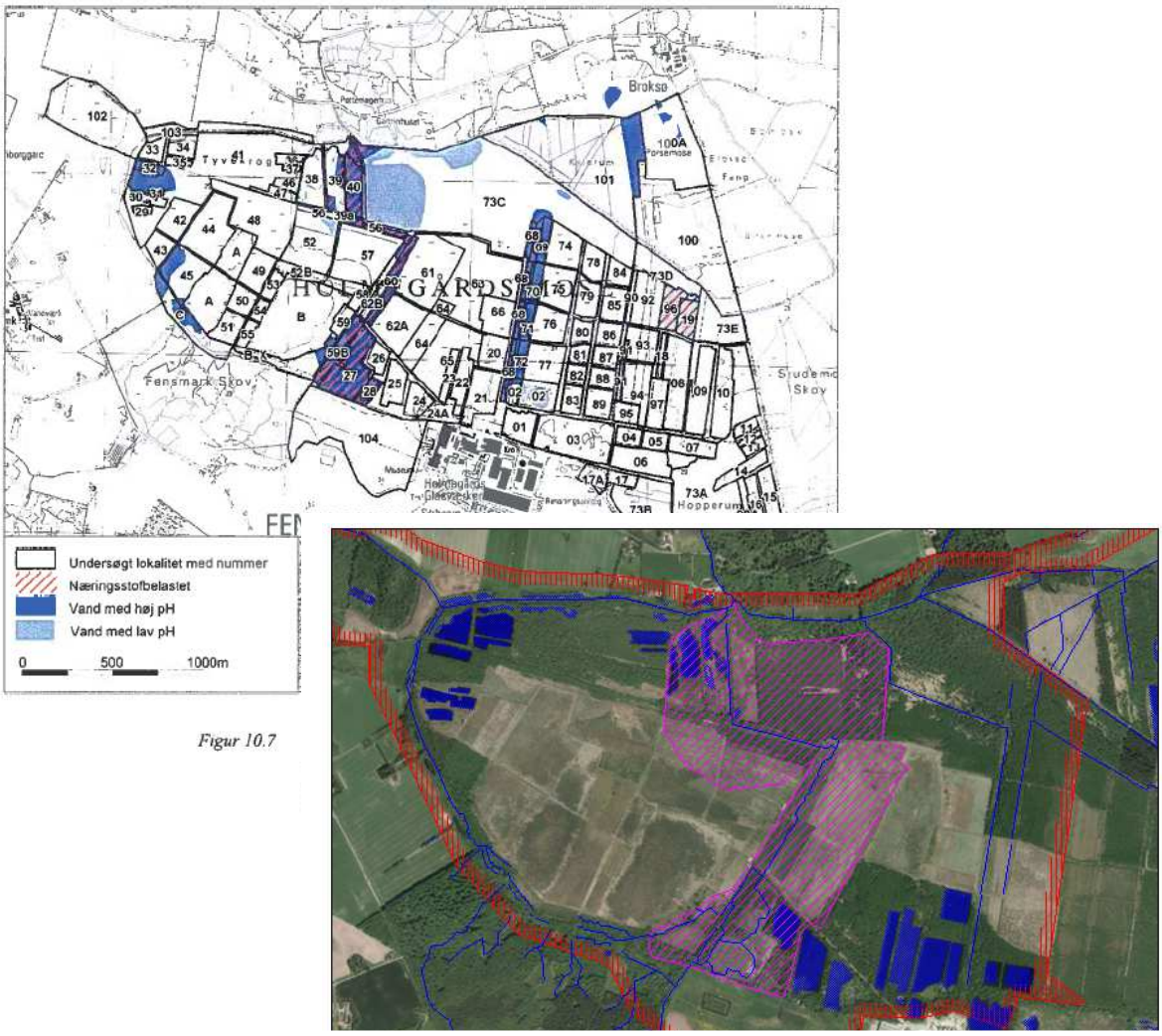
2.2.2. Weaknesses

One of the main objectives of the LIFE project was not achieved, namely maintenance or expansion of the habitat of fen orchid. The monitoring program revealed, that the small population of the orchid in the northern part of the bog did not benefit from the project and that the habitat actually shrunk. The population declined dramatically in 2011 and 2012, while it recovered to the 2010 level in the last project year, which was rather dry. In the monitoring report it is concluded, that changing water table on the habitat is the primary cause of variations in population and habitat size.

