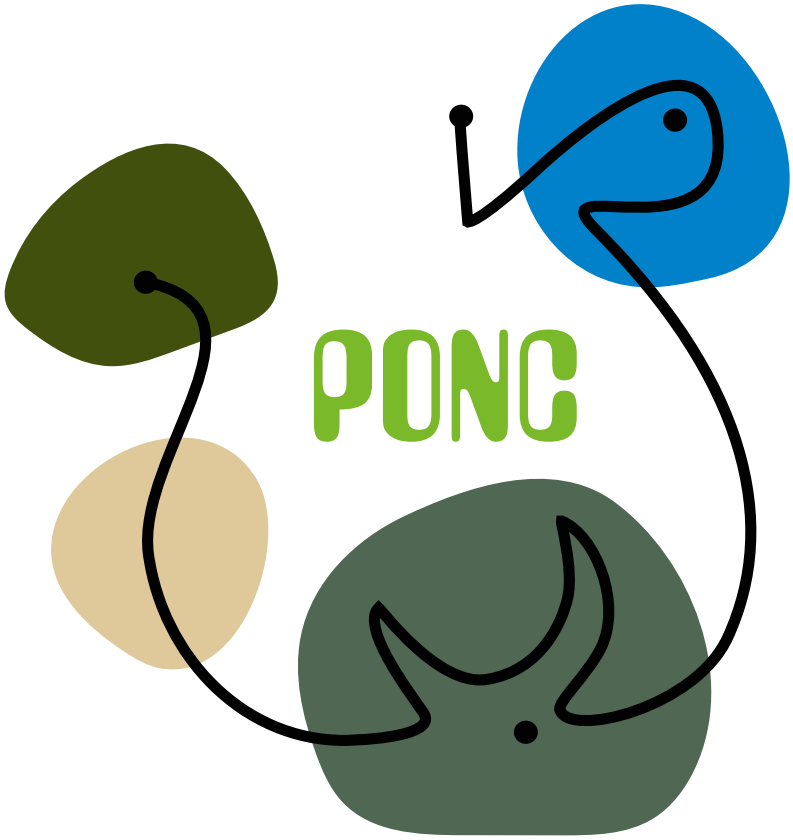
Towards a wilder,
cheaper and more robust
nature management

PONC

Process Oriented Nature Conservation



Process Oriented Nature Conservation:

wilder, cheaper and more robust nature management

Guidelines on how to apply the principles of process oriented nature management

Co-funded by the European Union

Co-funded by the European Union. The European Union support for the production of this publication does not constitute endorsement of the contents which reflects the views only of the authors, and the European Union cannot be held responsible for any use which may be made of the information contained therein.

Team of authors

Leo Linnartz, Judith Slagt, Lucy Dötig, Vikki Bengtsson, Ola Bengtsson, Tom Joye, Alexandra Mannaert, Jörgen Andersson, Zsuzsanna Aczél-Fridrich, An Creemers

Suggested reference

Please refer to this document as Process oriented nature conservation: a wilder, cheaper and more robust nature management, 2023. Digital publication

Creative commons licence CC BY-ND 4.0

INTRODUCTION

When asked to describe a perfect, idyllic landscape, no one will mention fences, barbed wire, roads or fields with monocultures, yet these are common in our highly populated landscapes. We introduced them to give structure to the environment, to define ownership boundaries and control people and animals. Natural processes however, ignore these boundaries and run their course regardless of these obstacles, unless the obstacle is too big, or indeed the area too small.

In the PONC project, where PONC stands for Process Oriented Nature Conservation, six partners from the Netherlands, Belgium, Sweden and Romania, all with a background in nature conservation, forestry and agriculture, tried to find out how we could make the landscape less hostile for biodiversity and how to remove the boundaries or obstacles to natural processes. We focused on landscapes which are challenging in the sense that they have to fulfil many functions and with hundreds of stakeholders: our highly populated, urbanised landscapes.

Our goal was to work with nature when possible and give room for natural processes whenever possible. We applied our questions, insights, discussions, problems and solutions to theoretical test cases in the participating countries. We visited landscapes in each country and tried to figure out why some aspects worked and others did not, and if they were transferable to other countries. Our optimism for finding solutions to create a wilder landscape was already high in the beginning, and while we all gained a lot more knowledge during these 3 years, our optimism at the end of this project is even higher. We all believe it is possible to find solutions to create landscapes, big or small, where natural processes can occur, alongside people. We are convinced that all stakeholders will benefit in the long run.

In order to safeguard the exchange of innovative knowledge and experience between partners and for all stakeholders, we collated the knowledge and experience gained in the project, in this handbook for professionals, guiding them through the process of applying process oriented principles in their nature conservation and landscape management projects. This product is a compilation of the learning process that partners went through during the project and serves as a roadmap towards successful introduction of process oriented nature conservation in utilised/ urbanised landscapes.

This document will short-circuit the learning process for other organisations going through the same process in the future, allowing for them to learn from success stories and avoid pitfalls. This handbook does not provide all the answers, but at least identifies the right questions to be asked and the right stakeholders to talk to.

We really enjoyed the opportunity to discuss and learn at a theoretical level, now we are looking forward to putting our knowledge into practice. We hope you are too after reading these guidelines.

1. Summary

In our contemporary European landscape there is an increasing division between the natural and the cultural landscape (agriculture, industry, habitation, ...). What little is left of functioning ecosystems is often secured in nature reserves, under very strict legal protection. And rightly so! But the cultural landscape surrounding these natural areas is increasingly devoid of any natural processes or biodiversity and our choices in the cultural landscape have an ever increasing negative impact on the ecosystems in the adjoining natural areas.

In the PONC project (2020-2023), where PONC stands for Process Oriented Nature Conservation, we explored the possibilities for allowing natural processes back into the cultural landscape, for the good of both nature ánd humans. There are several options on how to look at the concept of process oriented nature conservation. We used this term, rather than the term 'rewilding' because we were aiming at man-made landscapes where man obviously is a part in the equation, compared to vast areas which are 're-wilded' after they were deserted by inhabitants.

The overview of natural processes and listing of possible proxies for these natural processes, can help to focus on natural processes rather than focusing on just species or habitats. The PONC score we developed is a tool to measure and visualise the impact of introducing PONC principles on a site. This might help in communicating with stakeholders.

Focusing on man-made landscapes means you have to make compromises when wanting to rewild an area: some natural processes cannot be left uncontrolled, as this might lead to all kinds of conflicts. Compromises, like using proxies, must however not be seen as a defeat, but rather as a means to enhance the natural diversity on a site. Embracing the compromise is as much an exercise in 'letting go' rather than 'holding on': certain aspects will be lost, others will be strengthened and new ones will appear.

We, people, live off the land and feed off the land and are therefore dependent on the land. Nature is also dependent on the same land. We believe that a large part of our landscape can host large scale natural processes ànd at the same time provide for human needs. Examples thereof prove that this is possible. Even aspects that are now considered as problems, like invasive species, can be dealt with more easily and more cost efficiently with a PONC approach: a lot of these invasive plants are eaten and kept at bay by (re)introduced animals.

Apart from increasing biodiversity and wildlife, this approach will bring increased climate resilience against floods, drought and wildfires, numerous ecosystem services and more robust nature. Allowing more space for natural processes to develop very often results in a landscape which is more varied with a mosaic of different habitats. The larger the area, the greater the mosaic that may develop and thus the greater the benefit for biodiversity. However, wildness is beneficial even on the smallest scale, such as in your backgarden!

The costs for introducing or restoring natural processes may be lower than current standard management procedures. Let us not forget the benefits for us, people: in projects that focus on natural processes and where people are a core element to succeed, the connection between man and nature is restored and a lot more opportunities appear like ecotourism, volunteering, local products, etc.

Interaction between wildlife and humans is one of the issues that usually comes to mind first when thinking of 'rewilding'. But in every project there will be lots of challenges to overcome. An overview of different types of stumbling blocks and possible solutions will help managers to anticipate and to find a suitable solution for every problem. We have identified ecological, economic, social, legislative and natural stumbling blocks which, depending on the scale of the project, the location and the stakeholders, all require a different approach. The key message is to never give up, there is always an answer to the problem.

People working in nature conservation, regenerative agriculture, ecotourism, rewilding, sustainable forest management, water management, etc. all have an interest when dealing with natural processes, but also inhabitants, local government, landowners, the general public are not to be forgotten. Chapter 7 provides guidelines for engaging and inspiring many different groups of stakeholders in process oriented nature conservation during a workshop. And of course every situation is unique and needs a tailor made approach, but in our experience from the pilot workshops involving stakeholders, the principles for engaging different groups of stakeholders are the same.

Finally we provide some tips for putting process oriented nature conservation into practice. Stories and information based on our field trips, discussions and insights are summarised into four main topics: natural grazing, predation, regenerative agriculture and water management. The list of questions added at the end will take you through the process of applying the PONC principles step-by-step.

In order to allow natural processes back in, both biotic and abiotic, we will need to let go of some of our grip on the landscape surrounding us. Change is part of nature and natural dynamics are what makes a landscape resilient and robust. However, we will have to accept that if we want to work with nature and not against it, it will follow its own pace, which is not always the same as ours. But even in the tiniest spaces and close to humans, there is room for natural processes.

2. Project outline

Together with 6 partners from Belgium, the Netherlands, Sweden and Romania we started up the PONC project, where PONC stands for Process Oriented Nature Conservation. We also had an advisory partner in the UK; Knepp Wilding. PONC aims at exploring process oriented nature conservation within man made landscapes, such as our European agricultural or urbanised landscapes. The overall objective of the project was to build up knowledge and share experiences in transferring process oriented nature conservation concepts and solutions to new areas in Europe, both new geographical areas and new applications in utilised landscapes, thus multiplying their scale and potential impact.

In Europe society faces many challenges, not the least in the face of climate change and the corresponding increasing intensity and occurrence of extreme weather events. To conserve biodiversity and the wellbeing of human society, we need to explore nature-based solutions for these challenges. We need to focus our efforts on maintaining, restoring and (re)creating robust and resilient nature, capable of coping with the increasing pressure of human population, water and land use and climate change. Process oriented nature conservation, allowing for functional ecological processes driving nature, is one of the major nature-based solutions available. These ecological processes include climatic processes, hydrological processes, natural disturbances and interaction and dispersal and roaming of organisms, including large herbivores and carnivores. Most existing projects on wild nature are situated in remote, abandoned areas with only small human populations. PONC focused on man-made landscapes: landscapes where man is an essential part of the environment and where interaction between man and nature leads to new solutions.

With the outcome of this project we hope to boost and short-circuit the learning process for professionals wishing to apply process-oriented nature conservation as a tool to create wild and robust nature, intertwined with human activity. Wild and robust nature side-by-side with human activities will prove to be an invaluable tool to mitigate the consequences of climate change and to halt the loss of biodiversity.

The project was divided into a series of steps:

- Identifying good practice in existing process oriented nature projects and defining the driving forces behind successful projects.
- Application of process oriented nature conservation principles to selected case studies (e.g. agricultural or urban areas).
- Identification of stumbling blocks and solutions.
- Guidelines for stakeholder workshops.
- Handbook: how to apply process-oriented nature conservation management in practice.

The partnership included six partners from four countries from different backgrounds and origin, but all with experiences touching on process oriented nature conservation and land management.Therefore this handbook also reflects the experiences and lessons learned from different parts of Europe. We also included an advisory partner from the UK who has over 30 years of experience in applying natural processes on their land. Below is a brief introduction to the partners, but all partners are described more into detail in chapter 9.

PARTNERS

- Natuurinvest (coordinator, Belgium) and Agentschap voor Natuur en Bos (Belgium) have been working on issues in relation to public perception with predators in densely populated areas and sharing knowledge.

- Ark Rewilding Nederland (the Netherlands) has been working on rewilding approaches in the Netherlands and elsewhere in Europe for many decades.

- Fjällbete (Sweden) has been working on holistic regenerative agriculture in Sweden and beyond.

- Pro Natura (Sweden) have been involved in projects to look at wood pasture restoration and different solutions due to the lack of grazing animals.

- Milvus Group (Romania)has been working locally focusing on individual species' initiatives to gain traction and acceptance for larger scale opportunities.

- Knepp Estate (UK) in England has a rewilding project in a very intensively managed agricultural landscape.

The project ran from 2020 until 2023.

3. What is process oriented nature conservation?

3.1 Definitions

In this handbook, the term "process oriented nature conservation", or PONC for short, has been used to describe an approach to nature conservation that differs from a more traditional approach, which has focused on certain species or habitats. This term is closely related to other, similar terms that are used within the nature conservation sector. For clarification purposes we will therefore try to define the meaning of these terms and discuss similarities and differences.

In **a process oriented nature conservation** system functional, ecological processes are given space to develop and shape an ecosystem and the interactions between the species present in this ecosystem.

A similar concept that has been gaining traction in recent years is rewilding. This concept also focuses on natural, ecological processes and has been defined by Carver et al, 2021 as:

'The process of rebuilding, following major human disturbance, a natural ecosystem by restoring natural processes and the complete or near complete food web at all trophic levels as a self-sustaining and resilient ecosystem with biota that would have been present had the human disturbance not occurred.

Rewilding Europe, an organisation that works on a European scale, puts it as follows:

'Rewilding is a progressive approach to conservation. It's about letting nature take care of itself, enabling natural processes to shape land and sea, repair damaged ecosystems and restore degraded landscapes. Through rewilding, wildlife's natural rhythms create wilder, more biodiverse habitats.'

There are however quite a few other definitions in the scientific literature which perhaps partly is down to the fact that the concept of rewilding has been around for about 30 years, partly because different authors have slightly different ideas and partly due to geographical/ regional differences. Some authors are emphasising the reduction of human influence, some are focusing on the reintroduction of lost megafauna or carnivores, but most authors also very clearly include the increase of natural processes in their definitions. For a structured and very extensive overview of different approaches to the concept of rewilding see Pettorelli et. al. (2019).

Fig 3.1 - Free roaming reindeer grazing a sand dune and heathland area in the Swedish mountains in late summer. In the winter they migrate down to the woodland areas at lower elevation. The reindeers are a part of a traditional Sami husbandry system but the pattern of grazing and migration is the same as for wild reindeers in other parts of the tundra.

To some extent the process oriented approach to nature conservation is related to the concept of **nature-based solutions** that IUCN launched some 20 years ago, solutions that "leverage nature and the power of healthy ecosystems to protect people, optimise infrastructure and safeguard a stable and biodiverse future". Nature-based solutions are primarily a human-centred approach, finding solutions to the problems humans have created, but through what nature can provide. According to IUCN, Nature-based solutions are:

'...actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature. Nature-based solutions address societal challenges through the protection, sustainable management and restoration of both natural and modified ecosystems, benefiting both biodiversity and human well-being. Nature-based solutions are underpinned by benefits that flow from healthy ecosystems. They target major challenges like climate change, disaster risk reduction, food and water security, biodiversity loss and human health, and are critical to sustainable economic development'.

Fig 3.2 - Transforming an old rubbish dump to a green space is an example of nature based solutions (St Hans Backar, Lund, Sweden). Once the transformation is in place the ecological processes can start working.

Are all these terms describing the same thing, or are there fundamental differences? IUCN's nature-based solutions is a broad concept covering topics related to management of cities, infrastructure, land management in general, biodiversity and safety of human beings. Both rewilding and process-oriented nature conservation are well within the realms of IUCN's concept but have a slightly larger focus on biodiversity issues.

The term rewilding is sometimes understood to focus on recreating something that can be called 'wilderness' or something that can be considered to be 'wild' – a nature that consists of self-managing ecosystems where human influence is very low and natural processes are functioning.

The concept of process-oriented nature conservation does not exclude humans from "natural processes", but instead regards humans as a part (often very big, not necessarily very good) of many ecosystem processes. The focus is on understanding the natural processes themselves, how they work, why they work the way they do, and how these processes can be increased and lead to more biodiversity. This can happen with a higher or lower degree of human influence, but, at least in the more populated areas of the world, human influence will always be present in some form.

One example includes farming practices where new farming methods, by mimicking natural processes to a larger extent, can increase both biodiversity and the resilience of ecosystems over large landscape areas (sometimes called 'agri-wilding', see below). This can also provide a sustainable income for the farmers involved. Other examples include management of green spaces in cities, golf courses, recreational areas etc., places that we do not regard as 'wild' but where the potential for increasing the influence of natural, ecological processes is huge.

Is there really a difference between rewilding and process-oriented nature conservation? The answer to this is maybe no, if rewilding includes people as a component of the ecosystems and can consider urban or peri-urban areas within its remit . By focusing on increasing the natural processes, it allows the ideas to be included in any type of landscape or area, even in a very small way.

3.2 Overview of natural processes

It is often helpful to begin by distinguishing between processes mainly occurring as a consequence of abiotic (non-living) factors and processes dependent on biotic (living) factors. Examples of abiotic factors are storm/wind, fire, meandering, flooding, landslides or drought, while examples of biotic factors include grazing/herbivory (can be divided in different categories), beaver activities, predation, diseases, burrowing or tree hollowing and wood decay. Sometimes the abiotic and biotic factors can be difficult to separate from each other. Soil disturbance can take place as a consequence of wind or water related factors but can also happen due to burrowing or wallowing of different kinds of animals. A storm can fell or uproot a tree that has previously been colonised by wood decaying fungi.

