Report of the Life+ Project Expert meeting

Amsterdam Dunes, Source for Nature

LIFE11 NAT/NL/000776

19-20 April 2013

Preface

Working for Waternet and the Amsterdams Watersupply Dunes is a privilege. The Waterleidingduinen is part of a Natura 2000 area and home to many protected animal and plant species. Almost one million visitors a year come here to enjoy the abundant tranquillity and space. In addition, two-thirds of Amsterdam drinking water is pre-purified in the dunes. In short, this area of magnificent natural beauty and source of water deserves to be preserved for the future. We are therefore very pleased with the LIFE+ grant that the European Union has awarded us. It will enable us to give a significant boost to the quality of the dune habitats.

In the autumn of 2012 we launched the LIFE+ project “Amsterdam Dunes, Source for Nature”. In April 2013, a meeting was held during which a group of European dune experts spent two days examining the projects with us - this was a highly positive experience for the entire project team. It is gratifying to have it confirmed that we are on the right track. At the same time, it was useful to be given extra advice and to swap experiences with each other. Exchanges of this kind always yield new insights and ideas.

During the meeting, various intervention areas have been visited: the Haasveld pine plantation, prunus control areas (Hazenhoek and Starrenbroek), dune rejuvenation projects Noordvoort and the Van Limburg Stirum area and grey dune restoration works Rozenwaterveld. The field visits provided the opportunity for participants to see the situation before restoration and the results of recent projects., and to share their views. The wealth of statements presented in this report is the result of these field visits and of the discussions afterwards.

We deliberately spent a lot of time in the Waterleidingduinen area itself while the experts were here. Being out in the field often helps to bring the discussion more sharply into focus. For us, follow-up management was an important topic for discussion; you can read more about it in this report. Constantly looking ahead is a challenge, and always will be, but it is something we will certainly continue to do!

I would very much like to thank all those at the expert meeting for their enthusiastic participation and input, including Albert Salman for his outstanding guidance, and Gloria de Santa Catalina for the excellent reporting.

Petra Nelissen
Project Manager, LIFE+ Amsterdam Dunes, Source for Nature
Waternet

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1. Introduction to the expert meeting and the Life+ Project "Amsterdam Dunes, Source for Nature"

by Petra Nelissen and Luc Geelen, Waternet

In 2012 the Waternet Foundation managing the Amsterdam Watersupply Dunes (AWD) launched the "Amsterdam Dune source for nature dune restoration project''. The aim of the project is to restore and improve the several (priority) habitat types which form part of the Kennemerland Zuid Natura 2000 site. Habitat recovery will be encouraged by actions targeting the effects of desiccation and eutrophication. Specific aims are the expansion and improvement in quality for the dune habitat types 'grey dunes H2130', 'thickets of sea buckthorn H2160' and 'humid dune slacks H2190'. Species which get special attention include for example the whorl snail (H1014 *Vertigo angustior*), mottled white-faced darter (H1042 *Leucorrhinia dubia*).

The 3400 ha area is owned by the municipality of Amsterdam. The main land uses are nature conservation, drinking water supply and recreation. Since 1850 the habitats deteriorated in size and quality by desiccation from water extraction and by acidification and eutrophication from air pollution. This led to grass and shrub encroachment and accumulation of nitrogen-rich organic matter in the topsoil. In recent decades, these negative environmental impacts have decreased but to stimulate the recovery of nature it is necessary to remove the nitrogen-rich top layer of soil and carry out other nature management measures, such as tackling the recent expansion of invasive black cherry (*Prunus serotina*). Project implementation will focus on the removal of vegetation and soil organic matter to begin the process of recovery.

The actions will include:

- the mowing of vegetation and the removal of organic material in the dune valleys
- turf stripping to remove the organic top soil layer in dune slacks and dune grassland
- excavation of old blow-outs
- restoration of ponds
- grubbing up and removal of shrubs and trees, especially black cherry
- turfing over former thickets of black cherry including the seed bank.
- Grazing

Main Topics for the expert meeting were:

1. Can we achieve a favourable conservation status for habitattype H2130 under the present environmental conditions? *(chapters 2 and 4)*
2. Bringing back dynamics in the dunes, is it possible and on what scale? Can we set a conservation objective for the amount of open sand in our dunes? *(chapter 3)*
3. Is the removal of pine forest an appropriate (ecological, social, technical) measure to restore H2190 and H2130 habitat? *(chapter 5)*
4. Can we control *Prunus serotina* and other invasives in our dunes or even eradicate this species? Are the proposed methods appropriate? *(chapter 6)*
5. We quantify our habitats in ha. But how should we indicate the quality? *(chapter 7)*