As pointed out in the Natura 2000-plan 2010 – 2015 for Holmegaard Mose there are conflicting interests in a simultaneous goal of both to restore active raised bog and to improve habitat for fen orchid. The latter requires a humid, calcareous substrate – a habitat that is present in the fen orchid habitat, a peat cutting where the vegetation is in contact with the calcareous bottom of the former lake. However, according to Scenario 3.1, the water table in this area was expected to rise by up to 25 cm. This conflict is settled in the Natura 2000-plan in the sense that raised bog restoration is given priority over protection of the fen

orchid habitat. In the General Agreement of the LIFE project this conflict however, was apparently not foreseen.

The water level monitoring part of the LIFE project was not performed optimally. The installation of the data loggers was not carried out until the autumn of 2012, implying that a baseline with regard to all hydraulic efforts was not established. Furthermore, the loggers were not distributed in a manner that would create an overview of the effect in the project area as a whole. Only the central part of the bog and the minerogenic water flow through the bog is under real surveillance.



Figur 10.7

Figure 5 – Widely different assessments of the possible impact of elevating the minerogenic stream, which is crossing Holmegaard Mose. Violet diagonal stripes indicate the area, which is potentially influenced and thereby will experience a transformation of the ombrotrofic raised bog nature. Upper map from Scenario 3.1 in 2004, lower map from a technical report produced by the consulting firm Cowi in 2013.

2.2.3. Opportunities

The future for Holmegaard Mose in relation to the achievements of the LIFE project can be forecasted in two different scenarios, a “maintenance scenario” and a “development scenario”. The former, which primarily means recurrent management, can be realized by the DNA in its present role as management authority (section 3.2.2). The latter can only be implemented full scale by means of new funding, for instance as a supplementary LIFE project that involves the raised bog as a whole (section 3.2.1.).

2.2.4. Threats

The main threats under the present conditions are related to: 1) nutrient enrichment of the bog water, 2) desiccation and repeated overgrowing by birch trees in case of drawbacks in LIFE project achievements.

1) Nutrient enrichment.
One of the hydraulic actions in the LIFE project was to raise the runoff threshold of the minerogenic water that flows through the bog in two south–north going streams. The purpose was to reduce the gradient between water in the peat moss body of the bog and outside this, thereby diminishing the drainage from the bog. However, this action also involves a risk regarding influx of calcareous and, even worse, nutrient enriched water into the raised bog.