Fig 3.3 - Storm damage to woodlands often occurs on a larger geographical scale. The effects are often dramatic and seen as "catastrophic" from a human perspective. From an ecosystem point of view however, the effects of storm, wildfire, flooding etc. are almost always a natural part of the ecosystem dynamics.

Some of the ecological processes can be directly influenced by different management actions, some can (perhaps) be indirectly influenced by management and some may not at all be influenced by how we manage sites or landscapes. An example of where we can influence the processes directly is grazing. As a land manager you can put up fences and thus steer where the animals are grazing, you can decide which type of animals you have on site and you can influence how long these animals graze a certain area. All these actions will have

an indirect influence on processes such as vegetation dynamics, pollination, photosynthesis, carbon storage, mineral cycling etc. Ecological processes, that are more or less completely out of control for us as human beings, are often related to abiotic factors that work on a larger geographical scale, such as drought, storm, landslides or avalanches. We can sometimes influence how resilient an area is to the effects of, for example, storm or drought, but the actual storm or drought is beyond our control.

From a practical point of view the ecological processes that can be directly influenced by management are the ones that will be most significant for landowners, conservationists or land managers. The PONC project has therefore focused on these processes. A list of these processes is presented in appendix 1. That list is not to be regarded as complete and any inspired land manager can add as much as he or she can come up with!

Fig 3.4 - Grazing with domesticated animals is a biotic process and often used, in different forms and with different animals, as a way to manage land for conservation purposes.

During the PONC project a number of case studies from Sweden, Belgium, the Netherlands and Romania were compiled to try to understand to what extent natural ecological processes are present in different types of landscapes.

All in all a relatively large number of different ecological processes were present in the areas included in the case study, but very often on a small scale. The most frequent in these areas were grazing of various types and natural water processes. Most landscapes in the case study consisted of land in which many natural processes to a large extent had been hindered or completely removed. Although no scientific sampling took place, it is reasonable to believe that this situation is representative for large parts of Europe, at least the more populated parts.

The conclusions from these case studies form the basis of this handbook and are presented primarily in chapter 5, 6, 7 and 8.

3.3 Proxies or the real thing?

Process-oriented nature conservation almost always involves compromise. This may be because species are missing or extinct (e.g. bison, beaver, wolf or bear), because of size/scale of the area, or because of the proximity to urban, highly populated areas. It is important however to be pragmatic and accepting of this fact, and not see it as a failure. Small changes which allow even a single natural process to function will make a difference!

One important way to deal with the lack of a specific natural process, is to make use of so-called proxies. A proxy is something that is used to replicate or mimic the natural process or species that is missing. Some examples include using Konik ponies which are a domesticated version of the extinct wild horse and functionally similar to them, or using an electric fence to keep groups of animals together mimicking the presence of a predator, or using sluices instead of beavers to mimic natural water dynamics.

Fig 3.5A and 3.5B - Beavers have been trimming a hazel stool (left). If there are no beavers present coppicing can mimic the same process (right).

Managing with proxies is, in essence, nothing new, even in conventional nature conservation. Using a digger in sand dunes to mimic wind erosion or big tidal events, or veteranisation to speed up hollow formation in younger trees are a few other examples. What is important is to think hard about the triggers in the natural process that are being mimicked and use nature as your guide and ally. Also remember that many management actions are a poor proxy of the natural thing. E.g. hunting or number regulation are poor proxies of predation, often being highly seasonal and leaving no carrion behind for scavengers.

3.4 Species based nature conservation and process oriented nature conservation: conflict or co-existence?

In nature conservation today we are used to working with the concept of species and/or habitats/biotopes. These are entities that traditionally have been described, defined and delineated and are thought to be comparatively easy to recognise once you are on site. An enormous amount of scientific effort has, for example, been invested in describing species world wide. A lot of effort has also been invested in describing and defining habitats, although not to the same extent and rigour as has been put into taxonomic research. Most national and international nature conservation efforts are based on species and/or habitats, the European Natura 2000-system, with the birds- and habitats directives as cornerstones, is a prime example of this.

Occurrence of any species or habitat, at any given location, is always the result of several ecological processes, yet we very often pay scant attention to these processes when describing a site or formulating a management objective. No formal documentation has been produced where ecological processes are described and defined. Most conservationists, land managers or other people working with these issues are aware of the ecological processes that are influencing the composition of flora, fauna or funga on a specific site, but it is often not at the forefront of our minds.

Dynamic nature is not easy to encapsulate in habitat types, certainly if these habitat types are fixed in space and time. For example, an estuary has an ever-changing mosaic of gullies, mud flats and sand bars. Natural processes create this and maintain the mosaic. Conserving these natural processes is the only way to conserve the habitats and species in an estuary. The same is happening as a consequence of climate change: species will be lost due to increasing temperatures, prolonged droughts, more prolonged and heavy rainfall etc. At the same time, new species will appear and as long as the natural processes remain intact, open grazed wood pastures, swamps, marshes, seepage areas, etc. will still be very much worth conserving and allow for these changes to take place..

That our focus has been on species and habitats is not difficult to understand or explain. The appearance of a delicate orchid or a sturdy longhorn beetle is something tangible or substantial, whilst the process leading to their appearance (such as fungi decaying wood, grazing, mycorrhiza etc.), is less so. This is also very often reflected in how practical conservation projects are set up. Many nature conservation projects are for example species-based or habitat-based, as the availability for funding such projects may be more easily available or easier to follow up. On the other hand, many of these species or habitat-based projects may be carried out by NGOs or civilians and not by a national agency, thus the continuity of these activities can be uncertain.

Fig 3.6 - The longhorn beetle Rhagium sycophanta is an example of a recognisable "entity", but its occurrence is dependent on a number of ecological processes for example the death of larger oaks and other deciduous trees, fungal colonisation and wood decay.

The holistic approach of nature conservation requires the protection of social and cultural values as well. In order to achieve this, it is important for several different institutions to collaborate, but also, for the work to be coordinated by a leading entity. This is often desirable and can lead to local communities jointly working towards conserving natural values. It may, however, require quite a lot of manpower which can be a limiting factor.

Species conservation programs can in some cases probably be more easily accepted by communities. People's expectations are transformed by a slowly functioning economy; contemplating about the future or about the absence of certain natural processes and their effect can be difficult under such circumstances, even if such changes can negatively affect humans. A long-term conservation program based on ecological processes, involving several stakeholders (e.g. local residents, nature conservation sector, forestry, water management, municipalities) can thus be more difficult to implement.

Another area of potential conflict is between traditional (agri)cultural practices and 'wild' nature. In many parts of Europe, species or habitat based nature conservation practices are often inspired by 19th century agricultural practices (when management was done manually, on a small scale and at a slow pace), e.g. hay making, herded cattle or sheep grazing, coppicing, etc. It is sometimes argued that these cultural practices should be stopped in order to let nature run its course and return to a 'wilder', more natural state. However, if the natural processes are not clearly defined, the result might be counterproductive, as these cultural practices are in fact not an unnatural disturbance, but proxies that mimic natural processes. By removing the 'unnatural' proxies, the result can actually be a decrease in biodiversity.

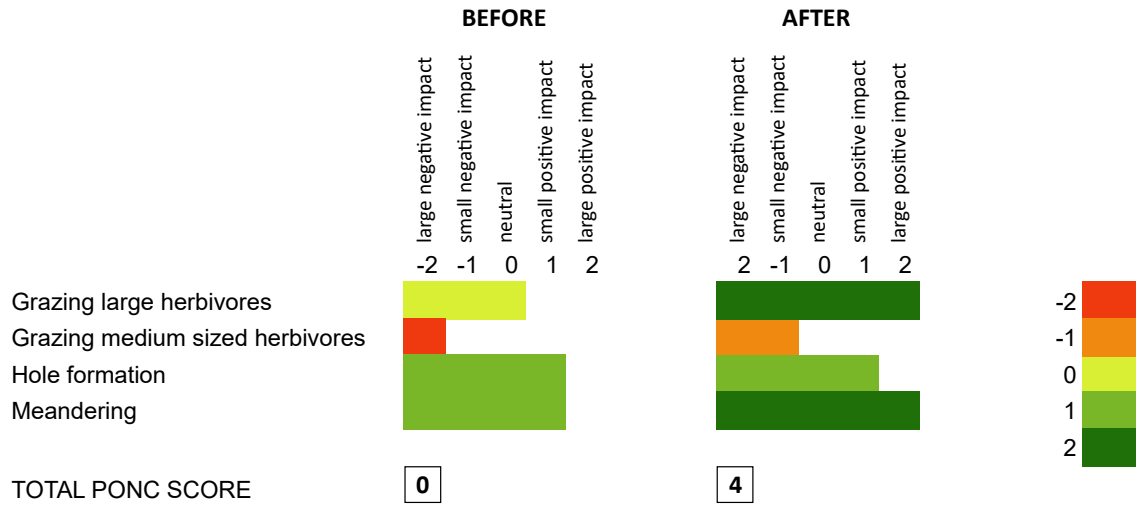
Fig 3.7: this 'Hutewald' in Hasbruch, Germany (a traditional wood pasture) hosted a huge biodiversity, mainly connected to the open landscape and the 800-year old open grown oak trees. With best intentions and for nature conservation, the 'unnatural' domesticated cattle was removed from the landscape about a century ago, resulting in beech regeneration, death of the ancient oak trees and a decrease of the associated biodiversity.

Considering all angles, would it be beneficial for nature conservation and biodiversity to focus more on ecological processes? Considering the whole picture, the answer to that question is undoubtedly "YES!" An increased awareness and understanding of presence or absence of ecological processes in various ecosystems will lead to a better understanding of species and habitat dynamics, enabling us to better predict future changes and improve conservation management. It may also provide tools for other sectors of society, such as agriculture, forestry, urban planning etc., to adjust current practices to be more favourable to biodiversity and yet be financially viable. This can also strengthen biodiversity and ecosystem resilience on a landscape level.

Focusing on ecological processes should not be seen as a conflicting approach to the more 'traditional' nature conservation but rather as a complementary approach. By just describing the ecological processes in the same context as the result of these processes (i. e. occurrence of species and/or habitats) a step forward has been taken.

3.5 Visualising the impact of introducing PONC on a site

Measuring the impact of natural processes is challenging, but vital if we are to understand if progress is being made. Torres et al, 2018 have developed a system to assess and measure the progress of rewilding. This system is however likely too complicated to be implemented on a wider scale. Sometimes it can just be useful to illustrate a change you want to make or a change that has happened, particularly as a communication tool. The idea with this tool is to give a score based on the level of impact of each relevant ecological process, highlighting if it is a negative impact (-2 or -1), neutral (0) or positive (+1, +2). It does not need to be an exhaustive list of all the processes on a specific site, but rather focus on the most important/significant ones, even if they are ones that you likely cannot alter (e.g. natural water dynamics). Otherwise there is a risk that the visual impact will be lost. This scoring system focuses primarily on the biodiversity aspects. In the example below we have scored the processes, as BEFORE, and AFTER, but you could also do BEFORE, NOW, AFTER, to illustrate steps in your progress. This is not intended to be a scientific approach, rather a pragmatic way to quickly illustrate the changes you want to make on a place or site.



The example above illustrates a wood pasture with reasonably old trees, where holes are forming, and where there is a canalised water course. The site is currently over-grazed by sheep. The management idea is to reduce the number of sheep and introduce larger herbivores (e.g. cattle), and with a digger increase the meandering/flooding regime in the stream.

STATUS BEFORE = no large herbivore grazing = 0; medium herbivores grazing with a negative impact = -2; hole formation happening to a limited scale = +1; Meandering at a limited scale = +1. The combined score before is 0 (0 + -2 + 1 + 1).

STATUS AFTER = large herbivores introduced and having a positive impact = +2; medium herbivores still present less negative impact = -1; Hole formation, no change = 1; Meandering improved and water holding capacity significantly improved along with more variation = +2; The combined score after is 4 (2 + -1 + 1+ 2).

4. Natural processes in a man-made landscape

4.1 Compromises for PONC in a man-made landscape

In people's minds, process oriented nature conservation and rewilding are usually connected to vast areas, abandoned (or never inhabited) by humans. But the explicit goal of this project was to explore if these principles could also be implemented in fragmented, man-made landscapes, inhabited and used by humans. Landscapes which are densely populated, where roads, houses, businesses, tourism, agriculture and so many more factors are interacting and competing.

In these landscapes, many natural processes cannot be left uncontrolled, as this would lead to conflicts of all kinds: conflicts with agriculture because of damage to their crops, problems with flooding of houses and businesses, etc. And also because we need to live off the land, we need to have agriculture to provide food, we need to harvest wood, we need to have recreational areas. For all of the above reasons, we must aim to allow for natural processes to be as wild, as complete and as large as possible, but at the same time accept that compromises will be unavoidable. However, compromises for allowing natural processes in a man-made landscape must not be seen as a 'defeat' or even inferior to 'real' wild nature. It is the pragmatic approach to reconnecting natural processes to the landscape we live in.

Below we will explore two of these compromises.

4.1.1 Compromises along lowland rivers

Naturally meandering lowland rivers have become sparse in densely populated areas. They have usually been canalised and straightened out for practical purposes. Natural processes linked to meandering rivers such as the occasional inundation of the banks and flat areas alongside the river are therefore no longer in place. When rivers are deepened and the banks made steeper and often reinforced, means that for example grazing animals can no longer get to the water (or out of the water). Therefore the river has become a barrier for nature instead of a natural corridor in the landscape. Also wetlands, marshes, shallow ponds and oxbow lakes adjoining meandering rivers are often lost in the urbanised landscape.

On the other hand, re-establishing the natural process of a meandering lowland river cannot be undertaken without taking into account the impact it will have on adjacent arable fields, grazing meadows, woodlands or other natural areas. In some cases the remeandering can be done with mutual agreement between the landowner and the authorities in charge of the waterways. This usually involves enormous budgets because it means buying off the land or compensating for the loss of income on that land due to inundation of the land or the simple fact of land disappearing, especially as when a river is remeandering, it is often impossible to predict where the river will flow exactly and it will change constantly. More important in densely populated areas is the fact that houses, industry and lots of infrastructure are laid out in the vicinity of rivers and streams, or even right on the banks of them. A meandering or re-meandering small brook is still a possibility in more open landscapes if good agreements can be made with all stakeholders, but a meandering river in crowded, man-made environments is only possible with

additional infrastructure. Infrastructure that can mimic the natural processes while at the same time ensuring the livelihood and welfare of surrounding inhabitants and actors.

Fig 4.1 In populated areas remeandering of rivers has its limits. Erosion of the outer bend of a river in this picture is approaching someone's garden fence, a clear limit of how far erosion will be acceptable.

4.1.2 Compromises with free roaming herbivores

Free roaming herbivores were once present in large numbers in our West-European landscape. By crossing the land and thereby not only grazing grasslands, but also shrubland and woodlands, they were a dominant factor in managing the ratio between closed and open landscape. They shape the landscape while at the same time creating habitats for other plants and wildlife thus enhancing biodiversity. Furthermore free roaming herbivores can reduce the risk of catastrophic fire, and increase carbon storage and climate change resilience. In Chapter 8.1 you can find more about this topic.

In an ideal, completely natural setting a free roaming herd consists of a mix of male and female animals and different ages, all together or in several smaller herds, depending on the species. The size of the herd also varies over time according to the species and local circumstances (availability of food, etc.). When there are no hard boundaries in the landscape and the herd can migrate for food and water sources according to their needs, they create an extensive mosaic of closed and open patches in the landscape and be able to move to new areas to find new territories. Social processes within the herd avoid inbreeding and ensure that the most fit males will reproduce.

It becomes clear that the use or introduction of free roaming herbivores will have to be linked to preconditions in our fragmented landscape with often small scale natural areas which are embedded between housing, industry, infrastructure and agriculture. There

might not always be room for expansion of the herd, nor for new herds to be formed because of limited space and food supply. Animals dying because of starvation during the winter season is generally not accepted by the general public.

In larger areas predation will have an effect on animal numbers and their distribution. Smaller herbivores are more vulnerable than bigger ones and will try to avoid predation by changing their behaviour and use of the area. In smaller areas human intervention (e.g. culling or removing animals) will help to avoid overpopulation and genetic inbreeding.

Another important factor when introducing semi-wild animals to people (or vice versa, depending on the way you look at it) is the fear factor. Generally people are afraid of what they don't know and the presence of the animals can make an area feel inaccessible. The size of the animals (European bison, Konik, ...) and the term '(semi)-wild' is often enough for people to 'be against them'. Putting up information panels and informing the public and other stakeholders in the vicinity of a site where animals will be introduced is a must. When introducing free roaming large grazers, the general public will also have to be 'educated' in order to avoid conflict, e.g. what minimal distance they have to keep to the animals.

Fig4.2 Educating visitors about does and don'ts is important when introducing large herbivores. Do not feed or stroke and keep your distance are the most important tips.

> **Our free-roaming grazing animals are really the managers of our rewilding project. Their disturbance creates a mosaic of dynamic, shifting habitats that is rocket-fuel for wildlife.**

Opening sentence on the website of Knepp Estate/rewilding

It is clear that we need to make compromises if we want humans to live within and amongst nature. Even though most of the natural processes cannot run freely, we can make use of proxies (see chapter 3.3) to mimic the effects of the natural process and to reinstate the effects and impact it has on the surroundings, thus hoping for a new balance to form, which is beneficial for both humans and nature.