2. Nitrogen deposition and its implications for management

Introduction by Annemieke Kooijman, University of Amsterdam

Coastal dune grasslands (grey dunes habitats, H2130) are under threat mainly due to grass and shrub encroachment. A surplus of nitrogen deposition is an important factor. At the beginning of the last century the nitrogen load was about 5 kg ha^{-1} $year^{-1}$. Because of agriculture, industry and traffic the amount of nitrogen deposition went up to about 45 kg. The last twenty years it has been reduced to 30 kg ha^{-1} $year^{-1}$ or a bit lower. Recent papers state that the critical load in 62% of the dune area is met. Dune managers and researchers are not convinced due to the continuing process of grass encroachment. Because of an intensified monitoring network, especially in and along the coastal area, this could be proven. There is an additional 6 kg ha^{-1} $year^{-1}$, which has proven to be taken in consideration. The sea along the mainland coast and on the Wadden sea islands produce ammonium vapour, partially from organic origin.

Another problem which has to be addressed is the accumulation of organic matter in the soil profile, which probably accumulated in higher amounts than under low nitrogen conditions. This heritage has to be taken into account when management measures are taken. Cattle grazing practices might not be sufficient to maintain the (European) goals for dune grasslands. (Kooijman et al. 2012)

Key statements

The limits of grey dune restoration management by mowing, grazing or sod-cutting are often determined by soils yet it is an area of knowledge which is not well understood by many dune managers. Education should be compulsory! *(John Houston)*

The nitrogen deposition in coastal dunes is much too high. We have to continue the management measures such as mowing and grazing. Otherwise, the effects of nitrogen deposition have negative implications for the habitat types 2130 and 2120. Our economic activities are the cause of the high nitrogen deposition. A financial contribution through taxes for additional management would be appropriate. Best solution would be to reduce emissions at the source. *(Gijsbert ten Napel)*

Gijsbert ten Napel

Conclusion of the discussion

All interventions pointed into the same direction, in support of the introduction by the speaker. The nitrogen load is properly considered too high and as a major threat to the quality of the dune habitats.

3. Dune mobility at a large and small scale

3.a Rejuvenation projects in the AWD

Introduction by Luc Geelen and Maaike Veer, Waternet

Due to a combination of factors which include decennia of over-protective dune management, limited new sand supply, N-deposition and relatively unfavourable climate conditions, the development of thick grass swards and scrub presents an increasing problem in Dutch coastal sand dunes. Sand dune over-stabilization is not only an issue ino the Netherlands. Many other European dune systems also have experienced a reduction in dune mobility over the past 60 years. Some dune fields completely stabilized by vegetation and in many others the proportion of bare sand has fallen below 5%. This trend raises an international concern about the impacts on many of the dune habitats and species biodiversity (e.g. Provoost et al. 2011). This trend occurs despite small-scale management interventions such as stock grazing, mowing and sod cutting.
First experiments with much larger-scale intervention measures are carried out to see if they have a more significant impact, and if a more self-sustaining solution can be achieved. These large scale interventions include sod cutting of areas of fixed grassland vegetation, scrub clearance, excavation of artificial 'blowouts' in inland dune areas, creation of artificial blowouts in the frontal dunes, strategic beach and dune nourishment.

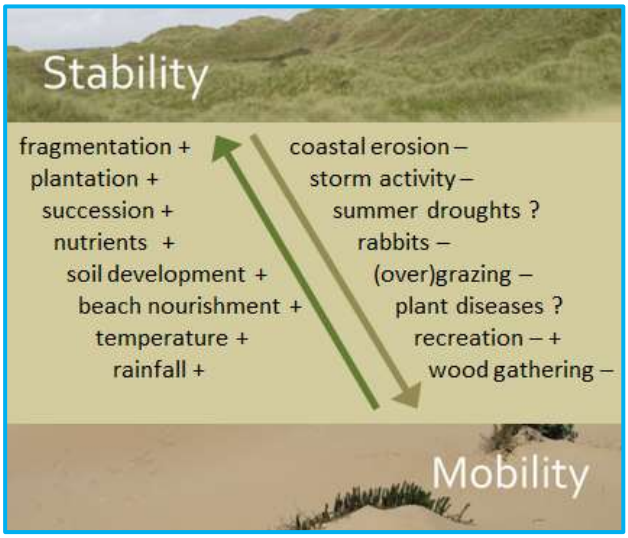

Figure 1. *Impact of environmental stress factors on dune mobility and stability, with indication of change (+ or -) over the last centuries. Adapted from Arens et al., 2013*