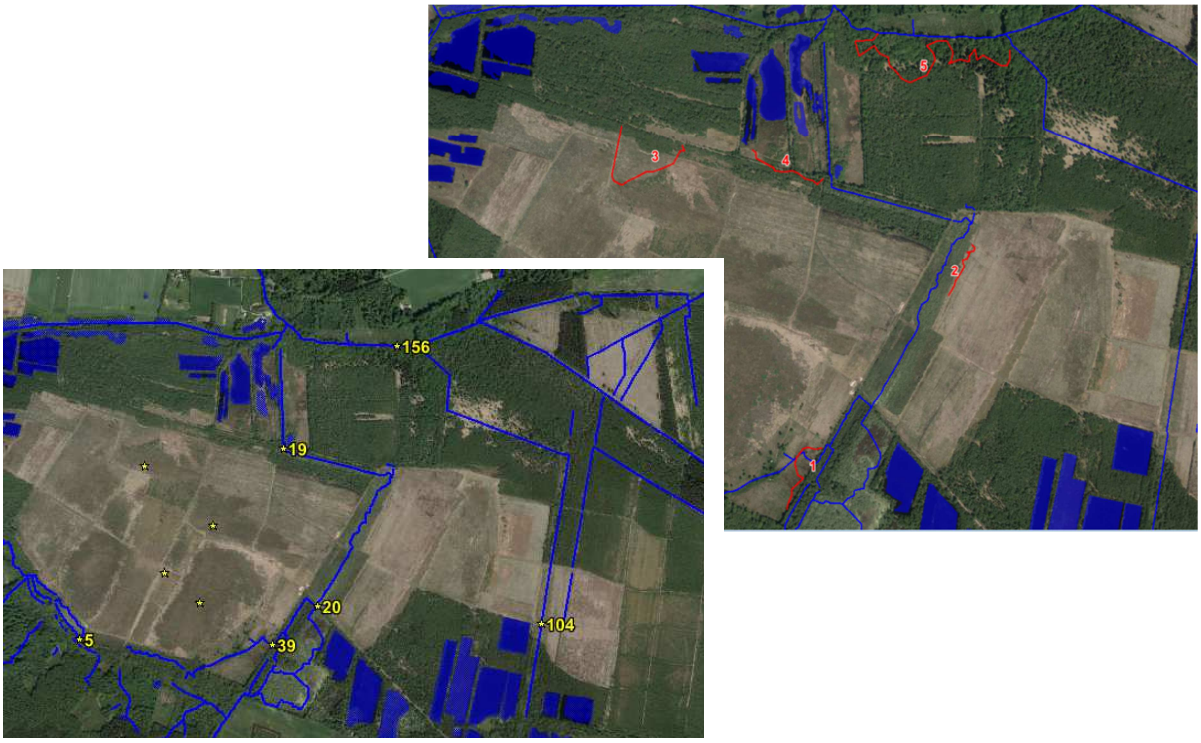


Figure 6 – Assessments of the nutrient impact. Upper map reflects the spread of reed and other plants indicative of presence of calcium or nutrient in the bog. The red lines shows actual fronts of reed. Lower map presents the amounts of inorganic nitrogen (micrograms / liter of ammonium, nitrate and nitrite) present in water samples taken from streams and ditches that flows through and around the raised bog.

This threat was assessed with widely different results prior to the LIFE project and by the end of the project, as shown in figure 5. According to Scenario 3.1 not more than already influenced area along the stream will experience an increased pH or nutrient content. On the other hand, the same consulting firm, Cowi, in a technical report by the time of finalizing the LIFE project predicts a zone of impact around 60 hectares. By subtraction of the already influenced zone, this means that additional 40 hectares of raised bog or potentially raised bog would develop to something different.

The same consequence of some degree of transformation of the raised bog nature can be foreseen in a belt of unknown width along the ditch that traverses the bog in the eastern part of the project area and along the ditches and streams west and south of the bog, which were also elevated in the project.

Being aware of the threat it was tried to evaluate the actual development on the site. Two methods were pursued. First, a field investigation of the actual eutrophication was carried out. The spread of reed (*Phragmites australis*) and other nutrient demanding or calcium demanding plants were mapped by gps, as reflected in figure 6, upper map. The main part of this impact is older than the LIFE project. However, especially the front of reed along the south-north flowing stream (No. 1 and 2) has been expanding markedly during the project period.

Secondly, the load of nutrients in the minerogenic water was measured at selected places after implementation of the hydrological effort. As indicated in figure 6, the water that flows through the central part of the bog still carries nitrogen several times over what might be considered a background level in the lag zone beneath Fensmark Wood (19 – 39 micrograms inorganic N / liter as compared to 5 micrograms / liter).

The testing also revealed that the stream flowing in the right part of the project area seems to be even more affected (104 micrograms / liter), while the heaviest load was registered in the "Skelgrøft" north of the bog (156 micrograms / liter). These last results were the cause of the decision in the final phase of the LIFE project not to fulfil the hydrological effort by implementing the lacking actions, ie. elevating the right (smaller) stream in parallel with what was done with the larger stream and adjusting the stone bar in Skelgrøften, which by control measurements had shown to be somewhat too low.