The steps in such a process are often many and the final goal may only be seen in the distant future. For us human beings accustomed to quick wins and substantial gains, it is counterintuitive to contribute to or even accept something we will not benefit from within our own lives. When reestablishing natural processes this is often the case. It is therefore recommended to set intermediate goals and to take small steps towards those intermediate goals. Also people are often reluctant to change: we accept what we know, we distrust what we don't know. Fear of the unknown, making assumptions and distrusting the change makers are some of the reasons it is hard to convince people of introducing change. Working on natural processes, be it on a small or large scale, needs to be a guided process with lots of different stakeholders. You can find more about this stakeholder process in chapter 7.

Another effect of reestablishing natural processes that has to do with change and the acceptance of people is the disappearance of cultural references in the landscape like avenues, pollards, hedges etc. When for example herbivores are introduced to an area where hedges and boundary trees mark the borders of a plot or where pollards are the majestic relics of a cultural landscape, they will most likely disappear as clear markings and will gradually become a part of their surroundings without necessarily disappearing completely. The fact they are not visible anymore as landmarks, makes people feel as if they've lost something of their cultural heritage.

Within that same mindset people also tend to take the landscape they knew and played in as a child as the 'default' landscape and regard this landscape and the accompanying wildlife and flora in it as the ideal landscape. They will take this landscape as a reference in their future lives. This is what is called the 'shifting baseline syndrome': 'a gradual change in the accepted norms for the condition of the natural environment due to a lack of human experience, memory and/or knowledge of its past condition'[1]. Related to PONC this means people usually don't have any knowledge of how the landscape looked before they were born, let alone hundreds or thousands of years ago. They will consider the landscape from their youth as the 'new baseline', as every generation will. Knowing about this process of shifting baselines is the first step in overcoming it, and convincing people that evolving towards a new landscape is not necessarily a bad thing..

1 (*)MASASHI SOGA1* AND KEVIN J. GASTON2, https://www.hsleiden.nl/binaries/content/assets/hsl/lectoraten/natuur-en-ontwikkeling-kind/buitenboosters/shiftin_baseline-syndrome.pdf

4.2 Living off the land

A very important aspect of process oriented nature in a man-made landscape is that humans are most likely not going to disappear from that landscape, and nor do we want them to! In some rural areas of Europe, there is a depopulation trend, which might offer possibilities for large scale rewilding. Other areas may have always remained pretty wild. But in many parts of Europe, especially the urbanised and more densely populated areas, process oriented nature conservation will have to take into account human needs. This includes 'harvesting' from that very landscape. Reality is that we will need to feed and provide for 8 billion people on this planet, and this population is going to increase in the coming decades. Additionally, in many places around the world, there is a righteous call for human development, raising the standard of living. So the challenge will be to feed and provide for that global population within the boundaries of our planet and with sufficient room for natural processes. One model is to make a sharp division between the human world, which is intensively used and almost devoid of nature, and the natural world, in which humans and their influence must be 'expelled' maximally. We do not believe this can ever be a successful model. Of course, some nature conservation areas must be strictly protected, but a large part of our landscape can host large scale natural processes ànd at the same time provide for human needs. Below we will explore some aspects of 'living off the land' that interfere with natural processes.

First of all, there is a huge potential in agriculture, to shift from the current predominance of (and policy support for) an agro-industrial approach to regenerative agriculture. This is discussed in more detail below (see Chapter 8.3).

Woodlands cover 39% of European land, but with large differences between countries and regions, ranging from over 60% forest cover in Sweden and Finland to around 10% in the Netherlands and Ireland (data: Eurostat). These woodlands can be used for recreation and might have biodiversity value. But many of them are commercial forestry plantations, with short rotation clearcutting practices, and little room for natural processes. On the other hand, given our extensive use of wood for paper, furniture, construction and heating, aiming to stop timber harvest will only lead to shifting our timber claims to other parts of the world, increasing deforestation there, e.g. in the tropics. So we should aim to adjust our own forestry practices to raise the potential for natural processes, even in commercially managed woodlands. This may include a more differentiated cutting regime, protected woodland reserves without any harvest, set-aside islands in commercial woodlands, a more natural tree species composition, multifunctional forest management (combining timber harvesting, biodiversity and recreation), introduction of large herbivores, etc. Many of these are being implemented throughout Europe and have proven to be successful.

Fig 4.3 Canoeing and cycling tourism has become a major economic activity in the Border Meuse area since more and more nature is appearing in the area.

The travel and tourism industry, in a broad sense of the term, is a vital part of the EU's economy and accounts for about 11% of the EU's total employment and 10% of the EU gross domestic product (GDP) (data: EU Parliament). And even though GDP may not be a very good indicator to attribute value, and we may all need to change our travel habits in the future, these numbers clearly indicate the importance of tourism and recreation for people. In man-made landscapes almost all of our natural areas, be it forests, beaches, sand dunes or grasslands, are used for some form of recreation. It is unrealistic to expect that tourism or recreation can be excluded from our natural sites (if that would even be a goal), so this aspect of 'human use' will have to be taken into account.

Apart from the economic impact of tourism in nature, the simple act of being in nature is considered to be beneficial for our mental health. Furthermore lots of sports like hiking, biking, horse riding, but also simply walking are carried out in nature. A survey conducted in 2021 across Europe[2] shows that EU citizens, when selecting tourism destinations, take into account the natural environment as one of the three major decision making aspects (the cultural offer and the price being the other two). The same study shows that a large majority of EU citizens (82%) are prepared to change some of their habits to support more sustainable tourism, for example, by consuming local products (55%), choosing ecological means of transport (36%) or by paying more to protect the natural environment (35%) or to benefit the local community (33%). Knowing this, the value (also economically) of reinstating natural processes in our landscape all of a sudden far exceeds the costs.

2 https://single-market-economy.ec.europa.eu/sectors/tourism/statistics-and-reports/eurobarometer_en

More and more people are willing to pay to travel off the beaten track and into the wild. Rewilding Europe, amongst others, are taking this opportunity to offer trips to rewilding sites. After all: why not be amazed by a natural site relatively close by rather than flying to Africa for a safari?

Industry and mining are generally considered to be quite hostile to nature, but this need not be the case. Of course there will always be an important impact of industry and mining on nature, which must be carefully assessed, and policy makers have to weigh the importance of industry and mining (and the associated costs, also in nature destruction) with the benefits for society. But if the decision has been made to grant permits for industrial zones or mining concessions, their design, the accompanying measures and their afterlife can take into account natural processes, leading to a major win for biodiversity. For example, connecting industrial zones to the surrounding landscape with blue-green networks is a no-brainer. Planting trees, hedgerows and digging ponds to collect rainwater can be done at low cost. But why not have the grasslands grazed by local farmers, why not connect the rainwater collection system of the whole industrial site to the surrounding blue network, why not let that rainwater find its way in a natural stream rather than a concrete canal?

Even hardcore industrial mining activity like gravel or sand extraction can benefit nature in the long term. Along the river Meuse for example, the local policy makers have created a legal framework in which the gravel extraction companies have a legal permit ensuring that they can continue their activity for the decades to come, but with a legal obligation to return their sites to nature (in this case giving more room to the river Meuse) after the extraction ends. Often these extraction sites are originally taken out of agricultural or industrial use, so the net space for nature along the river will continue to increase for decades, connected to these gravel extraction operations.

Fig 4.4 Gravel extraction along the river Meuse

We advocate a vision in which human use of the landscape does not necessarily rule out natural processes, but one in which well thought out and well designed human use, of any kind, can be intertwined with natural processes. Of course, this human use of the landscape must be reasoned and balanced and must add real value for society, taking into account potentially positive and negative impacts on nature and biodiversity.

4.3. Human development and biodiversity loss

Human development is a concept that refers to the process of enlarging people's freedoms and opportunities and improving their well-being. Increasing human development is generally seen as a good thing, something to strive for. But the other side of the coinl is that in the last centuries an increase in human development has resulted in a decline in biodiversity and overexploitation of natural resources.

It all comes down to how we want to measure human development. It is often measured in terms of economic prosperity, for example in an indicator like the 'gross domestic product', the market value of all the goods and services produced and sold in a specific time period by a country. Another indicator is the Human Development Index (HDI), created and updated by the United Nations Development Programme (UNDP), as a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living. In each case, the challenge in many places in the world, including Europe, is to support human development without overexploiting our planet. Because it is perfectly normal and acceptable that many people around the globe strive to reach a standard of living comparable to that of Western Europe, but we should not try to reach this goal in the same way. Giving natural processes more place in our landscape might help us to increase human development within the boundaries of what our planet can cope with.

> **"Insanity is doing the same thing over and over and expecting different results.**
>
> *anonymous, often attributed to Einstein"*

To illustrate the above, we can use the specific case of our Romanian partner organisation Milvus, which held a special position in the partnership. In the other countries of the partnership, we were mainly discussing the potential for restoration of natural processes. In large parts of the Romanian landscape, many natural processes are still largely intact and functioning on a landscape scale, but the main threat is the loss of these natural processes as Romania continues to develop economically during the coming decades, with strong EU support and funding. Below, Milvus shares their specific insight from the project.

Observations from Romania

In Romanian landscapes we can observe that natural processes can be sustained alongside human activities – to a certain point. Usually they go hand in hand with traditional land management methods. This is how semi-natural cultural landscapes with rich biodiversity, like hay meadows or wooded pastures have been preserved.

But, as in most of the former Eastern Bloc countries, economic prosperity is a priority to people, whereas wildlife conservation is met with little interest. Unfortunately this can be witnessed in the increasing trend of natural habitat loss in the country. Here are some examples:

According to official data provided by FAOSTAT, 46,000 ha of grasslands have been lost in Romania between 2007-2019. There is a huge demand for the intensification of agriculture and extension of arable land, therefore grasslands are ploughed and converted to arable land. This happens with habitats of protected species as well, such as the European ground squirrel. Diminishing numbers of European ground squirrels have a negative cascade effect on the population of the endangered saker falcon as well.

Changes in livestock numbers and management, result in the abandonment of grazing in some areas or the intensification of grazing in others, which can affect a number of protected species. For instance, if the vegetation on the pastures is too short due to livestock overgrazing in the hunting grounds of lesser spotted eagles, important prey animals (primarily small rodents) cannot survive here and eagles avoid these areas. Conversely, undergrazing leads to the disappearance of short-grass habitats, which in turn can lead to the local extinction of some species, like the European ground squirrel.

Infrastructure development has led to the destruction of the majority of wetlands in the country. Hence, many species depending on marshland or other stagnant waters (e.g. European pond turtle, moor frog, crucian carp, weatherfish) have disappeared locally or regionally. Water management authorities generally disregard conservation criteria, even inside protected areas.

The developing market economy has a huge impact on transport. The need for more vehicles means increased traffic and the construction of more highways and other roads in Romania. This affects natural habitats mostly through fragmentation, as well as rare or protected species through the isolation of their populations or through directly killing them by collisions with vehicles.

In the PONC project, after seeing the differences between existing natural processes in different parts of Europe, we were wondering how such processes will evolve in the future within Romania, and how decision makers could ensure that there is as little need as possible for rewilding or reintroduction of natural processes.

A growing number of conservation projects and programmes are being implemented in the country, many focusing on species protection. Most of them also bring economic benefits to local communities, but often these can only be seen over a longer period of time. Often short term projects don't have a strong enough impact to convince locals about the benefits of changing their attitude toward nature and rethink their landscape usage. However, we can observe a surge in the development of community-based nature conservation projects, with the results sustained by the local community.

As a result of EU membership, most nature conservation actions are implemented within

Natura 2000 protected areas, and to a lesser degree within natural parks. Consequently, natural processes could be effectively maintained only within these areas.

However, Romanian Natura 2000 protected areas (terrestrial sites cover 22.74% of the land area) are often considered as limiting factors for human development, although in Romania an important community-based nature conservation could be developed. In addition to subsidies given, in 2009 the first National Ecotourism Strategy was developed and ecotourism could play an important role in preserving natural landscapes, while encouraging communities to maintain their usual activities. Unfortunately this sector is developing quite slowly, not always taking into consideration the sustainability of nature, as is the case with many ski resorts, picnic/camping areas, bear tourism, etc.

Apart from economic development and human welfare, the general lack of knowledge or interest in the benefits to society of the natural ecosystem (also referred to as ecosystem services) and sustainability is another reason why a shift in management from standard practices to process oriented nature conservation is a slow process in Romania. For example lack of interest in management of wetlands, of riparian-waterside plants and trees leads to an unsuitable management of such areas, and quite often to their destruction by road construction or river regularisation works, as we often see e.g. in the case of alder forests along mountain rivers.

Providing more room for natural processes in our landscape, and subsequently maintaining this type of management is a hard task, as generally there is no emphasis on Romania's natural values. Even decision makers do not understand or take into account the damage to nature caused by infrastructure developments. One of the best examples for this is protected area management: in 2018 the right to manage Natura 2000 by NGOs was revoked, one of the (false) reasons given was that important developments (e.g. solar parks, highways, etc.) were blocked or delayed by protected area managers. One of the most important tasks of the National Agency for Protected Areas would be to establish the above mentioned cooperation between different sectors and assure community involvement in protected areas.

Process oriented nature conservation can be sustained in the long term, within protected areas. For this, protected area managers must consider community involvement and contribute not only to the protection of natural sites, but to the protection of cultural and social issues as well.

Good examples, where the improvement of the quality of life is in balance with natural values and their conservation, are rare and usually only in the long term. For long term results people must be convinced that they don't lose economically if novel or unusual solutions are applied. However, in order to make this work, good cooperation between various players is needed. Protected area management should work closely with sectors such as agriculture, infrastructure, energy, game management, water management, tourism, scientific institutions, forestry, etc.

In protected areas, natural processes are sustained by local communities, thus they contribute to the protection of the region's biodiversity, resulting in a win-win situation. One of the most common examples in Romania are the Transylvanian Highlands, where the developing economy has a strong connection with nature. With this initiative, many organisations support the development of local communities through ecotourism, while sustaining wild nature and mosaic landscape.

4.4. Invasive species in process-oriented nature conservation

In gardens and cities, as well as in natural areas exotic species are appearing. These are species that are not native to the area, but have been brought here by humans. Sometimes intentionally, as with garden plants and pond plants, but sometimes by accident, such as the many shellfish that have been spread around the world in ballast water from boats.

In their own home range, exotic species may be dominant, but not to the extent that they displace all other species. There they are held in check by numerous counterforces, such as diseases and parasites, to small and large grazers for plants and predators for animals. In their new region, without all those counterforces, exotic species often may have better chances of surviving compared with native plants and animals, which do have to deal with natural enemies. They then can become invasive and dominate.

However, control of invasive species is very intensive in terms of cost, time and the intervention itself, and is by no means always effective (Van der Loop et al. 2018). Eradication campaigns are often a waste of money because the species quickly returns. The question is whether we can also curb these invasive exotic species with process oriented management?

Grazing is one of these natural processes which is also naturally present everywhere on earth. Some invasive exotic species are very tasty for animals, such as water hyacinth for buffalo, giant hogweed for cattle, wisent and deer, or water crassula for pigs. These plant species do not disappear as a result, but they do become much less abundant than without grazing and regularly retreat to places where the grazers cannot easily reach. In general, grazers do have to learn that an exotic species is edible and perhaps also at what time of year it is best to eat, but after that, this can be an excellent mechanism for control.

Fig 4.5 Ungulates really love eating giant hogweed, preventing it from dominating the vegetation.

It may be more difficult when a plant has well-developed defensive mechanisms, such as thorns, spines or poisons, grows against cliffs or is a specialist in self-repair. The first two strategies are energetically costly to a plant and thus come at the expense of vigour. If grazing is eliminated, the fast growers always have an advantage over the species that produce poison or thorns. A fast-growing or high-growing (exotic) plant has an advantage in our ungrazed ecosystems and can

then dominate. Grazing by deer or large grazers, for example, can negate that advantage relatively easily and push an exotic species back to places where the grazers cannot reach.

This is also true for shrubs and trees: buddleia, indigo bush, Himalayan blackberry, black cherry and red oak are all very palatable, albeit some more than others. Trees and shrubs are most commonly eaten in winter, so year-round grazing is needed to reduce these species.

Besides foraging, large grazers have other effects on vegetation too. In search of food, the animals walk around a lot and break branches and stems. Some species, like Himalayan balsam and bracken have difficulties coping with the treading and trampling and disappear from the places where the grazers regularly visit. In addition to the relatively unconscious destruction by treading, there is also 'unintentional damage' by rutting bulls or deer and animals that want to groom their coats or wipe the felt from their antlers.

Another natural process is predation. Predators hunt both native and non-native animals. Wolf, for example, will eat coypu, in addition to beaver. Golden jackals are known to hunt coypu and muskrat so successfully that they have disappeared locally in the Danube Delta. Peregrine falcons and hawks take the invasive rose-ringed parakeets and hawks also take young Egyptian geese. In the latter lesser black-backed gulls and herring gulls are also masters. And white-tailed eagles snatch adult Egyptian geese. A healthy population of several species of predators is therefore important to keep invasive animals at bay.