Van Limburg Stirum area

3.b Dune rejuvenation in Welsh sand dune systems

Introduction by Rhodri Dafydd, Countryside Council for Wales (*)

Sand dune systems are an important component of the Welsh coastal landscape, however the total sand dune resource in Wales has experienced long-term decline and fragmentation as a result of numerous factors. Mobile dunes currently occupy 6% of the dune resource compared to over 70% in the 1950s, whilst bare sand amounts to just 2.5-3% of the Welsh sand dune resource. As a result, several rare species of plants and invertebrates have declined dramatically, and in some areas have been lost entirely (see Howe et al., 2012).
In 2009, the Countryside Council for Wales (CCW - now Natural Resources Wales, see footnote) assessed the opportunities for rejuvenating Welsh dunes and the response of key stakeholders to the proposals (Houston & Dargie, 2010), whilst detailed geomorphological studies of Kenfig Burrows and Merthyr Mawr Warren National Nature Reserves considered the causes of increasing stability and recommended how best to recreate more dynamic conditions (Pye & Blott, 2011 a & b).

In autumn 2011, studies were undertaken on an additional ten dune systems (Pye & Blott, 2012) and pilot rejuvenation work was undertaken on Kenfig in the winter of 2011-12. Excavators were used to remove vegetation on a 3.5ha area in the dune system comprising a short section of frontal ridge, a vegetated parabolic dune and its associated slack, (though an intervening track could not be removed).

CCW carried out further rejuvenation work on Kenfig and Merthyr Mawr Warren and on Newborough Warren National Nature Reserve and Brownslade Burrows for invertebrate and bryophyte conservation purposes. Work was completed on all sites over the winter despite exceptionally high groundwater levels. The result of the work is being monitored at all sites to inform future projects.

Articles promoting the need for dune rejuvenation have been published in numerous local and national papers and periodicals, and the work has featured on national radio and television programmes; all of which have raised the profile of the work and its importance.

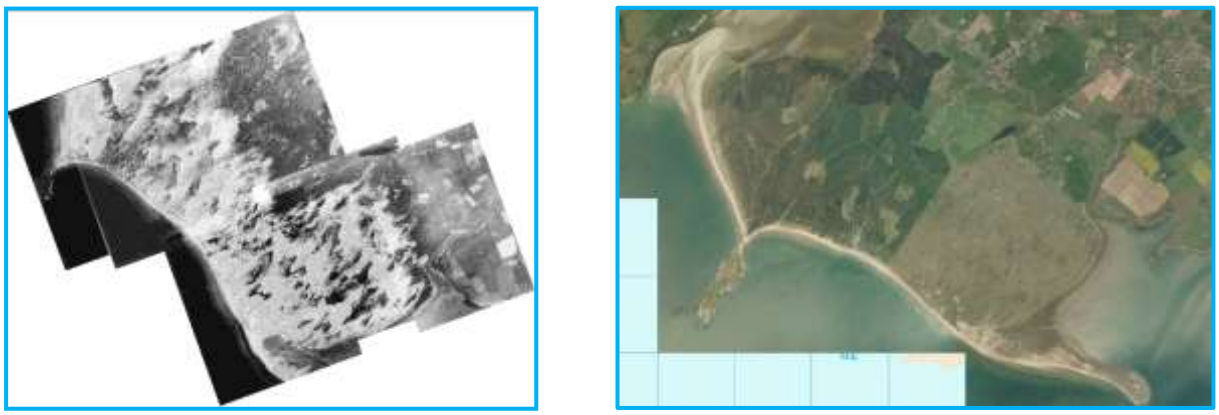

Figure 2a and b. *Newborough Warren in 1947 (left side) and in 2009 (right side)*
The aerial photographs show a decrease in bare sand / pioneer habitats.

Initial dune rejuvenation trial at Kenfig Burrows. A 3.5 ha bare sand corridor was created linking the beach with the crest of a large stabilized parabolic dune approximately 400m inland. The original frontal dunes were lowered and some of the excavated sand used to increase the size of the 'arms on each side of the sand transport corridor. Note the retained trackway, possibly disrupting sand movement.