2) Repeated overgrowing of birch wood and desiccation of the acrotelm

There are different strategies as to recurrent management of the areas cleared in the LIFE project. It is considered, that the main threat in Holmegaard Mose is extensive management in the sense, that regrowth from the tree stumps and shoots from germinated seeds is only being combated with several years breaks. Periodically cuttings of the regrowth with brushcutter provokes firmer rooting in the top peat layer (the acrotelm), and turns management into an eternity project (figures 13 and 15). This in turn leads to increased transpiration from the ever closer birch wood and to a lowered water table.

3. The after-LIFE objectives and methodology

3.1. Conservation priorities

3.1.1. Conservation plan for the raised bog as a whole

Attention has been caught by the fact that raising of water level in an ombrotrofic habitat by means of minerogenic water from the surroundings may be risky. Cleaning of the minerogenic water, as is done on the meadow south of the bog, may be difficult to do in the necessary extent, and even clean minerogenic water may induce unwanted changes in the distribution between habitat types.

The threat, which was described in section 2.2.4, is already materializing to some extent, as shown in upper map of figure 6 and by photos from the site, figure 6. The perspective of this development is, that the foreseen growth in the targeted habitat type **7110 Active raised bog* will be replaced by development of other habitat types or non-habitat nature. In the upstream part of the affected area a few hectares of degraded bog during the project period has actually developed into alkaline fen, which by continuing influence of nutrients may develop further to a non-habitat type.

Also there is a problem related to the objectives of the Natura 2000-plan concerning "hydrological integrity" for the whole bog. The plan states, that physical linking of existing fragments of raised bog shall be commenced immediately, which means during the first planning period (2010 – 2015). The clearing effort of the LIFE project has led to a visual linking of two major fragments. However, it seems to be certain that the streams flowing through the bog will not lead to a hydrological connection of the fragments. The streams are presumably to be considered as "functional lagg-zones", which means minerotrofic habitats surrounding each fragment (figures 8 and 9).

Figure 7 – The raised bog is cut through by two crossing streams. This photo shows the minerogenic and eutrophicated zone along the broadest stream, which was elevated as en element of the LIFE project. The zone has a width of 100 – 250 m. Upper right photo shows the front of reed along the minerogenic stream that was observed to expand during the LIFE project period, as an indication of influx of enriched water into the peat.