Some exotic species are, however, inedible. These can either be poisonous plants or poisonous animals, such as the giant toad in Australia. Grazing or predation are then ineffective, or even dangerous to those who try. Toxic plants will not reproduce as quickly because producing the poison takes a lot of energy, resulting in slower growth. But if a toxic plant species manages to maintain and expand, it will slowly but surely come to dominate the surrounding vegetation. Often such species are kept in check by pests, parasites or soil living organisms. In process-oriented nature conservation management, this will involve waiting for the native insects, nematodes or plant parasites to switch to the exotic species. Experience also shows that, over time, more and more species (insects, nematodes and parasites) are able to find a newcomer, thus integrating it into the ecosystem. As a result, once dominant invasive species can even disappear, as happened several times in the past.

And what about the introduction of the proxies themselves: are Konik horses, exmoor ponies, water buffalo, etc. also all 'exotic' species? Since these species are closely related to species that are living here or that used to live here in Western Europe, we do not designate them as 'exotic', but as 'replacements' or 'proxies' of the original native ancestor. Instead of calling a plant or animal invasive or non-invasive a growing group of people are in favour of having a whole range of 'invasiveness' depending on different factors. If we use Rhys Tailor Lemoine's scale where an exotic species is renamed according to when and how it arrived, its relationship to historically present species, its purpose of introduction and its behaviour in the new area, we find most species are called either 'substitute introduction' or 'surrogate introduction'. Where a 'substitute introduction' is defined as 'closely related and ecologically similar to an extinct native' and where a 'surrogate introduction fills a similar role to an extinct native which is not closely related'. So the choice of an introduced species is important: adequate research on a suitable breed of cattle, horse or other grazer is a must. And in the case of (de)domesticated grazers, this selection must focus on robustness, hardiness, self-sufficiency and local adaptation, since all breeds have descended from their wild native ancestors. Of course working with local species in process oriented nature conservation is also always an option, and perhaps the most suitable starting point.

5. Potential benefits of a PONC approach

5.1 Nature conservation benefits

Natural processes, whether biotic or abiotic, have influenced our landscape for millions of years. They have an evolutionary timescale and have created a framework with which species have adapted and evolved. Natural processes rarely (if ever) create a monoculture or a homogenous environment. If we compare a planted woodland with a woodland that has grown up due to storms or changes in grazing pressure, a very different type of woodland develops. The former is homogenous, usually all trees being the same age and the distances between the trees are similar, and the light regime is homogenous. The latter usually has trees ranging in age and size and patches with more or less trees, as well as areas with more or less light reaching the floor. More species are associated with heterogeneous woodland than one which has been planted on a single occasion (Felton et al, 2010; Burton et al, 2018).

Fig 5.1 - beech monoculture plantation and New Forest windthrown tree and varied age structure (2 photos beside each other). On the left you can see a relatively even aged woodland which has been planted and on the right a naturally regenerated woodland with natural processes such as windthrow being allowed, creating a more varied structure.

Humans have, particularly since the Industrial revolution, been working very hard to manage or restrict natural processes by canalising rivers, restricting the migration of animals, planting trees on sand dunes to stop wind erosion, to name but a few. This has often been at great cost in terms of human energy, but also for the climate in terms of use of fossil fuels, and for biodiversity. Even within nature conservation management, much effort has been used to stop or restrict natural processes!

The 'rewilding' and 'regenerative agriculture' movement have raised awareness of the fundamental role that natural processes play in bringing vitality back to our ecosystems and

thus also favouring biodiversity. Examples include bringing back a range of herbivores on an arable farm (see text box on Knepp Estate below), reintroducing beaver to a watercourse and moving animals in a way that simulates migration. In most cases biodiversity responds faster than could possibly be imagined (Garrido et al, 2019; www.knepp.co.uk). This has provided some hope in the face of the threat of the next mass species extinction. In Kent, the recently reintroduced European bison opened up the forest along their preferred trails. The once dark trail edges are quickly colonised by common cow-weed and heath fritillary, a butterfly that was becoming rare.

When we think about managing nature conservation sites, we often forget that it is the natural processes that provide the opportunities for wildlife to thrive. We rarely do a survey of the existing or missing natural processes. We focus on the species and habitats present, but not always the ecological processes that create the conditions for the species. An example could be that we have species dependent upon decaying wood and we create an objective to create more decaying wood in terms of cubic metres, rather than an objective to ensure that trees will be allowed to go through the natural ageing process.

Allowing more space for natural processes to develop very often results in a landscape which is more varied with a mosaic of different habitats. A more diverse ecosystem is also a more stable ecosystem (Tilman et al, 2006; Lucini et al, 2020). Each of these different habitats also attract different species. The larger the area, the greater the mosaic that may develop and thus the greater the benefit for biodiversity, because the natural processes are more likely to be able to function and create vital ecosystems. However, just being more aware of the natural processes in your area and looking for ways to restore more, is beneficial even on the smallest scale, such as in your back garden! Increasing 'wildness' even on small scales and close to urban environments is a win for nature conservation.

Knepp Wildland Biodiversity gains since conversion in 2002

- 9 pairs of nightingale in 1999, now 42.
- 13 of 17 bat species in UK now found here
- Turtle dove - 3 males in 1999, now 16 singing males
- Purple emperor butterfly increased by several 100%

As Professor Sir John Lawton, author of the 2010 Making Space for Nature in the UK report says:

"Knepp Estate is one of the most exciting wildlife conservation projects in the UK, and indeed in Europe. If we can bring back nature at this scale and pace just 16 miles from Gatwick airport we can do it anywhere. I've seen it. It's truly wonderful, and it fills me with hope."

www.knepp.co.uk

Fig 5.2 - pigs at Knepp rootling the soil, which in turn creates microhabitats for other species.

5.2 Climate resilience benefits

Our investigations into different approaches for managing land have highlighted the significant climate benefits from working with natural processes and encouraging more. This is both in terms of resilience and in terms of climate change and reduction of emissions.

In the regenerative agriculture movement, there is strong emphasis on trying to achieve the highest possible vitality of the ecosystem with grazing animals. Some examples include optimising the productivity of plant growth, improving soil ecosystems, increasing water and carbon holding capacity in the soil as well as reduction in the use of fossil fuels and a no-plough approach, to name a few (see also chapter 8.3).

Working with water-based natural processes such as by reinstating meanders, slows the speed of the water, retains more of the nutrients and reduces the likelihood for flooding downstream. The natural processes that beaver encourage by building dams, creates areas of standing water, as well as increasing the water-holding capacity of the land area. Their dams also trap nutrients from the surrounding land and help reduce pollution in the sea. Fish, newts and dragonflies profit, as do their predators like otter, black stork and hobby.

Fig 5.3. - a beaver dam which is changing the water management regime and thus creating many more habitats

Grazing when implemented in a way that mimics natural processes encourages permanent pastures which reflect less sun and thus have a cooling effect. The root systems of the plants and the soil ecosystem store a lot more carbon than ploughed bare ground. When working with natural processes and with a range of large herbivores, the regeneration of trees and bushes creating a more mosaic landscape also makes the land more resilient to drought and provides natural shade for the animals, as well as a varied diet. The animals dunging and the associated insect fauna recycle nutrients.

Beaver and natural processes

A literature review by Thomsom et al, 2020 summarised that a single beaver dam may modify the volume of flowing water by 3.400–628.000 m^3 per annum. They also found that during slow water flow, a dam may withhold 30–60% of a stream system's water volume. In addition, the presence of beaver increases the amount of open water in a landscape ninefold during both wet and dry conditions and moderated extreme drought events. Dewey et al, 2022 found that beaver dams and ponds also remove significant amounts of nitrogen from the river's water.

5.3 Economic benefits

It is often perceived that by increasing natural processes or by increasing the 'wildness' of an area that people need to be excluded and that the land can no longer provide a sustainable income. There are many examples across Europe, where the economic situation has proven that the opposite is true. For example the Knepp Estate in England was losing money through conventional, high input farming. Now the estate makes more income and generates high quality, locally produced food and has a booming nature-tourism business. More people are now directly employed by the estate than before. In addition the income streams are more diverse making the estate more resilient and less reliant on subsidies.

There are also many examples of how it costs a lot of money and fossil fuels to stop or control natural processes e.g. flood management. When natural processes can take care of this issue, such as by allowing a stream to meander, a beaver to build a dam or a polder to flood, increasing the water holding capacity, then many of the costs disappear and unplanned flooding of houses reduces. See also above in terms of the income saved by the natural processes created by the presence of beaver.

Fig 5.4 - Sigma Plan showing that by working with natural processes lots of money can be saved as well as avoiding major flooding of peoples' homes. Here you can see the PONC group discussing how it has worked and the wetlands created after only 5 years.

Sigma Plan - how much did it save?

As a part of the Sigma Plan project, some calculations regarding the potential cost savings due to flood management were undertaken based on the climate models from the year 2000.

If no measures had been implemented in the Scheldt Estuary i.e. no Sigma Plan Project, the cost of damage from flooding (and expected sea level rise) was estimated to be about €6 million per year in 2004. This would have risen year on year to more than €50 million per year by 2100 (based on 2004 price levels), with the total cost of damage for the period 2000 to 2100 estimated at about €1 billion. The main cause of damage would have been to homes and industry along the river.

By planning the grazing in such a way so that the animals can graze or browse for longer through the year, the costs also reduce, both in terms of providing shelter during the winter months or providing supplementary food.

Fig 5.5. Ponies eating holly in the winter is a natural food source. Browsing and debarking is primarily a winter activity for ponies and bovines.

Ecotourism is a big factor in many larger areas where natural processes are allowed to develop and there are several examples where this has been successful. In Portugal and the Greater Coa Valley, which was largely abandoned land, and where the local community had largely left, is now providing several small businesses with a sustainable income via wine production, local food production and nature tourism.

5.4 Social benefits

Over the last decades, the population across Europe has become increasingly urbanised, with many people leaving the countryside for urban areas. This has resulted in an increasing disconnect between people and nature. Projects, or new approaches to managing the land, which focus on natural processes, and where people are a core part can help to reverse this trend.

Sites, where natural processes have been developed or supported provide excellent opportunities for education. New projects, working at a landscape scale, can involve the local communities and encourage re-engagement in the land and the ecosystems upon which we all are reliant. Ecotourism initiatives, where local people become guides for visitors, or where products are produced and sold locally have many social benefits, as well as climate benefits. The quality of the meat produced by animals feeding on a species-rich diet is also of higher quality and ensures that the income is kept locally as well.

Fig 5.6. - Vilde Mose in Denmark has an ecotourism guiding programme and it is fully booked every year. It has the sensation of an African safari in Europe with the opportunity to see bison grazing.

Volunteers can be involved in monitoring the development of the natural processes, or the associated species. This can encourage citizen science where once again the connection between people and nature can be reestablished.

The positive results that come quickly once areas are managed working with and mimicking natural processes gives people hope at a time when the climate crisis is becoming more acute. Natural processes often create beautiful landscapes that are appreciated by people, and they often cost less to manage.

Groene Woud, The Netherlands

This is an area, where as a consequence of reintroduction of red deer, and increasing natural processes, recreation has increased. The Café Groene Woud attracts many people, who stay at the nature camping area and who come to watch the rutting season of the red deer.

Local farmers included and are helping to join up the landscape, with sustainable farming taking place all around the corridors and cores of the nature areas.

6. Potential stumbling blocks and possible solutions of a PONC approach

When working with process oriented nature conservation, many stumbling blocks can arise. Stumbling blocks can be identical in all types of nature conservation, but some will be specific for the process-oriented approach. Several stumbling blocks will be most apparent during startup and will fade away in time if dealt with properly. Other stumbling blocks are less connected to project startup and might pop up at any time. And of course, some stumbling blocks will almost always pop up, where others might never do so. This chapter provides a selection of stumbling blocks and possible solutions that worked elsewhere, as inspiration and preparation for new PONC projects.

6.1 Ecological stumbling blocks

Nature targets

Many nature managers work according to fixed targets: they are supposed to conserve an x amount of this or that species, or x amount of this or that habitat type. In addition, these habitat types are supposed to remain at exactly the same spot. It is likely that there are also development goals: e.g. keep bush encroachment in the open areas under control and at the same time and in the same area, let natural succession convert monotonous pine forests into mixed broadleaved forests. Incompatible goals, such as these described are achieved by having a high grazing pressure on the one hand, little or no grazing pressure in the forest. These kinds of goals and targets are typically seen in Natura2000, where they are legally binding, but you see them also in other nature reserves. These targets may also be in contrast to where natural processes are pushing a natural area towards. Which in turn shows process oriented nature conservation can be somewhat problematic.

There are several ways of dealing with this situation:

- You don't adopt the PONC-approach and continue to work as you did before.
- You let go of as many fixed targets as possible and bring your goals in alignment with the natural processes you can restore. You adopt a PONC approach, steer with the natural processes and accept where this is taking you.
- You adopt an intermediate approach, where you relax some targets, adopt a PONC approach, but at the same time do additional nature management.

Of course, working in a Natura2000 area with legally binding targets, you mostly have to choose options 1 or 3. Option 3 may include fencing a part of an area off to avoid grazing, cutting trees and bushes on an open field or heather manually or using sheep flocks and a shepherd to maintain the open areas. You can also add more forest while not increasing the amount of grazing animals, as the grazing animals only spend limited time in the forest, thus lowering the grazing pressure in at least parts of the forest.

Good monitoring is necessary to guide the natural processes and the extra work efficiently. E.g. lower the grazing pressure in time and not when it is already too late.

Fig 6.1 Over time, more and more trees start growing in open heather. Pines and birch aren't very palatable and as a result, more pine and birch trees grow than are eaten by large herbivores and thus the N2000 habitat dry heather will gradually decrease in abundance. Large herbivores destroyed some braches of the Scots Pine on this picture, but that will not keep the young tree from growing tall.

Using domesticated animals

Standard commercial cattle breeds are often not adjusted to grazing outside year-round, because they cannot endure the weather or are unable to fend for themselves, e.g. they need supplementary feeding, are not able to give birth to their offspring without human intervention or develop problems with their hooves. In some countries (e.g. Sweden) year-round or winter grazing may even be against the law and special permits may be required .

Possible solution

- Switch to grazing with semi-feral bovines and horses. Horse breeds that are often used are Exmoor ponies, Gotlands russ, Koniks and Bosnian Mountain horses. Semi wild bovine breeds are Highland cattle, Galloway, Tauros, Sayaguesa and Rode Geus. Also semi-wild water buffalo or wild European bison can be used.

- Make sure that the individual animals you use have experience with living outside in winter and are well adapted to the local climate. If not, give them extra care in the first winter and when necessary even take them into a stable. In the second winter, animals will be more adapted and some additional food will suffice. Let the animals slowly adapt, without maltreating them. Offspring will do better than parents and from some point onwards the herd will be fully adapted.

- Long-legged breeds are better adapted to flat lowland conditions and short-legged breeds are better adapted for mountainous areas. Local breeds are often well adapted to local conditions, but many local breeds aren't suitable anymore as they have been turned into high productive breeds.

- Larger herbivores in self-selected social groups (~60% female, 40% male) are better able to fend off attacks by predators such as a wolf.

Fig 6.2 Often hardy races such as konik horses are used for grazing in nature areas. They are used to living outside in summer as well as in winter.

Persistent vegetation

When starting a project, the existing vegetation in the project area is very influential. For example, the area might consist of planted coniferous forest for the purpose of harvesting. Efforts to mechanically convert homogenous coniferous forests into mixed forest, broad-leaved forest or open habitats (heathland and land dunes), are costly and not always very effective. The old coniferous forest still dominates the seed bank and will try to return. These regenerating coniferous stands cause high maintenance costs otherwise suitable open habitats will eventually close up again.

Possible solution

- Thinning a pine forest allows it to transform naturally and at a faster pace than without intervening, however it is important to ensure variation when thinning (e.g. not even-spaced).

- Large grazers can help create a mosaic in the landscape, creating more heterogeneity. However, they have a preference for broadleaved trees, so when transforming from pine to mixed forest, the grazing pressure should be low enough for trees to be able to rejuvenate naturally.

- As intermediate feeders, deer have a larger effect on broadleaved trees and bushes than grazing species such as horses or any of the bovine species, which prefer grasses. So reducing the amount of deer and increasing the amount of horses and bovines, reduces pressure on the broadleaved woody plants.

- Introducing flora species, transplanting flora species or using seeds from natural grasslands. As an example: One could use hay from a flora rich area to enrich an area that currently lacks a seed bank for these species.

- Be patient. Natural processes take time and existing vegetation can be persistent for decades, but will eventually change over time.

Invasive plant species (also see chapter 4.4)

Both indigenous and exotic species can be invasive and can cause problems when spreading in (new) nature areas. Ragwort and creeping thistle are examples of indigenous species, giant hogweed and black cherry of exotic ones. They can spread to neighbouring areas, causing a nuisance and may result in less support for the project among neighbours. Large seed sources in surrounding areas increase the chance of invasion in your area.

Possible solution

- Mowing a strip of 25 to 30 metres will keep the wind propelled seeds from spreading to neighbours.
- Reintroducing natural processes can create more balance, and push invasive species into a less dominant place in the ecosystem so novel ecosystems appear.
- Grazing with large herbivores such as European bison, bovines and horses helps to reduce several invasive species. Grazing suppresses exotic invasive species such as Himalayan balsam (Impatiens glandulifera) and Japanese knotweed (Reynoutria japonica). European bison eat black cherry (Prunus serotina), giant hogweed (Heracleum mantegazzianum), bracken (Pteridium aquilinum) and red oak (Quercus rubra).
- Natural predators may be more likely to have an impact when allowing natural processes to develop e.g. painted lady caterpillars demolished the population of creeping thistle at Knepp.