Work in progress at Merthyr Mawr in Dec. 2012 (left) and following completion, April 2013 (right)

(*) In April 2013 Natural Resources Wales took on the responsibilities of the Countryside Council for Wales, Forestry Commission Wales and Environment Agency Wales.

Key statements

Whilst large remobilisation projects are exciting, and have the potential to generate self-sustaining erosional features, it is perhaps more important for species to conserve widespread but smaller bare sand and blowout features throughout the dune system. *(John Houston)*

One of the main problems is that the management is not dynamically adapting to the constant changes that dune systems are facing. *(Sjakel van Wesemael)*

Sjakel van Wesemael

In order to get large-scale dune dynamics it is needed to set short term priorities and practical work, taking into account a long term and strategic approach. (Paul Rooney)

Maaike Veer

Maintaining and restoring dune mobility is one of the major challenges for future dune management. Most of the dune biodiversity restricted to the coast is directly or indirectly linked to mobile dune habitats. Unfortunately, a number of both natural and anthropogenic factors currently seem to encourage fixation. Remobilisation projects are essential for gathering practical and theoretical knowledge on the subject. *(Sam Provoost)*

Disturbance by visitors can be used to achieve and maintain small-scale sand dune mobility. People can act as a management tool contributing to keep the area active. *(Paul Rooney)*

Maike Isermann

If it is not possible to restore large and long-time possibilities for a sustainable natural dynamic of beach-dune-systems, it seems important to try dune and dune slack restoration also at a small scale, especially in areas where larger and long-time possibilities are not accepted due to protection against high water. *(Maike Isermann)*

Dune mobility is impeded by infrastructure (bike paths, walking paths, etc.). Therefore this is not only a technical issue but also a social question/decision. *(Paul Rooney)*

Small blow-outs are very important since they help to keep the area active. Research and experience have shown that sometimes blow-outs do not stay active for a long time. However, once they stabilize (in 10-15 years) in the meantime, they can create a very wealthy situation, gradually developing from primary vegetation to grey dune vegetation with a variety of species. It is necessary to create frequently new blow-outs in the whole dune system (in the foredunes, middle dunes and hinterland dunes) in order to keep the area active. Otherwise, the area will be covered by vegetation that is less interesting and valuable. *(Annemiek Kooijman)*

Annemiek Kooijman

Conclusion of the field visits and discussion

Small scale destabilisation of dune systems through the creation of new blow-outs in various locations can be an effective management tool to stimulate dune mobility. It can generate areas of bare sand helping to rejuvenate the landscape. Although these blow-outs may not remain active for a long time and may be stabilised within the next years, they can provide the opportunity for the development of pioneer species, delivering ecological benefits to the area.

4. Sod cutting for management and restoration of Grey dunes

Introduction by Mark van Til, Waternet

Grey dunes suffered especially from grass and shrub encroachment in the second half of the 20th Century, due to prolonged nitrogen deposition, causing acidification and eutrophication, and a decline of the rabbit population. This led to a widespread loss in species diversity considering both flora and fauna.

Sod cutting is applied in order to remove the nutrient rich and acidified topsoil layer. The expert meeting visited experiments with sod cutting in grass and shrub encroached dune grasslands at the Rozenwaterveld. This project executed in 2002 resulted in a quick recovery of the vegetation (Van Til & Kooijman 2006). Besides also characteristic fauna species such as rabbit, blue-winged grasshopper, the Niobe fritillary and the Queen of Spain fritillary profited from the measure. Success parameters for this measure are the small scale approach, the presence of relic populations in the neighbourhood, and the development of a vegetation with a high structure diversity with bare sand. Up scaling of sod cutting in combination with the application of mowing management and the recovery of small blow outs further encouraged the restoration of Grey dune habitat at the Rozenwaterveld.

As part of the Life+ project in the AWD sod cutting will be applied in grass and shrub encroached grey dunes at the Tonneblink, Pollenberg and Vinkenveld. Besides, sod cutting in (former) thickets of *Prunus serotina* and in grass and shrub encroached dune slacks will also lead to a substantial recovery of Grey dune habitat in Haasvelderduinen-Boeveld and in the middle dunes.

Biodiversity depends on good management.