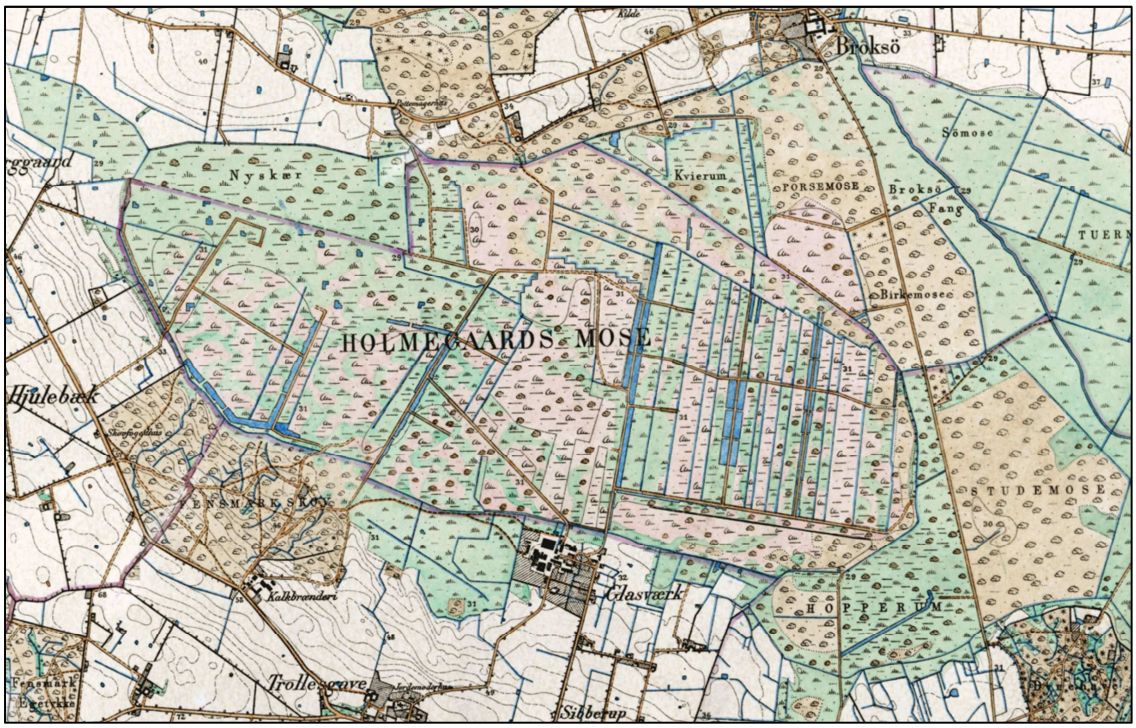


Figure 8 – Holmegaard Mose in the mid 1800s. The raised bog was formed from a shallow lake for thousands of years. The extent of this can probably be seen by the position of annular drainage ditches in this early state of exploitation. The size of this nearly pristine raised bog is 437 hectares.

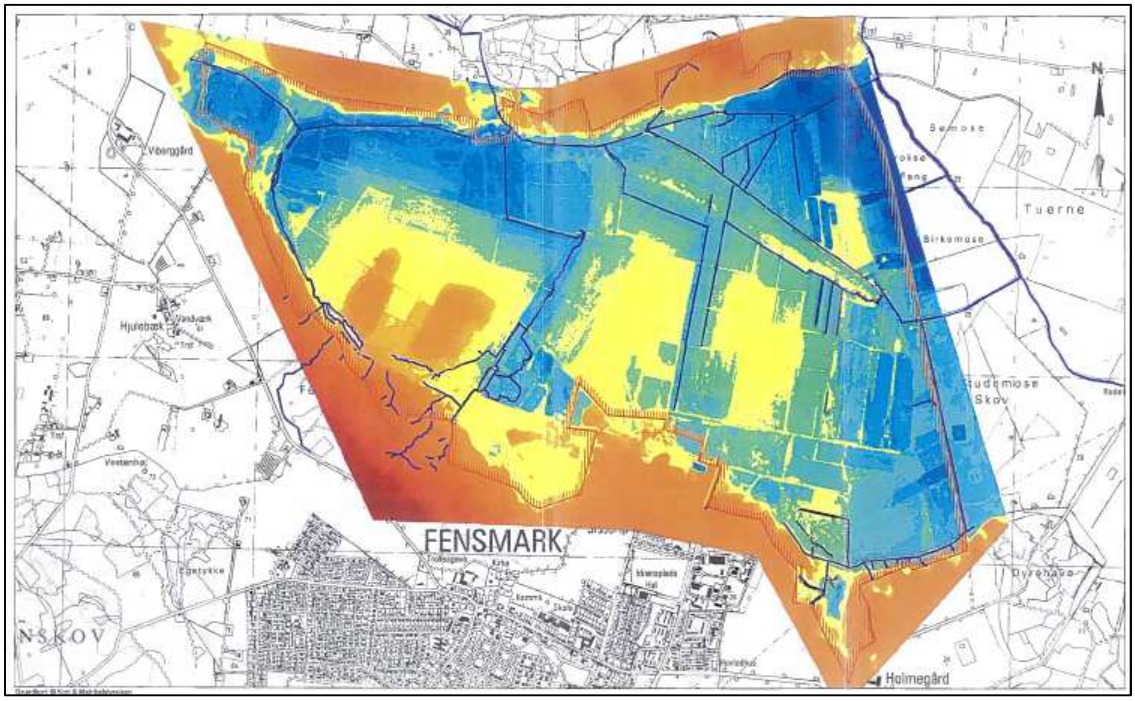


Figure 9 – Topographical map from "Scenario 3.1". The colours reflect differences in altitude and thereby the drainage impact. By means of two crossing ditches, the raised bog is cut into three parts. The height difference between the blue areas in "the canyons" and the orange heights in the bog is around 2,5 meters.