6.2 Landscape stumbling blocks

Fragmentation and scale

Fragmentation of natural areas by human infrastructure, such as roads and canals, makes migration and colonisation difficult, as well as posing difficulties for enlarging the area or connecting to neighbouring areas. Another problem could be starting with several smaller project areas, instead of one larger area, which prove difficult to connect.

Possible solution

- Connect areas by building wildlife crossings such as a green bridge or a fauna tunnel.
- Many animals are good swimmers and all it takes is to create an area where they can easily get in and out of the water on opposite sides.
- If there are several smaller areas, herds of large grazers can be moved between these areas or the herds can be small. To avoid inbreeding, bulls can be rotated between small herds. Or two-year-old horses can be taken out of the herd, as this is the natural age at which they are expelled from the herd naturally.
- If grazing is key then using alternative grazing systems such as ‘holistic grazing management’ which involves moving the graziers regularly can help reduce these problems and the dispersal of seeds with the animals helps with colonisation of plants.

Fig 6.3 Fragmentation can be mitigated by connecting two grazing areas across a road. Reducing traffic speed, e.g. by using speed bumps, is highly advised.

Minerals and nutrients

Due to previous agricultural use, most of the time nature restoration on arable land has to start from a phosphate rich soil. Or due to intense agricultural use of the surrounding area, calcium, magnesium and potassium have been leached out of the sandy soil, causing mineral depletion. Furthermore, an excess of nitrogen causes certain species, such as purple moor-grass, to dominate and out-compete rarer plants. The water quality can also be influenced by this, as it is polluted with pesticides and fertilisers coming from the agricultural areas upstream.

Possible solution

- Traditionally this is counteracted by removing vegetation or hay from the project area, thereby removing phosphate- and nitrogen-rich vegetation. This is however only useful when the current high nitrogen deposition stops. Otherwise, the ratio between phosphorus and nitrogen deteriorates, with adverse effects on biodiversity.

- Wetlands and beaver lakes soak up nutrients. American studies show that 40% of the nitrate can be deoxidised and taken out of the water by denitrifying bacteria. Phosphorus is used by the vegetation and grazing animals will redistribute that over a vast area.

- Convert surrounding areas to less intensive agricultural practices, such as regenerative agriculture or work together in a collective plan.

- Divert polluted water around the project area instead of letting it flow through the area. If water quality improves enough, this water can become part of the natural hydrology of the area.

- Add large grazers. When former agricultural land can be added to a grazing area on impoverished sandy soil, large herbivores will feed mainly on the rich former agricultural land but will also defecate elsewhere. This will slowly redistribute the abundance of minerals from places with too much minerals towards places with a deficit.

Hydrology

Hydrology has a large impact in a project area, while it is not always possible to control the hydrological conditions due to surrounding stakeholders. For example, water extraction for drinking water or agriculture can lead to desiccation, lands that are ploughed have a high evaporation rate, and ditches to ensure the drainage of agricultural lands lead to drought in neighbouring nature. Lower ground water tables can cause ponds to dry up, leaving animals without drinking water.

Possible solution

- Block ditches and remove drainage pipes where possible, to avoid water being transported too quickly, heather bales are effective and cheap ways of doing this. Weirs can also be used to restore the water level.
- Turn drainage ditches into a series of ponds. Use the soil that comes out of the pond to block the outflow of water towards the next pond, etc.
- Buy up surrounding land so you gain more influence on the hydrology
- Large herbivores in social groups are very effective in closing ditches, especially steep and deep ones. Every time they cross a ditch, soil from the sides is pushed down into the deepest part, turning these crossings into a small dam. Wallowing patches and bull pits are often found in the sides of a ditch, pushing even more soil into the lower parts. Even within one year a difference can be noted and in five years a large difference. Especially bulls, horses and wisent are very active at such spots. A combination of herbivores works best.
- If drinking water for the animals is not guaranteed and the groundwater is too deep, new ponds can be dug. Put a layer of loam with sand on the bottom and sides and you have a new pond that holds water.

Fig 6.4 Wisent, horses and cattle bulls have transformed this 2m deep drainage ditch into a shallow series of ponds.

6.3 Economical stumbling blocks

Funding

Funding is needed at all steps of the project. Already at the start of the process, a project plan needs to be devised to involve and convince all stakeholders. A lack of funding can therefore be a stumbling block for a project. Agricultural subsidies may not always be possible to use when different approaches are being adopted with grazing systems. Available grants may be short term. Funding may be available for the start of a nature conservation project, but not for long term monitoring and maintenance.

Possible solution

- If you want to (re)wild a specific site, costs can be very high. It is better to aim high and be flexible in project aims.
- Take ecosystem services into account: if your project can help avoid damage by flood water, you might be able to get money from e.g. the waterboard.
- Consider ways in which income can be generated from the project and find diverse income-streams e.g. safari business, nature-tourism, converting buildings to commercial rentals, sell meat from excess livestock.
- Consider adopting a regenerative agriculture approach as this can provide a steady and reliable source of income for the livestock owner.
- Local farmers, animal owners and citizens can contribute to the maintenance of the site's wilderness parallel to their benefit from this (local brand for their products, touristic activities etc.).

Loss of income

If efforts are made to convert an area to process oriented nature, this might lead to a loss of income for some stakeholders, e.g. due to lower wood production or loss of agricultural subsidies.

Possible solution

- Letting natural processes do the job should lead to less human work being needed, which leads to lower labour or maintenance costs and less or no need for expensive machines. Sell them.
- Timber: harvest few high value trees instead of many low value clear cut trees.

- Combining grazing and forestry can cut costs in the early phase and bring at the same time income from grazing. Combining tree harvesting and grazing can continue, as this was the case all over Europe for millennia. For a fruitful combination the level of grazing should be somewhat lower. The species composition should be adapted too, with less deer and more horses and bovines, increasing the pressure on grasses and allowing thorny bushes to appear and broadleaved trees to grow up inside these bushes.

- Income from (eco-)tourism can be a support for your project, especially when rare animals such as the European bison are involved.

- Diversification of income sources can also ensure greater stability of income in the longer term.

Loss of value

Turning agricultural land into nature can lead to resistance, because some people might feel that this leads to a loss of valuable arable soil, which is capable of producing food.

Possible solution

- Communicate: Nature is not useless, but also valuable. It offers all kinds of soft values, is good recreation ground and is often a better combination with other functions than agriculture, e.g. nature above drinking water sources or flood prevention.

- Communicate: Productive soils also give rich results for nature and store more carbon.

- Turning arable land into grazed perennial grassland is one of the options in process oriented nature conservation while still producing food. Additional benefits will be the substantial positive effects on environment and climate change.

6.4 Legislative stumbling blocks

Obtaining permits

Procedures for permits and exemptions are time consuming. For example: obtaining permits to change the hydrology might be difficult, since the water board is afraid locals or farmers might claim damage when water levels are too high. Another problem might be that in the management plans for the local forest reserves 'grazing' is not included, so the animals need to be fenced out.

Possible solution

- Start pilot projects to see what can be changed and show the effect of these changes.
- Move forward step by step.

Tenant agreements

Long lasting tenant agreements cannot always be changed. The tenant can block change when he or she refuses to move to another area. A similar problem might arise with existing hunting permits, which reduces the amount of available prey for predators in the area, forcing them to look for livestock as prey.

Possible solution

- Talk to the tenant (or hunter, etc.), and offer an alternative area. Buy lands closer to the farm and swap this for the land you want, which will create a win-win situation.
- Have patience and wait until the land becomes available.
- Make sure you stop the tenant agreement in time (put it in your agenda).
- Bring in another livestock owner/grazier that is doing well from a different approach that could talk with the tenant farmer to show that it is possible to make new systems work.

Migrating animals

Free roaming bovines and horses can cross borders, e.g. between countries or owners. This poses legal problems if for example the veterinary requirements differ between these countries.

Possible solution

- Try and get the whole area (consisting of different owners/countries etc) appointed as one single unit.
- Design and implement cross-border grazing permits.
- Consider these herbivores as wild animals and adapt the legislation to this.
- Officially reintroduce wild herbivores and allow them to roam freely.

Cadavers

Decomposing cadavers attract a lot of biodiversity. Also, animal bodies contain many minerals and nutrients, which all can be recycled and released back into nature areas after death. However, dead (domesticated) animals cannot be left on site due to legal prohibitions or are removed because of health concerns, or public perception.

Possible solution

- Return traffic killed wild animals into a nature reserve or leave the contents of the belly in the field after shooting an animal.
- There is no obligation to dispose of the bodies of wild animals. Thus, having animal species, such as wisent, declared and treated as “an indigenous wild species” offers opportunities.
- Dead livestock in nature cannot always be found in time or cannot be removed without destroying protected (N2000) nature. Make arrangements with the government that in such exceptional cases, the cadavers are allowed to stay.
- European laws offer exemptions for cadavers in N2000 areas. Convince national authorities to make use of these possibilities.
- It is important to inform the general public via newsletters, social media, etc. and to inform farmers about the very limited risks of diseases, i.e. diseases can be monitored best on live animals or by a vet on a recently succumbed animal.
- Fig 6.5 A lot of biodiversity is connected to the circle of life, from fungi, maggots and scavenger beetles to golden jackals and vultures. They all take part in recycling essential minerals of deceased animals. The bigger the dead animal the more biodiverse.

Wild versus domestic animals

Semi-feral horses, bovines, wisent or deer in a fenced area might be regarded as kept animals instead of wild, and thus fall under the same rules and regulations as farm or zoo animals. E.g. cattle need to be ear-tagged and have to be tested for certain diseases before being transported. It is much easier to give a farm animal a veterinarian treatment than a wisent, deer, feral horse or bovine. For that, the latter animals, and especially wisent and deer, have to be caught first or immobilised. Semi-feral animals are not used to human intervention, which will cause them a lot of stress.

Possible solution

- Arrange an exemption e.g. for nature areas larger than 100 hectares. Animals living in these areas are seen as semi-wild and thus do not need to be treated as domesticated animals.
- Use alternative ways of grazing domestic animals, such as agri-wilding. Accept that the results will probably differ.

Liability for damage caused by animals

The owner of an animal might be responsible when that animal causes damage. This can mean that you have to pay when an animal harms a person (even when the person was the cause of the incident, not the animal), or e.g. when a horse damages a car by eating the coating of the car.

Possible solution

- Have appropriate insurance that covers this.
- Approach all grazing animals as wild animals, especially in the smaller nature reserves.
- Inform the public about the presence of large herbivores and how to approach them, e.g. through information boards, excursions, articles in newspapers, magazines and local papers.
- Prohibit the presence of dogs in the area to avoid conflicts between dogs and grazing animals.
- GPS tagging systems which allows visitors to see where the animals are and avoid them.

6.5 Social stumbling Blocks

Resistance to change

People might feel sceptical or be against process oriented nature conservation in general, because they like what they have or they do not know what they will get after the project. For example, there can be resistance to the change of an open landscape into a more wooded landscape which will dramatically alter the view. Changes in the landscape can be too fast, unwanted or unexpected for local communities. If their fears and concerns are not taken into account, this can lead to declining support for the plans.

Possible solution

- Try to avoid taking something from the people without giving something in return. For example, if people can no longer take a dog into the area, make sure to create another area close by especially for dogs.
- Manage expectations: make people enthusiastic about the process, not about the end result. It is important to ensure that people continue to believe in the project, even if it takes a bit longer.
- Educate and inform people. 'Letting go of strictly defined objectives' is part of process oriented nature conservation. Answer questions about what is going to be different as best as you can.
- Hold meetings to inform locals, give excursions, give field lessons to local children and open up a café: make sure you are visible.
- Positive media attention for the project can help local people to become proud of the project or area.
- Make concessions if needed. This can be very straightforward, such as creating hiking paths or railings at steep slopes to make the area more accessible.
- Include all local stakeholders in a project steering committee. Persevere in keeping the communication between all stakeholders up and running, even in times of opposition.
- Involve locals in the long-term management of the project area, e.g. as volunteer or guide.

Cultural heritage versus nature development

PONC management might clash with cultural landscape heritage values. Stakeholders might view cultural landscapes such as heather, hedgerows and typical views as more important. The introduction of free roaming animals or the development of 'wilderness' nature might impede these cultural elements.

Possible solution

- Have extensive discussions with local nature conservation and heritage managers to gauge the level of acceptance for different natural processes. Both nature conservationists and heritage managers are potentially reluctant to change much to their current management.
- Tune down human intervention, but allow for a certain level of human intervention to be retained (e.g. coppicing, mowing), in order to maintain the heritage value of the landscape. This can be limited to specific areas, as part of the mosaic landscape.
- Given the heritage value of the cultural landscape, local stakeholders might prefer domesticated historic breeds instead of 'wild' herbivores. But even then, robust types can often be chosen that barely need human assistance.
- Implement systems like holistic grazing management (regenerative agriculture).
- Identifying opportunities to support nature conservation, e.g. focusing on the cultural history artefacts in the landscape can be a 'lubricant' for nature conservation efforts.
- Select areas where the cultural landscape is less important or create pilot areas to highlight the changes.

Proof wanted

Sometimes, stakeholders ask for certainty; that a certain result will be accomplished or they ask for (scientific) evidence. For example, grazing of large herbivores will not negatively impact a certain plant species or restoration of a certain habitat type to be achieved.

Possible solution

- Take people on an excursion to areas which have already been wilded, to show how this can look in practice.
- Monitor the flora and fauna in the project area to keep a track of changes.
- Give examples of positive effects of natural processes that people may not think about e.g. that trees have the ability to produce new shoots because they have evolved to cope with grazing/browsing animals. Sand pits favour bees and birds, created by livestock etc.

Fig 6.5 An often asked question is whether the large herbivores would eat the rare flowers. The honest answer is: they sometimes do. But since flowers and herbivores evolved together, flowers have learned to use various kinds of poison to keep them from being grazed and often produce more flowers after they have been eaten and are allowed to regrow.

Divergent interests and opinions

There can be many different kinds of stakeholders involved in a project, who can have all kinds of divergent interests. This can include opposing interests such as nature conservation, water management, monetary profit, increase in tourism, farming etc. Sometimes working together with a certain stakeholder can be seen as working with the enemy. Individuals within one stakeholder group might also be of different opinion, e.g. a farmer near his pension might feel differently than a young person. Agricultural organisations generally oppose the 'loss' of agricultural land to nature. Nature conservation organisations largely welcome this process, but persons within these organisations differ in their appreciation of process-oriented nature as opposed to 'classic' nature conservation.

Possible solution

- It takes time to convince all stakeholders of the benefits of the project, do not rush this process but take time to get to know each other and find a common way forward. Some stakeholders might not have cooperated together before, so it takes time to build trust.
- Let the stakeholder organise themselves (e.g. let farmers form a farmers group, which is represented by a spokesperson), so that they can be a discussion partner in the project.
- Find ambassadors that come from the specific stakeholder groups to help 'speak the same language'.

Vocal opposition

When implementing a project, this might lead to opposition. Sometimes this opposition can become quite vocal in e.g. social media or during meetings. This may tarnish the image of your project and can cost a lot of energy.

Possible solution

- You must try to get as many people as possible to support your vision of the area. Don't stop communicating because of the opposition.
- A small minority often continues to be opposed and is very difficult -or impossible- to convince of the positive sides of the project.
- Focus your communication and energy on the rest of the people involved.
- Find ambassadors to help smooth the process.

Black and white thinking

People think you have to choose to either do 100% process oriented nature management or 100% traditional. However, this is rarely ever the case in practice and especially in smaller nature reserves it is even impossible. Viable populations of large herbivores require huge areas, let alone viable populations of their natural predators. Traditional managed nature reserves often also depend on natural abiotic processes and the restoration or improvement of these processes.

Possible solution

- Much smaller social herds can be actively managed and still have their natural effect on the area. Another form can be regenerative agriculture, i.e. moving the herds around.
- You can have process oriented nature and still manage unwanted invasive species.
- You can combine natural grazing with additional grazing with a shepherd and sheep or goats.
- You can restore abiotic processes and still manage an area traditionally.
- Provide examples of pragmatic projects where compromises have been made e.g. Knepp (UK), the Millingerwaard (the Netherlands) and the Sigmaplan (Belgium).

Additional management required

Sometimes process oriented nature management alone does not suffice and additional management is needed. This can be caused by fragmentation of the landscape, which impeded the reintroduction of certain natural processes (e.g. water table, tidal movements, large scale grazing). Also, additional management might be necessary to adhere to regulations, e.g. the amount of vegetation in floodplains must be regulated so it does not hinder the flow of water, and therefore additional mowing is necessary.

Possible solution

- Try to find a process oriented solution, e.g. in case of vegetation hindering water flow one can enlarge the biggest side channel allowing the river to flow more freely. It will now be deeper or wider than originally planned, which compensates for additional forest growth and the formation of river dunes.
- Accept that the outcome of process oriented nature conservation might be different than expected.
- Try to intervene as little as possible and stick as much to natural processes as possible.

Fig 6.6 Although large herbivores do eat a lot of trees and sometimes debark them, that rarely keeps areas really open, so additional management may be needed if an open landscape is the goal.