Key statements

> Sodcutting also promoted sand mobility. Another plus point is that Sodcutting replaces the natural process of sand spray. *(Gijsbert ten Napel)*

The results speak for themselves. This is a technique which could be more widely applied to similar but different problems. It has the advantage of maintaining the structure and pattern of the landscape mosaic with relatively little disruption. It is important knowledge to disseminate. *(John Houston)*

After the big restoration work, follow-up management is essential. Since grazers prefer plants that are at their earlier stages, grazing was applied quickly after sod cutting. *(Mark van Til)*

Mark van Til

Conclusion of the field visits and discussion

Rabbit grazing plays an important role in the recovery of the grey dunes. However, their population is very variable and, therefore, not reliable. Shallow sod cutting is an effective management technique when applied on a small-scale. This measure has resulted in an increase in grey dune flora and fauna species and open varied vegetation. This highlights the need of follow-up measures such as sheep grazing. The Amsterdam experience has proved to be successful.

5. Pine removal for restoration

Introduction by Luc Geelen, Waternet

Pines were planted in the AWD in several periods on several sites in the 30's and 50's of the last century. From the time of planting, the pines began to exert an ever stronger influence on the dunes. On the plantation sites, natural dune mobility stopped. The water table dropped on the site and in the surrounding of the woodland, light levels were lowered, temperature extremes were reduced and soil character changed. Species characteristic of the open dunes were lost, to be replaced by relatively few common woodland species, but also birds of prey start to breed in the pine trees.

With time the maturing pines begin to seed into surrounding dunes and drier slacks. In the areas of remaining open dunes, conditions are altered by the shelterbelt effect of the trees. This reduced the influence of prevailing salt-loaded winds which play an essential role in maintaining the character of the more open dune system.

Removal of Pine woodland has a wider impact on the dune ecosystem and Waternet intends to remove 4 ha of pine woodland. However socio-economic research showed that the general public is not in favour of this management intervention.

Excursion to the Haasveld pine plantation, in the AWD

Key statements

Pines have been planted. They should disappear when necessary for the restoration of dune landscapes. *(Gijsbert ten Napel)*

Pine trees should be removed because they do not belong to the area. Its elimination will provide an open area that may contribute to increase wind speed and therefore dune mobility. *(Annemiek Kooijman)*

Removing the pine plantations will help reduce the stress on the water table and will help restore the dune landscape. *(Luc Geelen)*

Luc Geelen

Despite red squirrels, pine removal is one of the most important management measures in open dune landscapes. Rejuvenation from old stands and spread to new places is known from different dune areas. *(Maike Isermann)*

The removal of pines, stumps and the organic topsoil layer will maximise the intrinsic values of the area, promote the aesthetics of the open landscape and reduce the stress on the water table. *(Paul Rooney)*

The removal of pine plantations can be a socially sensitive issue and needs to be carefully considered. The ecological impact of the woodland can probably be almost totally reduced without removal of all trees. Complete clearance is often a landscape choice and should be presented in this way. *(John Houston)*

John Houston

The pine plantation to be removed is located next to a path. People can see many trees are already dying. Since people do not like to walk through a graveyard of trees, this is a good reason to justify the complete removal of the plantation, but it might be an option to leave some large vital trees if this would be beneficial for public support. *(Albert Salman)*

Albert Salman

Conclusion of the field visits and discussion

The conifer plantation should be cut down in order to restore open dune habitat conditions in the area and landscape value. This should be done together with the removal of the stumps and the litter layer. Social opposition must be seriously tackled. In this way a special effort must be devoted in providing clear communication on this intervention to make people understand the benefits that this restoration measure will entail and, thus, ensure public support.

6. Black cherry control

Introduction by Luc Geelen, Waternet

Black Cherry (*Prunus serotina*) is an invasive exotic species in the Netherlands. Especially the last twenty years Black Cherry has also expanded enormously in the Dutch dunes. Particular in deteriorated sea buckthorn thickets, but also in the open dunes Black Cherry spreads rapidly. Due to its rapid growth Black Cherry is replacing dune vegetation and is forming a serious threat to the conservation objectives of the Natura 2000 area Kennemerland Zuid. Especially the habitat types H2160 (sea buckthorn thickets), and H2130A and H2130B (calcareous and decalcified dune grasslands) are affected.