In order to utilize the momentum of the recent LIFE project, an effort is made to identify the key elements of a renewed conservation strategy comprising the raised bog as a whole. The elements could be:

1 Blocking drainage of ombrotrofic water all over the bog

A part of the LIFE project was blocking of drainage ditches in the western part of the bog (figure 10). The ombrotrofic water is the bogs own water with the right chemical constitution, and retention of this water should be the most important thing of all. The action implies a detailed examination of the three remaining raised bog fractions in order to seal as many leaks (drainage ditches, desiccation fractures etc.) as possible.

Figure 10 – Blocking of an old drainage ditch in the western part of the bog by a manually inserted plywood plate, December 2013. The actual difference in water level on the two sides of the plate was measured to be 12 cm .

2 Redirection of minerogenic water crossing the bog

A long-term linkage of the three raised bog fragments implies redirection of the minerogenic streams through the bog. A technical solution is required, which at the same time makes it possible to redirect the permanent streams and to prevent a drying out of the raised bog peat that will reverse the positive present situation characterized by renewed peat moss growth.

The critical situation with regard to desiccation is the period from May until September. The appropriate solution may be a technical design, which permits the water to flow in the present riverbeds across the bog in this period, while it is redirected to the “ringchannel” in the rest of the year. The crucial point is, that an exclusion of a permanent stream through the bog will permit a slow turnaround of the vegetational succession in the former riverbeds. A slow regrowth of sphagnum will be possible, beginning with minerotrofic peat development as an initial step towards long-term recreation of a coherent raised bog.

As previously described, the planned actions in the LIFE project dealing with the easternmost crossing stream were cancelled due to uncertainty about the quality of the water. After clarifying of this aspect, it will possible to involve this stream in future efforts.

Figure 11 – The eastern part of the bog still receives overflow water from areas with combined sewer systems.

Although the amount of water that runs in the easternmost stream is considerable less than the amount in the westernmost stream, it could be convenient to redirect also this stream to a certain extent. This has to be further clarified.

3 Purification of nutrient enriched water in the eastern hinterland

In parallel to what has been realized in the catchment of the western stream, i.e. irrigation of the meadow south of the raised bog, it may be a relevant option to purify the water that feeds the easternmost stream (figure 11), especially if it would be preferable to maintain an ongoing but modest flow through the bog. However, this has to be enlightened by further monitoring of the hydraulic conditions.

4 Prevention of return of polluted water in the eastern part of the bog

The drainage water from the southern catchment of eastern Holmegaard Mose merges with drainage water and possibly sewage water from a larger hinterland in “Svenskegrøften”, which forms the eastern border of the raised bog. It has been reported, that by heavy rainfalls and high water flow in Svenskegrøften, situations may occur in which water from Svenskegrøften are flowing backwards into the bog through ditches in the eastern part. If it is not an option to block the ditches, it may be a solution in order to prevent backflow, to install high water valves in the outlet. This subject also requires further investigation.

3.1.2. Revised plan for recurrent management

Recurrent management by grazing sheep is regarded as a temporary measure according to discussions in the Advisory Board and the Steering Group of the LIFE project. The more accurate extent of this measure is dependent especially on the economic context. The strong

emphasis on grazing in General Agreement rested on the expectation, that manually defined solutions were too expensive.

However, in the spring of 2013 a cooperation with Næstved Municipality came into action concerning a labor program called “utility activation”. Unemployed citizens were referred to useful tasks in the public sector as a prerequisite to receive benefits. From the beginning of June and until November a number of citizens involved in this program took part in the management of the raised bog. This concept has played a major role in the actual re-revision of the management strategy (figure 12).