Lack of skilled and/or trained people

Process oriented nature management differs from traditional nature management. This also means that specific skills are needed. For example, handling large animals that are in social groups and used to being outside all year, is very different from handling docile cattle. A farmer without experience with de-domesticated cattle might therefore not be the most fitting person for the task, and might have a different view on how to handle animals (also with respect to administering medicines, sorting out the animals etc.). This can lead to management that is not well adjusted to the idea of giving more space to natural processes..

Possible solution

- Hire people skilled at the job, e.g. a grazier that is familiar with working with semi wild animals.
- Give new employees training on the job and don't send them only on agricultural training, as they will be taught the wrong attitude towards wild animals.

6.6 Human-wildlife conflicts

Large predators

Large predators such as wolves have recolonised an area but come into conflict with livestock and give the large predator a bad reputation.

Possible solution

- Shepherds, herd guarding dogs and electric fences are proven solutions. However, it takes time to convince livestock owners to use these prevention methods and to educate them how to use them properly. Subsidies on proven prevention methods are important to help livestock owners.
- Active communication is very important, as well as active debunking of fake news and fake claims. Stories told by farmers who have used the above methods successfully are effective.
- An active group of volunteers and professionals that are helping livestock owners is an important success factor.
- Opposition from farmers will be strong in the beginning. Acceptance does take time.

Damage inflicted by wild animals

Animals can have an impact that can be perceived as damage. Examples are the impact of red deer or wild boar on agricultural crops or residential gardens. Where beavers build dams, the water table rises and crops can get damaged or cellars of people living nearby might become flooded.

Possible solution

- Anticipate for the damage and manage expectations. Strive for a consensus between all stakeholders, e.g. on what amount of damage is acceptable.
- Prevent and protect: e.g. try and buy flood-prone land along a stream with beavers, use beaver deceivers to lower the water table behind the beaver dam, protect valuable trees with mesh wire and lure bevers to a place where they can cause little or less damage.
- Try to frame the 'negative' aspect in a positive way, e.g. when beavers flood a valley, tell the newspaper that beavers are the best groundwater managers around.
- Use a spokesperson. Make use of a famous person or politically important person as an ambassador for the species.
- Compensate damages.
- Measure the cost savings and share that information

Interaction Domestic and feral horses

Having domesticated and feral horses in one area can cause problems. Feral stallions can try and bring a domesticated mare into their wild harem, irrespective of a human rider on the horse's back.

Possible solution

- Keeping both riders and drivers apart from natural grazing is a possibility, but often that means cutting out a large group of users and having a large part of nature ungrazed by horses.
- Not having stallions in the group, or only for a short time.
- Take time to let the feral horses get used to the domesticated ones, e.g. in the Maashorst (NL) they introduced pregnant Exmoor mares without stallions. By the time the foals were born, the mares were used to domesticated horses and their riders, and ignored them. The foals grew up with this behaviour as their example and do not cause any nuisance later on.

Fear of large animals

Some people fear large grazing animals such as the wisent or bovines with large horns. The introduction of large cattle can also be considered to be decreasing the accessibility of the site. Furthermore, occasional incidents might happen e.g. when a bull attacks an unleashed dog or a hiker approaches too close to an animal with calves. This will lead to negative publicity, which can hamper the project.

Possible solutions

- Don't downplay the issue, as large grazers are big and sometimes dangerous animals.
- Inform the public of how to behave towards these large animals through signs and billboards explaining guidelines such as keep at least 25 metres distance from the animals, keep dogs on a leash/no dogs allowed. A visual aid of how far 25 metres is might help, such as two wooden sculptures 25 m apart, so people understand what distance they have to keep. For a wild animal such as a wisent, 50 metres is advisable.
- Have rangers, volunteers or hosts present during busy hours and days, especially in the period after introduction of new large grazers or opening a new trail in an area with large grazers.
- Have a contingency plan ready, which includes who to contact and how to communicate when an incident occurs.
- Remove animals that display unwanted behaviour.

- Don't go too fast, aim for compromise between stakeholders before introducing changes in the landscape. A strategy of 'done deals' might work in the short term, but will slow down the process in the long term, because of declining support and growing opposition.
- GPS on the animals allows people to avoid them if they want to.
- Consider keeping heavily used public paths outside of the grazing area. So people with their dogs can still use this path, while the rest of the area is kept free of dogs.

Fig 6.7 Although some people are afraid of large herbivores, most of them are not and often rush towards them to take a picture up close.

Humans altering the behaviour of animals

Visitors might feed the large grazers. This can lead to the animals associating humans with food, which will cause them to approach humans and become intrusive. People also might try and pet the animals, take pictures with them or put their children on the backs of young animals.

Possible solution

- Have a person dedicated to educating the public about the problems people cause.
- Put up signs and billboards with guidelines such as: keep 25 metres distance from the animals, keep dogs on a leash, don't feed the animals.
- Organise excursions in the area e.g. for locals, in which you explain the best way to interact with the animals.
- Explain that if an animal is perceived as a nuisance, that animal has to be removed and sometimes culled.

Animal welfare

Certain aspects of process oriented nature conservation can be too far from the comfort zone of the general public. For example, the fact that large grazers have no shelter, have to stay outside all year round, even maybe in snow, have less food available in winter which can lead to emaciation. Also, the animals can look untended, e.g. with burdock in their manes and tails. Furthermore, social structures in herds can lead to fights between the animals, e.g. stallions kicking and biting each other, which looks very aggressive and can lead to ugly looking wounds. This can lead to public outrage or negative media attention.

Possible solution

- Communicate ahead of the problem, before you even introduce the animals. Try to educate the public by explaining that these animals are different from domesticated animals, suited to living outside year round, there is good grass underneath the snow and shelter in the forest, etc.
- Take people on excursions in the field. They get a chance to ask questions and you get the chance to explain and show how these wild animals live.
- In most grazed areas in the Netherlands, additional feeding is only done in extreme circumstances such as when an area has been flooded. Self-healing wounds are mostly left untreated, but vets are called in when managers want a second opinion or deem treatment necessary. Don't push it to the limits, as too much wildness might lead to public outrage and eventually to political intervention as was the case in the Oostvaardersplassen (see text box).

Fig 6.8 When snow falls in winter, people feel sorry for the animals and are afraid that they will starve. But underneath the snow, the grass is green and palatable. Experienced animals know this and most of them have learned from their mother or know by instinct to push the snow ***a****way to reach the green grass.*

Oostvaardersplassen (NL)

In the Oostvaardersplassen large herds of red deer, Konik horses and Heck cattle were introduced. No extra care was given to the animals, they had to fend for themselves. Surplus or diseased animals were shot when it was clear that a specific animal wasn't going to make it by itself. As the animals became more and more adjusted to this way of life, the grasslands became more and more grazed, up to the point that many people claimed it was overgrazed. Trees and bushes did not survive this grazing pressure. The barren landscape and the emaciated animals during winter were not acceptable to the public. Also birders started to complain when the amount of breeding birds went down as the number of herbivores went up even further. Especially large grazers starting to die of starvation, which led to public outrage. Also, the lack of large predators meant that most animals died during winter, whereas large predators kill more constantly and eat and thus remove their kill. In the end, a high level political decision was made to change the management of the area, e.g. by culling the large grazers. The lesson learned is that animal welfare and public opinion can influence decision making and thereby curtail the amount of natural processes

7. Stakeholder participation guidelines

This document provides guidelines for engaging and inspiring many different groups of stakeholders in process-oriented nature conservation during a workshop. In the project we ran several workshops to test what the best approach was on how to engage people with different backgrounds. And of course every situation is unique and needs a tailor-made approach, but in our experience from the pilot workshops involving stakeholders, the principles for engaging different groups of stakeholders, such as small farmers, large landowners or the general public, are the same.

These workshops can include different stakeholders, such as people with land, people with money or people with inspiration/knowledge. It is advisable you bring them together in a geographically interesting site or with a common theme. This can be either a site where the natural processes might be increased or to review the local management interventions. It can also be a site in which the natural processes have already been improved.

Whether you are starting a specific project about implementing natural processes or just inspiring others to increase the presence of natural processes on their land or area they work, it will consist of three phases in which you will have different forms of participation of stakeholders:

1) an inspirational phase, where you want to inform other people and inspire with different ideas regarding how to apply PONC on a small or large scale, or to join in with a specific project,

2) a design phase, where you want to gather ideas and discuss relevant topics, and identify how process-oriented nature conservation can be applied,

3) an executive phase, where people start up a PONC project or where your PONC project is starting up or already running, and you do want to stay in touch with all relevant stakeholders to discuss topics that arise.

In each phase the goals for participation of your stakeholders will be different. Because phases 2 and 3 are so case-specific, in this document we focus on phase 1, the inspirational phase. We outline some tips and tricks for when you want to host a workshop for stakeholders, with the aim to inspire and inform them about process-oriented nature conservation, at a small or large scale. For the design and executive phase, tips and tricks can be found in the other parts of this handbook.

In Annex 2 you can find some general tips for conducting a workshop with stakeholders. The tips are based on several workshops held by one of the partners, the Agency for Nature and Forests (BE), involving stakeholders in various nature conservation projects.

Participants of the meeting

1. When deciding on which stakeholder to invite, keep in mind the following: some stakeholders have to be included because they are decision makers or have a legal stake in the project, e.g., landowners. Other stakeholders, you might want to 'grant' decision making powers, such as local inhabitants. You can also decide not to include some stakeholders at a certain point, to avoid fruitless discussion, groups that are too large or to get started more easily.

2. Your stakeholders might also be people you want to inspire to take forward the ideas from the PONC project and apply them on their own land, or together with a group of landowners.

3. For your project team or workshop hosts, find a group of like-minded people that give each other energy, but also acknowledge the magnitude of the problem, they should also have good knowledge of the various different PONC methods that are available.

4. It is easy to 'preach to the converted', but it is more important and interesting to convince the sceptics and the hostiles. We might be afraid of conflict, but confrontation is the first step towards a solution. Pitfalls may be to try and convince the small group of people that will never accept change (the 10% very vocal, but never to be convinced).

5. Use well-known people, influential locals or people with an inspiring background as ambassadors for your project or for process-oriented nature conservation. This may make the project/ideas more relatable or give it more credibility than you yourself trying to 'sell' the project or the PONC ideas.

6. It may be useful to bring in people from outside, such as locals or a neutral spokesperson, or share short videos that explain concepts in a concise way.

Setting of the meeting

1. Create a safe space (small, warm atmosphere), where stakeholders are invited to speak in their own name, not as a representative of a certain group/institution. As people, we share the same values, but institutions might not share those values. “You as an individual are smarter than your institution”.

2. Start the meeting with confessing the biggest mistake you have ever made and of which you have learned something to get people at ease. This breaks the ice and gets people out of their trenches. When you get people out of their trenches, make sure the same is true for you and your companions.

3. Group dynamics are very important. Once you get in a negative dynamic, it is hard to get out of it.

4. Allow time for discussion/questions both for the whole audience, but also in smaller groups, so that all types of stakeholders have the opportunity to feel comfortable about asking questions.

Content of the meeting

1. Provide presentations/information about PONC and the specifically relevant natural processes for your audience i.e. the focus may be water-holding capacity and wetlands, or it could be with a focus on grazing. This can help bring different stakeholders together.

2. If you have a specific project in mind, it is important that when you introduce it, start with the big picture to provide context and tune it down all the way to the practical individual level: what can you do on your land, in your garden, on your farm, etc.. Link the project to larger societal challenges such as the biodiversity crisis, climate crisis, carbon capture, water (flood prevention, droughts), nitrogen deposition or land abandonment, and how your project is a nature-based solution. This might create a feeling of social responsibility.

3. Make a Cost- Benefit-Analysis or SWOT analysis to gain insight in the gains and losses of a project or increasing focus on natural processes. This will help make the project more tangible and give people insight into what the financial possibilities around the project/ process-orientate nature conservation are, for example linked to eco-tourism, or saving money by taking a different approach to the grazing regime

4. Use illustrations, photos, videos and other media to create a vision of the end result of your project and to showcase before-and-after-pictures of similar sites, e.g., of holistic management, natural grazed half open forests, etc.

5. Be aware of the fact that getting to a certain point is a long process of multiple years. Positive examples, sharing failures and mistakes can help bridge this gap. A key objective is to increase the understanding of natural processes. Another objective is to provide inspiration from small changes making big impacts compared with the current position.

6. Besides providing information on the process-orientated nature conservation in general or a specific project, make sure to also organise lectures and field trips on rewilding, agriwilding or nature restoration in general, so people understand the context of the project and see for themselves what process oriented nature conservation means.

7. Be sure to share information about mistakes that have been made and the lessons learned as well as stumbling blocks and solutions that have been developed as a part of the PONC project.

Form of the meeting

1. Mix indoor meetings with field visits to example areas. During a multiple day field visit, the joint dinner and evening drinks often break the ice.

2. Organise field trips in which you take people to a similar site that has increased numbers of natural processes in action, to show them what it might look like or take them to the designated project area where you can discuss the plans in the field.

3. If you have interested landowners, visit their land to provide the opportunity to discuss how the principles of process-oriented nature conservation could work and be applied on their land. This can work well as a follow-up event.

4. Organise field lessons for school children, in which they receive education on nature and natural processes. These children can be the best ambassadors to get their parents involved in the project, when the project is specific and planned.

5. Celebrate successes, large and small, with a party, excursions or interesting lectures.

8. Process oriented nature conservation in practice

8.1 Natural grazing

8.1.1 Natural grazing as a natural process

Natural grazing refers to a system where large animals, such as bovines or horses, can graze in a way that is as close to natural as possible. This can mean for example that the animals are in groups with a social structure, they are outside year-round, they can fend for themselves and can choose where and what to feed on and where to rest. Grazing is a natural process that forms a landscape and increases biodiversity. Large herbivores can suppress grass growth and prevent tree and bush encroachment in a grazed area, which allows for a more diverse vegetation to establish. Such a landscape is also called a mosaic landscape as a mix of patches of grasses, herbs, shrubs, and trees is formed by different grazing and browsing techniques. Plants protect themselves against grazing using spines, thorns, or toxins and by that, a natural selection of grazed vegetation begins. Forests and shrubs under grazing pressure can become more open from which insects, birds and other plants subsequently profit. Thus, the plant community composition and species richness increase and become more diverse (Bonavent, 2023). By supporting populations of existing large herbivores or by reintroducing them where extinct, lost functions that are crucial for a healthy ecosystem are secured.

During the last ice age, a wide variety of megaherbivores still occurred in North-Western Europe, but many of these, often large, species went extinct as a result of human actions and with them their function within the ecosystem. Out of the European large herbivores, the European bison (*Bison bonasus*), onager (*Equus hemionus*), red deer (*Cervus elaphus*), fallow deer (*Dama dama*) and moose (*Alces alces*) still exist in the wild. The wild horse (*Equus ferus*) and aurochs (*Bos primigenius*) live on as domesticated species (*Equus caballus and Bos taurus, respectively*). The European wild water buffalo (*Bubalus murrensis*) went extinct, but its close relative, the Asian wild water buffalo (*Bubalus arnee*), is still present in the wild and a good ecological equivalent.

Fig 8.1 Large herbivores are important for ecosystem functioning. Releasing Exmoor pony as a proxy for the extinct wild horse and wisent restores these lost functions.

Suitable wild horse proxies that can be used for natural grazing include konik horses and Exmoor ponies. Suitable proxies for aurochs are Heck, Taurus, Sayaguesa, Rode geus and highland cattle. River buffaloes (*Bubalus bubalis*) are used instead of their extinct wild counterparts, the wild water buffalo. Each large herbivore has its own grazing technique and preferences, which enables the co-existence and facilitation between species.

Species such as red deer, water buffalo, and bovines preferably live in nutrient-rich places such as fluvial valleys, river floodplains, and marsh meadows, but can also survive in nutrient poorer systems like sandy soil landscapes. In such poorer areas, bovines profit from other herbivores that graze on dry grasses, like horses and onagers. The latter two species flourish on nutrient-poor and fibre-rich vegetation and they can easily survive in poor sandy soil landscapes. Moose preferably trim the trees of nutrient-poor soil landscapes: pine, birch, and aspen. European bison prefer a richer and more diverse landscape such as former agricultural areas on sandy soil or river valleys and seepage areas.

It is important to mention that the above-mentioned effects and benefits of natural grazing for an ecosystem only occur if extensive grazing[3] is applied. An ecosystem with extensive grazing management is in balance as large herbivores are present in lower densities and there is little or no winter starvation. This is in contrast to intensive grazing, which puts high pressure on the ecosystem and does not leave enough space for diversity to establish. Such a system can also be called overgrazed.

In a natural environment, vegetation and large herbivores are in balance with each other. High numbers of herbivores keep the vegetation short, but if the grazing pressure is too high, less food will be available in the next winter months. In that case, the condition of some of the large herbivores will be insufficient to survive the winter. Not only the death rate but also the reproduction rate depends on the condition of the herbivores. Therefore, the grazing pressure will naturally never exceed this maximum carrying capacity which is determined by food availability and richness, summer droughts, and harsh winter conditions.