In 2004 the first complete mapping of Black Cherry in the 3400 ha of the AWD was executed and a management plan started in 2005. Over the years, a great management effort has been performed. Larger trees are cut and pulled, areas are mowed, sod cutting is applied and grazing with sheep and cattle is applied on an extensive scale to combat Black Cherry. In 2008 and 2012 the mapping of the area was repeated to monitor the spread of the species and to monitor effects of the management.

Control of invasive alien species is not easy and this is especially true for Black Cherry. Experiences of others from different dune areas and own experiences are helpful in making management decisions. There is not one single solution.

Grazing to fight Black Cherry is used in several Dutch dunes (sheep, cows, goats, mix). Especially sheep and goats in higher densities appear to be effective. This can also be achieved with the targeted use of a shepherd led herd. It is important that grazers not only eat Black Cherry, but also get enough grass in their menu. Sheep are eating mostly (older) seedlings and new shoots from sawed stumps. Cattle do not seek the Black Cherry, but graze it passing on leaves. In the autumn cows go after the berries of Black Cherry, sometimes therefore breaking many branches and opening shrubs. Sawing and the succeeding use of glyphosate works on the sawed stumps and is very effectively, especially when it is performed in dry periods in September / October. However glyphosate cannot be applied in the AWD due to its drinking water abstraction function.

Grubbing up method with extraction of whole trees in Black Cherry stands succeeding management by intense sheep or cattle grazing is necessary. In suitable – not too hilly - terrain with tightly packed young seedlings succeeding mowing can be useful. Also local sod cutting may be considered to counteract germination and re-establishment, effective measure but costly. The effectiveness of Ring-sawing varies, it is necessary to repeat it several times, but it is especially applicable in inaccessible terrain with solitary adult specimens, and it does not result in wood waste.

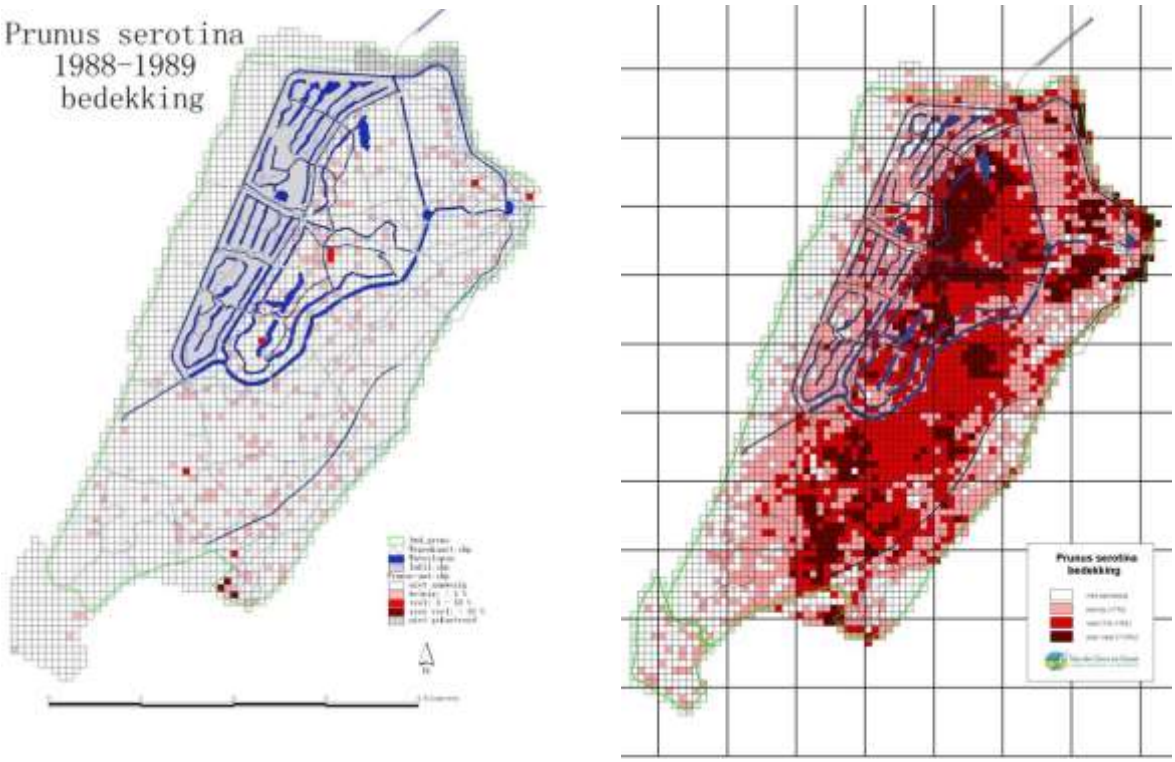

Figure 3a and 3b. *Prunus serotina presence (per plot) in 1988-1989 (left side) and in 2004 (right side).White = not present; pink <1%; red 1-10%; dark red >10%.*

Clockwise from top left: Scrub management work at the Amsterdam Waterworks; stumps of Prunus on part of the AWD after restoration works; volunteers cutting scrub at the AWD.