The utility activation program in 2013 was a municipal pilot project. From 2014 the same principle was implemented in a national law, and the cooperation will from hereon be formalized in the revised context.

The principles on which a revised plan for recurrent management will be build are:

1. Diminishing the possibility for birch seeds to germinate by striving for coherent and full area sphagnum vegetation. This is the base of the hydraulic effort and the reason why it is important to combat re-growth as quickly as possible to minimize the evaporation. Additionally, it explains the intention of out-phasing grazing gradually, as the traffic of sheep prevents peat moss recovery.

Figure 12 – Management regime in Holmegaard Mose.
Pink shading: Grazing areas where grazing seized before 2013. 13,1 hectares
Red shading: Grazing areas in operation 2013 and further on. 31,0 hectares
Green shading: Manual weeding 2013. 2,2 hectares
Green dotting: Bush clearing 2013. 50,3 hectares

2. Eliminating sources of birch seeds from the open bog surface. This means that regrowth of birch trees shall be removed at the latest before they start to produce seeds.

3. All birch seedlings shall be removed by manual weeding or uprooting. Even birch trees in 2 – 3 meters height germinated from seeds can be uprooted by hand (figure 13) using a so-called extractigator. In contrast, when cutted down with brushcutter etc. they will develop firm rooting and thereby be impossible to uproot manually.

4. Regrowth from birch trees shall be managed by crushing or sheep grazing or by other non-chemical means that are killing the trees. There is a need of developing suitable manually methods that are less harmful to the acrotelm (upper peat layer) than the first mentioned. Continued management with brushcutters can be used until one of the former methods can become operational.

A detailed management plan based on mapping of the regrowth pattern in separate peat cuttings and parts of the cleared bog will be made every year in the spring.

As the cooperation with Næstved Municipality is the cornerstone in a management strategy with emphasis on manual effort, the size of the actual effort will be dependent on the municipal labor market situation. The current perspective is that necessary manual resources with regard of maintenance of the present cleared bog area are available. Until further the actual grazing regime of around 30 hectares will be maintained.

The cooperation with the municipal labor market center offers another possibility, as the center contains a blacksmiths repair shop. The possibility of performing experiments with management techniques and development of specially adapted management tools should be pursued.

In case that the cooperation scenario is made impossible somehow or another, the DNA will fulfil its obligations as management authority by a less favourable but cheaper and still realistic management strategy based on grazing, as outlined in the General Agreement.

Figure 13 – Even fairly large birch trees can be uprooted from the soft peat soil by hand. However, this is only possible if the trees have not previously been cut down, because the root of the trees that are cut down will have developed a firmer rooting in the substrate.

Figure 14 – Examining a peat moss. A pillow of live moss have started to grow on the exposed surface of dead peat moss where there used to be birch forest.

3.2. Monitoring priorities

The LIFE project included a management program, but did at the same time utilize the results of the national monitoring program (NOVANA). As the NOVANA program continues, and Holmegaard Mose remains one of the regularly monitored localities, there will be some further collection of biological data under this frame. Also the water level data loggers that were established in 2012 will continue to deliver data of relevance for prolonged assessments of the achievements of the LIFE project and supplementary measures.

However, as pointed out in section 2.2.2, the distribution of water level data loggers were not optimally, and supplementary monitoring is preferable. An extension of the scope for restoration will require better knowledge of the water regime in the raised bog in general.

The biological monitoring of Holmegaard Mose in the LIFE project was suitable for a meaningful assessment of the hydraulic effort of the project. Especially coverage of peat mosses and distribution of species (sphagnum and others) with indicative qualities were valuable parameters. It seems important to continue this monitoring although not necessarily every year.

While surveillance of the Annex II species *Liparis loeselii* and *Graphoderus bilineatus* presumably is properly carried out by the NOVANA program, it would be of importance continuously to gather knowledge about some of the rare invertebrate species that are characteristic of the habitat nature type **7110 Active raised bog*, as they still seem to be on the edge of extinction.