Furthermore, the presence of predators results in more alertness and movement of the herbivores as they fear a possible attack (i.e., “ecology of fear”). This shortens the time of foraging and as a consequence the condition and reproduction decline. As a result, the amount of grazing animals drops to just below the carrying capacity. Medium sized prey has more to fear from predation, larger herbivores profit from this release of competition. As the presence of predators varies in space and time, this creates a varying grazing pressure of large herbivores in the ecosystem, which allows for a variety in vegetation structure and composition, including a varied shrub and forest development locally. However, this grazing pressure is at the top of what an ecosystem can supply.

3 Extensive grazing is that in which livestock are raised on food that comes mainly from natural grasslands, shrublands, woodlands, wetlands, and deserts. It differs from intensive grazing, where the animal feed comes mainly from artificial, seeded pastures.

Fig 8.2: Grasslands full of flowers, dense thickets and scattered trees are the result of extensive natural grazing, where predators or humans keep the densities just below the carrying capacity.

Such continuous natural grazing occurs in large natural areas, where natural processes are not limited by space. However, not all nature areas are of sufficient size for the realisation of full-scale natural grazing and other natural processes, such as the densely populated North-Western Europe nature which is highly fragmented. Managers of a nature area must estimate the carrying capacity of the land and animals, to prevent overgrazing. When working with semi-wild animals, a grazing pressure where (almost) no deaths occur in the winter months and where at the same time grasslands with shrubs and patches of forest can develop is ideal. This gives abundant space for flowering plants and with them all insects and birds that depend on them.

8.1.2 Continuous grazing vs. mob grazing

In a natural situation, large herbivores will migrate seasonally and even daily, feeding in nutrient-rich wet habitat and ruminating on dry ground, avoiding high predator presence, or avoiding deep snow in winter or dried up areas in summer. Confining large herbivores within fixed boundaries can also lead to an overabundance of animals, and continuous grazing in one place eventually results in overgrazing unless animal numbers are managed by predators and/or humans. There is, however, another form of grazing, which the manager or farmer of an area limited in space could choose to practice. This form of grazing can be called holistically planned grazing or mob grazing, and it mimics the natural behaviour of herds of migratory wild herbivores and thereby the natural process of migratory herds in nature.

To mimic migration in time and space, large herbivores are moved from one area to another, and the land is grazed for a short duration, but with a higher density of animals. The herd is moved when one third of the vegetation is eaten, one third is trampled and one third is still standing. The time an area is grazed can be for a few hours a day or one day. The variation of grazing results in a longer period of grass recovery, higher soil quality, better nutrient distribution, and plant composition, to name a few positive effects (Lemus, 2011). As this method requires enough space to serve as a food source, it might not be practised year-round due to a shortage of food. However, the positive effects of such practices are immense: the trampled vegetation results in more organic matter entering the soil and a higher recovery time of the grazed parts results in a healthy ecosystem (Wagner et al., 2023).

Fig 8.3: A small part of the herd of 1000 konik horses in the Oostvaardersplassen. Rewilded konik horses in nutrient rich areas form large herds with many harems and stallion groups and start using the area on a rotational basis.

In general, migrating herds tend to stimulate the growth of palatable grasses and other plants, whereas sedentary grazing stimulates unpalatable plants with poison, spines or thorns. Both types of plant species survived during evolution, indicating that both types of grazing would have been around. This is exactly what can be observed in existing large natural grazing systems scattered over the world.

8.1.3 Social herds

Large herbivores naturally live in social groups. Wild or wild-living cattle and bison live in groups of adult cows and their offspring, groups of bulls, and solitary old bulls. Whereas wild horses live in harems and groups of young stallions. In suitable areas especially horses roam in big and complex composed groups with multiple harems and bachelor groups together. Food availability, competition, and predation determine the composition and size of these groups and their distribution across the landscape. Outcompeted bulls search for a quiet and unoccupied place, which often is a less suitable area. Predation herds animals together for safety, sometimes in herds of multiple species at once. Together, this results in grazing behaviour that varies in space and by that serves a more varied ecosystem.

In all species, male and female animals are born with the same ratio. Due to a higher net death rate amongst male bovines, more adult females than males survive. This, in an approximate ratio of 2 à 3 to 1, respectively. Especially in cattle, the presence of multiple male animals is of crucial ecological importance. This is because bulls make an extensive system of bull pits in order to impress each other, which, year after year, are being restored at the onset of the mating season in late spring and early summer. In abandoned bull pits, succession can start all over again and many pioneer plants depend on this process. Furthermore, many other species like the sand lizard, burrowing wasp species, and sand bees profit from these bull pits, too.

Fig 8.4: A highland bull works hard to impress females in heat and to keep competing males at bay.

Nearly all large herbivores are gregarious animals, which live in groups with a firm social bond. Within such a group, animals protect and help each other and feel safe. Harems and groups of cows are examples of where there are firm bonds, but also individuals can have such bonds with each other. There is also, of course, the strong bond between a mother and her offspring.

Animals that grow up in social herds get to know the terrain and learn from their fellows: locations of abundant food or water to drink, what food is palatable and what is not, and where the water is shallow enough to pass through, to name a few examples. In addition, they are being raised and educated: they learn how to behave with each other and towards the environment. Behaviours like flight behaviour and how to deal with predators and humans, are being passed down to the next generation within a herd. In an environment with wolves, for instance, a firm social herd is crucial for their survival. Without collaboration, wolves have an advantage, and mostly young animals pay for it subsequently. Experiences in the Netherlands and other places in Europe teach us that large herbivores adapt quickly to their environment and learn how to behave towards wolves to protect their offspring. Thus, a herd that is well-adapted to its environment and the public is especially worthy.

> **“One sheep is not a sheep;**
> **you need at least five sheep to behave as a sheep.**
>
> *– Jörgen Andersson, agriwilding farmer*

Furthermore, semi-wild living herds of bovines, horses, water buffaloes, and bison, in principle, do not need any external care. Their resistance and relatively low densities keep away parasites and diseases. Magpies seem to be European oxpeckers and take ticks out of the fur of bovines and bison. The herbivores even position themselves so that the magpies can better reach their fur. Moreover, calving happens naturally and without human intervention. Medication is not, or only on rare occasions necessary.

Fig 8.5: During the massive floods in the Meuse Valley (BE) in the summer of 2021, no grazers were lost in the Negenoord-Kerkeweerd nature reserve, as the permanent herd knew the terrain and gathered on the high grounds during the floods.

8.1.4 Biodiversity

Many species commute daily or follow a seasonal migration. For instance, places with water for drinking and bathing are an important steering factor for the presence of many different large herbivores. When water is scarce, animals concentrate around the places that still hold water. From there, daily tours to forage elsewhere are taken, which results in a higher grazing and browsing pressure around water places. Furthermore, some species are more mobile than others, and so a natural variation in the landscape is established: the mosaic landscape. This effect can be strengthened by the presence of predators in the environment, which keep large herbivores alert and mobile within the landscape. While moving around in the landscape, seeds are dispersed via dung and clinging to the animal's coat. In addition, some of the large species, like deer, will search for shelter in shrubs and forests during the day and move towards nutrient-rich areas next to marshes and riparian areas of rivers and creeks during the night to forage. By doing so, nutrient-rich and nutrient-poor areas are linked to each other, and herbivores bring minerals and nutrients from one place to another by excreting their dung. This clean dung (free of medication) subsequently serves as a source of life for various organisms. Insects and fungi profit from this, but also other species that then live on these insects and fungi flourish (Fig 8.x1). If an animal dies its carcass provides the soil with minerals and nutrients again. Thus, large herbivores, and other animals, help to recover the nutrient cycle, which otherwise leach out of the ecosystem (Fig 8.x2).

Fig 8.6: Dung without medicine like wormer is full of life.

Fig 8.7: The nutrient and mineral circle on higher sandy soils. Rainwater washes out minerals, however, herbivores and other animals like wolves, bats, and eagles spread these minerals over a wider surface again.

Approximately half of the biodiversity is involved in the decomposition of dead plants and animals. Carcasses of big animals, which remain in nature areas, are a feast for many organisms: large numbers of of carrion beetles and other insects profit from the presence of dead matter, among which are various rare species (Fig 8.x3). In a short amount of time, a carcass is cleaned up and all that remains are a few bones. The positive results on biodiversity of leaving a carcass in a nature area are impressive (Gu et al., 2014; Krawczynski, 2022).

Fig 8.8: Large dead animals in nature bring, in addition to a lot of biomass, high biodiversity.

Predation plays a crucial role in the number of carcasses in nature areas. Mostly, old, weak, and young animals are caught and killed, which serves as a natural population control. The population stays generally healthy, and the growth rate is hampered. Prey leftovers, two to three times a week, are a fresh food source for scavengers like ravens, eagles, carrion beetles, and omnivores like the wild boar.

All in all, natural grazing recovers nutrient and mineral circles and the continuous co-evolution between herbivores and plants.

8.2 Predation

Where herbivores live, predators roam. Wolves are now back in Northwest Europe, although the population is still in the build-up phase. After about a century and a half, this species can again have its effect on the ecosystem. Wolves prefer easy prey, which provides enough food and not too much danger. That is why old, sick or, conversely, young, inexperienced animals are often predated. In this way, wolves keep wild ungulate populations healthy and put the brakes on population growth. The choice of less dangerous animals ensures that red, fallow and roe deer in particular are hunted more strongly than bison, cattle or horses. By hunting mainly on medium-sized grazers, deer populations are suppressed and wolves indirectly increase opportunities for larger herbivores as more food remains for them. This also changes the suppression of woody vegetation by herbivores, as medium sized herbivores are browsers and intermediate feeders, whereas the larger herbivores are mainly grazers.

In the presence of sufficient deer and wild boar, wolves will hunt these species more. A greater choice in the range of game also makes it easier for wolves to find suitable wild prey, in which prey size, huntability and food requirements play a role. Large grazers, sheep and other livestock are then rather spared, although livestock should be well protected to prevent predation. In the absence of sufficient deer and boar, wolves will try to get their hands on calves, foals or yearlings of the large, dangerous species. However, wild horses, cattle and bison, in close-knit natural social herds, quickly learn how to deal with wolves and other predators, largely avoiding wolf predation. Three-year-old bulls in particular appear to play an important protective role in bovines (Carbyn & Trotter 1988). So much so that in Bulgaria and Croatia, for example, the wild koniks and some roe deer seek the protection of a bovine group at night. In Northern Portugal, garrano mares form a circle with their heads inward, so they can kick back. The foals are in the middle, while the stallions are outside the circle, attacking the wolves (Fontes 1977). In natural herds, harems often have multiple adult stallions, which provides better protection (Linnartz & Linnartz 2017).

Fig 8.9: Bovines chasing wolves away and trying to encircle them

Wild ungulates also try to avoid predation in other ways. They avoid dangerous places, they seek each other's company, or they hide extra well. Chamois, mouflons and ibexes seek shelter on steep rock faces, where they can flee much faster than wolves. Forest areas with many fallen trees make flight difficult and are often avoided. As a result, forest rejuvenation has a greater chance there than elsewhere. Wolves and other predators thus influence the landscape and the regenerations of woodland.

Apart from wolves, lynx and brown bear also roam Europe. But these are often more sparsely distributed and more rarely venture into human dominated landscapes. Lynx is specialised in hunting small deer species and the young of larger ones. Brown bears are omnivores and will hunt and scavenge in early spring or even in winter. Brown bears are strong enough to steal the prey of wolves, thereby forcing them to hunt new prey.

8.3 Regenerative agriculture

Regenerative agriculture is defined as, "to enable the highest imaginable vitality in ecosystems, by satisfying human needs". A definition grounded in the absence of conflict between what is best for humans and what is equally best for the web of life as a whole. To fully understand the concept we need to ask ourselves whether "the highest imaginable vitality" is at all possible without human "intervention"? A question that leads us to the fundamental conclusion that nature is not to be "conserved" nor "protected" from humans, and that the process required is one re-integrating "culture" with "nature", rather than separating them further. Imagining future landscapes approaching the highest imaginable vitality of ecosystems reveals perennial grasslands with trees, where tractors are roaming today, and less trees and more grazing animals within the areas today labelled as "forests". Large herbivores once again dominate our landscapes whether they are resembling ancient or modern versions of the four legged ships for microbes, evolutionary designed to vitalize ecosystems.

Patches of monocultures providing humans with potatoes and vegetables can be imagined near the houses where people reside in this "savanna". A landscape where the production of meat, dairy, eggs, nuts, berries and fruits are integrated around gardens and dwellings.

As regenerative agriculture outcompetes monoculture practices, biodiversity will be able to return.

Farmers, for good reason, feel caught between a rock and a hard place as they confront industry and authority. Regenerative agriculture may offer a new way out of the predicament. Vitalizing ecosystems, in general, coincides with substantial reduction of costs for agricultural inputs. Since regenerative agriculture, as well, transforms the "consumer" to a "participant" in the shaping of our future landscapes, the farmers will no longer be anonymous, exchangeable suppliers to the industry.

Regenerative agriculture is enabling farmers to once again produce nutritious food and a welcoming landscape to local citizens, rather than anonymous bulk and bureaucratic services to industries and authorities.

When it comes to authorities it remains to be seen if they will continue to support and

promote the agro-industry, leading to the the squeezing of farmers to produce even cheaper raw material to feed the industry, or if they will ally with farmers and citizens, supporting regenerative agriculture to produce healthier food and more vital ecosystems.

It has been said that regenerative agriculture strives for perennial grasslands and pastoralism, but there is also a branch of this movement developing the capacity to produce traditional cash crops while vitalizing soil health. The pioneers have made great progress even though the pressure from conventional "low till" farming is increasingly pushing towards something called "organic light", labelling the chemical glyphosate as acceptable.

This battle is yet another example of how crucial it is for regenerative farmers to invite "the public" to their farms and landscapes asking for their collaboration and protection.

As the farmer Cain, in the biblical saga, murdered his pastoralist brother Abel, he immediately set off to establish the first city outside the Garden of Eden. Ever since that day, farmers have been the prerequisite for urbanism, while pastoralists have been rightfully regarded as a low value base for taxation. The concept of land ownership has become the cornerstone for society as we know it. Process oriented nature conservation provides a good reason to question our systems for access to land. What if we zoomed out from the limited perspective of individual farms and, instead, applied a lens of ecosystem vitality on landscape level?

Ecosystem processes, the foundation of regenerative agriculture

Within regenerative agriculture we learn about a "house" with four windows.

- The water cycle
- The mineral cycle
- The energy flow
- Community dynamics

No matter the window, we are looking at the same whole, but the questions we ask will be different:

- What kind of rain do we have? Is it effective? Is the water allowed to participate in life many times before it leaves our landscape again? Is the rain leaving the landscape through streams of clean water gently flowing, all year round?
- Do we allow the life in our soils to extract the minerals out of the geological material? Do we have soils able to hold and circle the minerals in order to sustain life over and over again?
- When the sun shines, does it fall on vital green leaves performing photosynthesis?
- Do we have the biodiversity of species required and do enabled collaborate in order for rain to be effective, minerals to cycle and sun to be captured?

5 Principles

When aiming for highest imaginable vitality while growing crops we talk about 5 principles

1. Keep the soil covered.

2. No till

3. Diversity of species

4. Keep living roots “always”

5. Integrate livestock

The results from caring for the soil as a living system like this are remarkable and embarrassing. Why did we, as farmers, not figure this out before? We are simply cutting costs while maintaining yields. As long as we realise how animals on the land are a prerequisite for soil vitality we can produce a lot of bread and beer etc. without destroying ecosystems. Pigs and chickens may become something we only eat for Christmas.

Feeding the world

Feeding people is relatively easy while feeding the food industry is costly, destructive and dumb. Every landscape is calling for its people and by sharing the labour we feed ourselves in abundance of quality and diversity. But separating humans from nature while leaving the farmer alone on the land will less likely give us the food we need, nor the vitality of ecosystems necessary to support us.

The link below leads to Gabe Brown in North Dakota telling and showing his experiences

https://youtu.be/9yPjoh9YJMk

Wild or domesticated?

Vitality of landscapes begins and ends with the vitality of the soil. Vitality of the soil begins and ends with properly managed grazing animals. Evolution developed a system based upon the relationship between predator and prey, allowing plants to recover between grazing occasions. Pack hunting predators made it the wise thing for grazers to keep themselves bunched together, in large flocks, constantly moving across vast areas. For the individual plant on the ground this meant that most of the time there would be no grazing animals around, enabling it to recover before a flock of grazers passed by again. Once more leaving the land grazed, trampled and fertilised.

The role of the regenerative farmer/pastoralist is to mimic these patterns making oneself the proxy of those pack hunting predators. By gently planning recovery periods for the grass, the productivity of the land can be optimised together with the vitality of the animals. We call this practice “holistically planned grazing”.

Generally speaking regenerative pastoralists will breed domesticated animals back towards what they would have looked like before modern breeding programs, or breed wild animals towards more domesticated features. European farmers can learn from American colleagues as the American bison is now becoming more popular among regenerative pastoralists.

The link below leads to Sarah Gleason and her regenerative bisons

https://gleasonbison.com/land-regeneration/

Wild or domesticated? Forest or field? Nature or culture? A hallmark of regenerative agriculture is the blurring of these borders. Why not help wild grazing animals through the winter with some hay? Why not establish fruit bearing trees in "the wild"? etc.