Key statements

Edith van Mourik

Since project money is not always available, it should be convenient to find a natural and economic way to keep Prunus under control. *(Edith van Mourik)*

Invasive alien species need to be tackled hard; the potential future loss of biodiversity is massive. Money is the major bottleneck, the removal of invasive plant species is often very labour intensive. Action should be taken at the very early stages of invasion. Broad, preferably European legal initiatives need to be taken in order to improve prevention of alien species escaping into natural habitats. *(Sam Provoost)*

Rhodri Dafydd

Control Prunus is possible but costly. Management may be dictated by the requirement to achieve favourable conservation status of specific SAC features, therefore if Prunus threatens these Natura 2000 features it will be necessary to control it. (Rhodri Dafydd)

Is it sustainable long-term if the adjacent sites are not doing anything to keep *Prunus serotina* under control? A strategic approach needs to be taken in order to tackle this issue instead of being only focused on site management. It is crucial to implement a science base project in a realistic context. *(Paul Rooney)*

Linda Mooij

Given current resources and determination, it would seem possible to eradicate *Prunus serotina* from the Amsterdam dunes. Such a policy, however, should be seen in the regional context so that a core area of eradication is protected by a buffer zone. *(John Houston)* The discussion on Black cherry (*Prunus serotina*) control is according to my opinion more about woodland and the position of woodland within the Dune system. If Black cherry is a problem, what about encroachment of *Populus tremula, Crataegus monogyna, Prunus spinosa, Ligustrum vulgare, Sambucus nigra and eventually Fagus sylvatica, Fraxinus excelsior, Acer campestre, Ulmus minor, Acer pseudoplatanus, Quercus robur and Hippophae rhamnoides*? Succession of soil under current conditions in an eventually more damped ecosystem with less dynamic (erosion, sedimentation and inundation) gives way to the development of woodland, whether you like it or not. The position of the different succession stages in the dune system ought to be more compressed in a geological transgression phase than we actually experience. The present landscape is a result of the intensive use of the dune system since its development during the middle ages. Plant communities are not static entities; they develop and change in abundance and composition. *(Hans Wondergem)*

Hans Wondergem

Management measures are necessary. We have to keep looking for the cheapest interventions. (Peter Olijhoek)

Peter Olijhoek

Black cherry control is very important from the beginning of the first establishment because in later stages the removal will be very difficult. Information of the public, concerning the use as ornamental plant is important. *(Maike Isermann)*

Eradication is the best but impossible. Prevent expansion. Continue to suppress in sensitive and rare habitats. Remove seed trees. *(Gijsbert ten Napel)*

In the last decade tens of hectares of habitats have been lost. In some areas Prunus is coming back in the Hippophae shrubs and they are pushing them away due, in a big part, a too early decrease in grazing intensity. *(Luc Geelen)*

Loic Gouguet

Prunus should be controlled to keep open grassland and shrub habitats. Roots removal and soil disturbance will allow rejuvenation. *(Annemiek Kooijman)*

First 80-90% of Prunus will be eradicated after the Life+ project. However, the last 10-20% will cost a lot of effort and money. Follow-up management is essential and small scale work. Next invasive species control should start earlier. *(Mark van Til)*

It is possible to control Prunus, however money is the main constraint. It is necessary to manage *Prunus serotina* where it is too late to stop expansion. Have a look all around the area of Waternet. *(Loic Gouguet)*

Marten Annema

We need a strategic approach to invasive alien management with a wide geographical coverage. *(Marten Annema)*

A strategy on “follow-up” management is needed. Put everything you got on it. Continue the management as long it takes. Don’t stop too early. Involve the neighbours. *(Willem Stuulen)*

Willem Stuulen

Conclusion of the field visits and discussion

Complete and radical removal of Prunus roots and seed bank is required to prevent re-sprouting and re-establishment. Although the strategy and management practices of Waternet are broadly supported, many experts feel that the control area is sometimes too restricted, especially when much caution is given with regard to surrounding vegetation such as Sea buckthorn (*Hippophae*).