3.3. Capacity needs of the project team

As DNA has been management authority in Holmegaard Mose for almost a decade there is considerable expertise in the organization as to continue the management on the base of LIFE achievements. This is the case when it comes to all aspects of future management, as DNA is responsible for surveillance (i.e. the NOVANA program) as well as organizing and fulfilment of the actual management obligations including grazing by sheep. The present sheep live stock is owned by DNA.

Cooperation with volunteers is vital for future management, although not critical as to its survival. DNA is very much committed to a continuation and expansion of this cooperation if possible.

3.4. Institutional issues / Political challenges

DNA has been cooperating with the landowners (one major and three smaller) since the assignment of management contracts in 2004. The biggest landowner was a member of the LIFE project Steering Committee and there is an ongoing dialogue as to actual management, possible revision of the contracts etc.

Næstved Municipality, which was also represented in the LIFE project Steering Group, is another important partner. The municipality is the legal authority in terms of nature conservation legislation, production and enforcement of the Natura 2000-action plan etc. Næstved Municipality is furthermore the key partner in the expected future cooperation based on labor market legislation as previously described.

Both Næstved Municipality and the landowner are involved in current (March 2014) discussions and investigations concerning initiation of a new LIFE application covering the raised bog as a whole. The perspective is realizing the principles outlined above in section 3.1. So far there has been a good and constructive dialogue between all parties involved.

In Holmegaard Mose there is a longstanding tradition for cooperation between the management authority and groups of volunteers, organized e.g. in DSNC, DOF (Danish ornithological society) or as individuals. For instance, every year during the project period DSNC and DNA in common arranged a “voluntarily management day”, typically with a number of participants around 30.

The primary partner is DSNC but also cooperation with individual engaged citizens is and will continuously be carried out. The fields of cooperation are actual management and surveillance, both biological and in terms of general awareness e.g. concerning occurrence of hydraulic leaks.

Figure 15 – Dense regrowth of birch in an area, where former clearings have been followed by too extensive management.

Figure 16 – Cooperation with "Danmarks Natur-fredninsgforening" (DSNC) has been an important feature of Holmegaard Mose management, and will undoubtedly be so in the future.

Figure 17 – Volunteers performing raised bog management.

4. Financial outlook

Maintenance scenario

The LIFE project has financed equipment and durable goods, which will facilitate the future management of the raised bog. Approx. 50.000 € was used on an All Terrain Vehicle with associated trailer and fencing material. This amount corresponds well with the budgeted sum. Due to an agreement with the landowner all the existing permanent fencing was removed and replaced by moveable fence, which meant that the purchase of fence was only slightly less than expected although the actually grazed area is considerably smaller than anticipated.

The ATV has proved to be very useful also with regard to the efficiency of the logistics related to the general maintenance of the bog. There are no expectations of immediate and substantial requirements with respect to equipment.

The cost on personnel has varied considerably during the project, reflecting differences in timing and labor consumption between individual actions. A future "maintenance level" is assessed to be in the magnitude of ½ full time employment plus maintenance requirements on a yearly base with respect to the sheep herd. This amounts approx. 65.000 € per year.

In case, that the former outlined cooperation with Næstved Municipality should be hindered, the demands of manpower from the DNA would be somewhat larger even though the management strategy was shifted in favor of grazing. The necessary requirement in this situation is assessed to be approx. 1 full time employment plus sheep stock maintenance, or around 90.000 € per year.

Development scenario

The requirements of a renewed situation in which the raised bog are managed as one hydraulic entity is under present investigation. If the actual positive atmosphere that surrounds this work continues, an application for a new LIFE project will be submitted this year as part of a larger aggregated project application with several beneficiaries. A more detailed economic description is not possible for the time being (March 2014), although it is evident that the economical frame will be somewhat smaller than in the 2010 – 2013 project.