Leaving surrounding scrub vegetation intact is beneficial for re-establishment from seeds (birds) and also physically hinders grazing and other actions to control re-establishment. It is questioned whether the presence of whorl snails in surrounding vegetation should be a legitimate obstacle to removing this vegetation, since the distribution of the snail is possibly much wider than acknowledged, due to limited field observation.

Large-scale and complete clearing of Prunus including the surrounding scrub vegetation at first sight gives poor vegetation results. However, in this case small scale scraping and encouraging dynamics may sufficiently increase biodiversity. To control Prunus on long-term, it seems that the enhancement of dune mobility is a better strategy than caution for surrounding vegetation and snails. In other provinces then Zuid-Holland authorities in charge seem to be more flexible regarding the snail. Possibly this is the only strategy leading towards a dune with conservation value and without Prunus dominance.
After clearing and follow-up management, continuous monitoring and permanent effort are required.

7. Measuring habitat quality

Habitats are typically quantified in hectares. However, how habitat quality should be measured? A short discussion was held during the meeting about the aspects that should be considered when assessing habitat quality. More attention should be paid to monitoring aspects and habitat quality assessment.

Key statements

Natura 2000 habitat definition is largely based on vegetation characteristics. A more substantial habitat quality assessment requires use of animal species with a larger home-range and more complex habitat requirements. Questions such as 'how large do habitat-patches need to be' or 'what mosaic structure is desirable' cannot be answered properly without the use of fauna habitat characteristics. The use of *Argynnis niobe* and other invertebrates as target species for grey dune restoration in the Amsterdam Watersupply Dunes is a good example of this approach. European initiatives should be taken to improve calibration of habitat quality assessment between member states. *(Sam Provoost)*

Sam Provoost

It is important to combine management with scientific monitoring, to be able to evaluate the management, also small scale management. *(Maike Isermann)*

The real health of dune systems is not only given by its extension but also by distribution, function, habitat structure and background processes. All are expressions of that health. *(Paul Rooney)*

Paul Rooney

Summary

During the meeting the experts broadly supported the strategy and management actions in the "Amsterdam Dunes, source for nature dune restoration project" (LIFE11 NAT/NL/000776).

Coastal dune grasslands (grey dunes habitats, H2130) are under threat mainly due to grass and shrub encroachment. A surplus of nitrogen deposition is an important factor.

Rabbit grazing plays an important role in the recovery of the grey dunes. However, their population is very variable and, therefore, not reliable. Shallow sod cutting is an effective management technique when applied on a small-scale in grass and shrub encroached habitats.

Destabilisation of dune systems through the creation of new blow-outs in various locations can be an effective management tool to stimulate recovery. It can generate areas of bare sand helping to rejuvenate the landscape.

The conifer plantation should be cut down in order to restore open dune habitat conditions in the area and landscape value. This should be done together with the removal of the stumps and the litter layer. Social opposition must be seriously tackled. In this way, a special effort must be devoted in providing clear communication on this intervention to make people understand the benefits that this restoration measure will entail and, thus, ensure public support.

To control the invasive *Prunus serotina* complete and radical removal of roots and seed bank is required to prevent re-sprouting and re-establishment. Although the strategy and management practices of Waternet are supported, many experts feel that the control area is sometimes too restricted, especially when much caution is given with regard to surrounding vegetation such as Sea buckthorn (*Hippophae*). In this case small scale scraping and encouraging dynamics may sufficiently increase biodiversity.

Natura 2000 habitat definition is largely based on vegetation characteristics. Although little time could be spent on the item a more substantial habitat quality assessment was promoted with the use of animal species with a larger home-range and more complex habitat requirements.

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Organisation of the Expert meeting
Waternet.

Location
Nederzandt (Noordwijk), the Netherlands.

Sessions chair
Albert Salman MSc (Coastal & Marine Union - EUCC)

Meeting report
Gloria de Santa Catalina Capellan and Albert Salman (EUCC)

Pictures
Linda Mooij (Waternet) and Albert Salman (EUCC)
Photo page 6: Waternet.
Photos pages 7-8: Rhodri Dafydd
Photos page 10: Waternet
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