Patterns of "conservation"

Throughout the world in various climates and conditions we can see a pattern of how nature conservation (e.g. in national parks) is failing to vitalise landscapes and halt the decline of biodiversity and where holistically planned grazing is showing impressive results on neighbouring land.
Sometimes it is simply the lack of animals causing the difference, but more often it is the continuous grazing applied within the conservation areas to be blamed for such suffering landscapes.

The link below shows some images from vitalization through holistically planned grazing

https://fb.watch/knmnAr_ypd/

At a crossroads

Regenerative agriculture or "agriwilding" provides an alternative route. A world where ecosystems in general are allowed to become vital and diverse, while only limited areas need to be "sacrificed" to monocultures. The path we are walking right now is the one assuming that most land must be sacrificed to monocultures while limited areas can be saved for nature conservation. This narrative claims as well that the more land we "save" from humans, the more harmful technology we are likely to use on the remaining monocultures and the more we must process the "raw materials" produced there. In this narrative people are banned from most of the landscape and only permitted to enter as alienated tourists in designated "rewilded" areas.

It is fair to say that farmers are now pushed against the wall and they have valid reasons to perceive themselves as being out of sensible options. Not even the ones enlightened about regenerative agriculture may find it possible to continue without support.

This project about "process oriented nature conservation" sheds light on this dilemma.

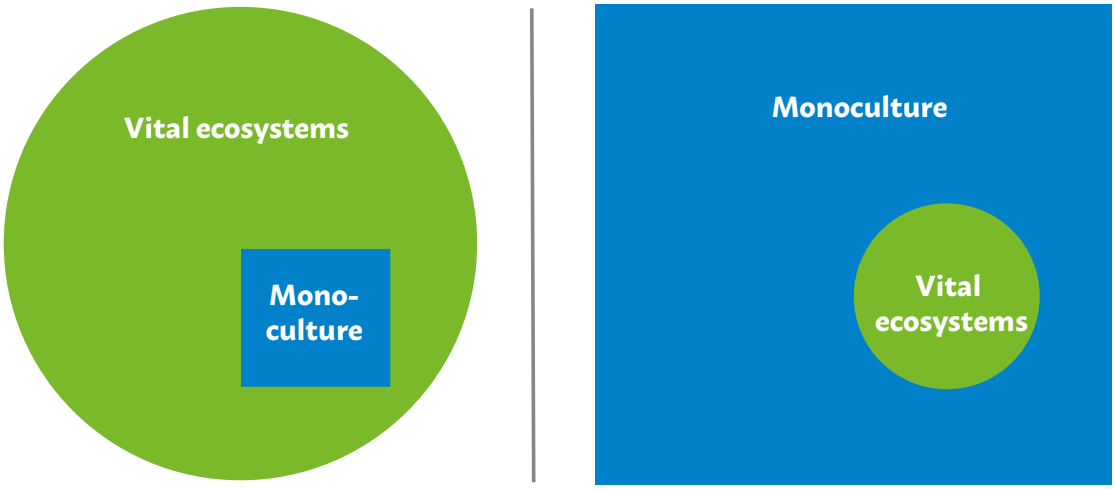


Fig 8.10: we have to choose between a model in which we live in a vital landscape, with a minimal monoculture area, or the current monoculture landscape, with a minimal area of vital ecosystems.

The definition of regenerative agriculture as "enabling highest imaginable vitality in ecosystems, by satisfying human needs", puts us humans at the centre of responsibility. We are now choosing between saving some nature, or acknowledging ourselves as "beloved communities, teaming with life". Beloved communities are defined as communities "where everyone is being cared for".

Ecological outcome verification

Within the global network for regenerative agriculture, a monitoring system for evaluating the vitality of ecosystems has been developed. The system is scientifically robust and can be applied to the various ecoregions in the world. The idea is that managers of land are making themselves able to evaluate the outcome of their management practices over the short and long term.

Progress made in the vitality of landscapes can be shared and communicated within the communities caring for the particular landscape. People interested in birds or butterflies etc. can participate in the monitoring as well as purchase food from vitalising landscapes.

The link below leads to more information about Ecological Outcome Verification (EOV)

https://savory.global/eov/

8.4 Water management

Remeandering

Rivers and streams meander through the landscape, with the outside bend eroding away and the inside bend growing through deposition of eroded material upstream. The erosion forces are especially high during floods and, depending on the flow speed, stones, gravel, sand or clay are transported through the water. Outside the bend there is a lot of space and the flow velocity decreases. The heavier sediment is quickly deposited and sandy levees are formed parallel to the main flow. Further on, mainly lighter sediment, such as clay, is deposited, so that low areas in the terrain slowly silt up. The meanders can become so close together that a short circuit and eventually a breach occurs during flood. The water temporarily flows straight ahead, leaving behind an elongated horseshoe-shaped lake, which soon becomes clogged with sediment upstream. Old gullies flow along with high water, sometimes so powerful that they become eroded and are once again part of the main stream. The stream valley of a natural river is therefore a maze of old and new stream channels, levees, shallow clay basins and horseshoe-shaped lakes. Islands, sand and gravel banks arise and disappear again in this dynamic landscape.

In Europe, the banks of many streams have been fixed in the past. As a result, the outer bend has stopped eroding, but the sedimentation has not. Sediment washed away by rain from fields has accumulated in our river valleys for centuries. As a result, the streams often run deep in a high and dry floodplain. By removing bank protection, rubble and stones placed by people, the natural forces of running water are unleashed.

Trees on the banks are easily washed over. Especially when a stream runs deep and trees are high on the banks. Over time, the roots of a tree are sufficiently undercut and the tree falls into the stream. This brand new obstacle blocks the passage of the flowing water, causing part of the water to squeeze between the root ball and the new bank. As a result, the fresh bank erodes quickly. At the same time, the crown traps a lot of sediment and debris, and a deep pit is created under the trunk as the flowing water searches for new routes to pass. This goes on for a while, after which the tree ends up in the middle of the stream, the crown in a new sandbank and the stream has shifted a bit. Over time, a stream automatically widens and creates a lot of variation in its depth.

Streams are naturally bordered by riparian woodlands. Natural succession starts with freshly deposited sediment in inner bends and with riparian forests. This succession has more to do with time than with duration of flooding and thus altitude. However, both are also linked to each other. The more often an area has been flooded, the higher it has grown due to sedimentation. With the larger streams, all successional stages can be interrupted by a meandering outside bend or bend that has been cut-off, when then restarts the process again.

Fig 8.12: Riparian woodland helps rivers to meander. Fallen trees block the water flow and redirect it towards the riverside.

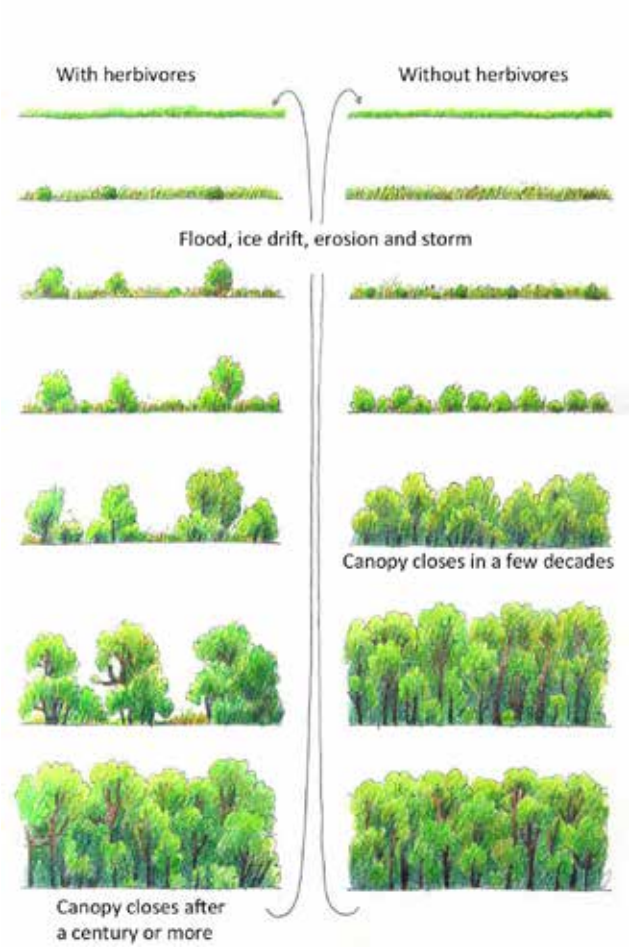


Fig 8.12 Without large herbivores, forest will cover the entire river valley and abiotic natural processes like ice drift or erosion will only have a local and temporary effect. With large herbivores, the woodland will stay open for a much longer period. They supply enough delay for the abiotic processes to create a mosaic of grassland, shrubbery and forest patches.

River valleys are nutrient-rich due to the process of sedimentation and provide space for large numbers of large herbivores. They keep parts open and delay the succession to forest, so that together with the dynamic forces of the river and other natural processes, they ensure that there is a large proportion of open area. During high water, the grazers migrate to the higher levees and the adjacent high sandy soils where the temporarily higher numbers provide an extra grazing pressure on woody plants. The same high water causes the transport of numerous plant seeds, bulbs, tubers and rhizomes. Willows and poplars don't even need that: a washed-up branch easily sprouts again.

A riparian forest without grazing animals can develop into a dense forest of willows and poplars within one year. Soon it is impenetrable and after a decade it is already grown quite tall. If there is no grazing during the germination phase of the willows and poplars, a rapid development to closed forest is unavoidable. However, if large herbivores are there from the first moment, countless seedlings are eaten and an open grassy and herb-rich plain is created with numerous bonsai willows and poplars. Slowly thorny bushes and coarser vegetation appears, within which trees can grow large. Especially if the river leaves behind a tangle of branches and dead trees at high water, young trees and shrubs can grow inside, protected from the grazing animals. Slowly this grazed woodland also grows into a more or less closed riparian forest. In the meantime, however, the river has cleared other places of forest, so that all successional stages are always present somewhere: herb-rich grassland, open thickets, early and late successional stage floodplain forest.

Beavers

Beavers form a separate category of all types of grazers, rodents and browsers. They shape the landscape in stream and river valleys like no other. Shallow streams are dammed by beavers so that they can swim safely to trees and bushes to gnaw them down. The bark is eaten and the rest is used as building wood for beaver dams and burrows. Behind the dam a beaver lake is created with a beaver lodge safely in the middle. The stream flows into the lake on one side. On the other side, the water seeps diffusely, over and along the dam. Fish easily pass through those dams, as migrating fish and dam-building beavers co-evolved over millions of years of evolution. Some wiggle through small openings, while others jump over it.

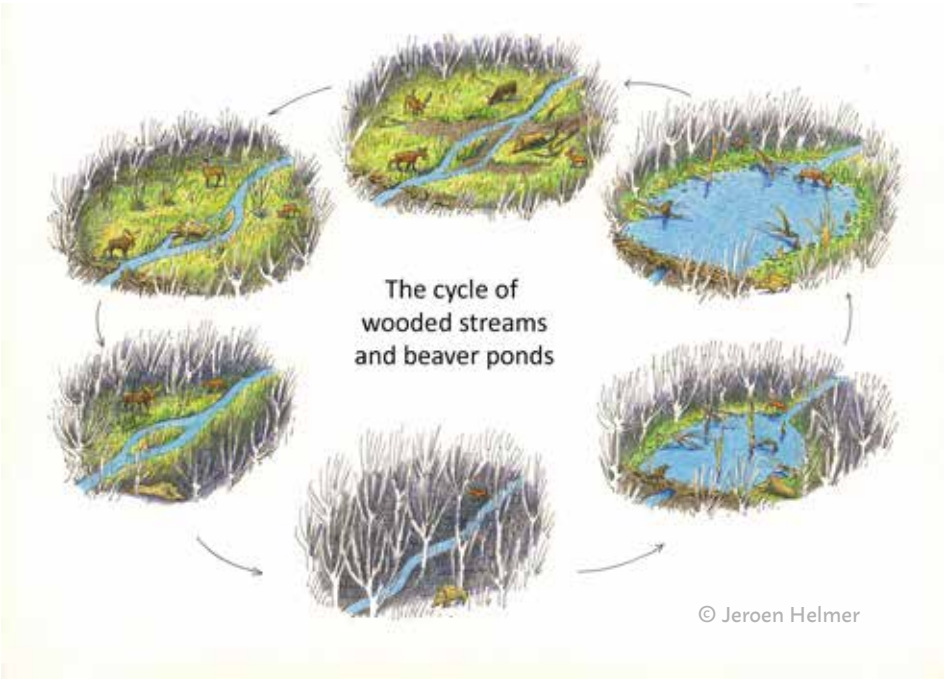


Fig8.13 The cycle of wooded streams and beaver ponds, running from wooded stream, via flooded woodland, open pond, open grassland and young open forest to a wooded stream. Along a stretch of river all these stages will be present in every beaver territory, ensuring an interconnected metapopulation of all these different habitats and species that go with it.

As long as there is enough food, the dam grows and is constantly maintained by the beavers to prevent breach or too much water loss. Every time the stream threatens to make a new course somewhere, it is dammed up. The stream is thus forced to flow over a wide area, which means the water loses its speed and with it the sediment. Clay, sand and organic material, such as twigs, leaves and the like, swirl down into the lake. The beaver lake fills up slowly and evenly. Over time, the food and construction wood for the beavers in and around the lake runs out. They then have to walk too far; a dangerous journey if there are also wolves or other predators dangerous for beavers. The family leaves the lake and moves upstream or downstream. The old dam soon breeches without maintenance and the lake empties. The bottom dries up and a completely new stream is created on the mudflats. Numerous grasses, sedges and other marsh plants germinate on the nutrient-rich mud. This is a very attractive area for the many herbivores in the landscape, which slow down the succession to forest, but do not stop it. In the long term, forest returns and therefore habitat suitable for the beaver family to return, after which the cycle repeats itself. Beavers know this and mark a territory that includes all stages of this cycle so that a suitable new relocation site is always available.

Initially, this is a linear process, with all stages neatly lined up one after the other in the stream valley. But the more often a new course has to be dammed, the more and more a two-dimensional maze of dams, lakes, marshes and streams emerges. Due to the fact the beaver lakes trap a lot of sediment, the stream valley becomes flatter and it is therefore easier for side streams to form or the stream chooses a completely new course after the beavers have left. The end result is a marshy and flat stream valley with an enormous variety of biotopes. This also provides plenty of room for water storage in times of high water, so that a rain shower does not flow down at lightning speed, but is stored in the width of the floodplain and slowly flows away.

Beaver lakes are teeming with life. Amphibians find a suitable place to reproduce there, just like dragonflies and many other species. The lake offers a suitable habitat for fish. For migratory fish, a beaver dam is not a real barrier and the nutrient richness in the lake forms a good growing area for the young migratory fish. It is worth noting that the black storks in the Belgian Ardennes are attracted by the beaver lakes. Grass snakes also find everything they need there. There is plenty of food and the piles of dead plant material deposited on the floodline after the spring floods form a beautiful natural biotope in which to deposit eggs. Other species, such as rhinoceros beetles, also appreciate this.

© Jeroen Helmer

Fig 8.14 Beaver ponds offer lots of opportunities for biodiversity.

Beaver lakes that have dried up often contact a variety of marsh plants. Due to the flat valley plains, periods of high water can be absorbed in the width and it takes a long time before the ground is really dry again. The many grazers that flock to this lush vegetation leave deep footprints in the mud, which fill with water after a shower or flood and thus contribute to a soaking wet valley floor. Because grazers slow down succession, this flowery grassland remains suitable for insects for a long time, which gives them time to build up large populations.

8.5 Take action!

In this last paragraph we would like to highlight and summarise the main steps you can take (or the main questions to ask) if you want to work with natural processes in your landscape, be it a nature reserve, a woodland or an agricultural landscape. Of course, depending on your type of project, one or more of these steps can be irrelevant, so the following is merely an inspirational checklist. You can find more detail about each of these steps in the different chapters of this document.

1. What are **the long term objectives** for your landscape?
   - Biodiversity objectives (not in terms of species or habitats, but functionality)?
   - Social objectives (i.e. interest to the local community)?
   - Be as holistic as possible.

2. **Map the existing and the lost natural processes in your landscape** and evaluate the following aspects:
   - How complete and functional are they?
   - Do they work on a full landscape scale or not?
   - Do they have a positive, a neutral or potentially even a negative effect on the ecosystem?

3. **Map the main stakeholders** and their interests:
   - Who are the decision makers?
   - Who are the (economic) winners and (economic) losers if natural processes will be introduced?
   - What is the associated local community like and what are their interests, questions and fears?
   - How can you influence the main stakeholders or connect to the local community and enthuse them?

4. Are there any **management issues** or problems where process oriented nature conservation could help?

5. What **natural processes** you could potentially improve or restore:

   - Do you have sufficient decision making power or leverage?
   - Do you have sufficient scale?
   - What are the priorities (e.g. maximal ecosystem benefit)?

6. What **compromises** can you make or could turn out to be a win-win?

   - What human use of the landscape is acceptable or desirable, and within which boundaries? (e.g. forestry, hunting, recreation, mining, agriculture, ...)
   - What management/nature conservation will remain necessary (because of the limitations of the man-made landscape, cultural history, biodiversity, ...)

7. What are **the potential stumbling blocks** and how could you overcome them?

   - Ecological stumbling blocks?
   - Landscape stumbling blocks?
   - Economic stumbling blocks?
   - Legislative stumbling blocks?
   - Social stumbling blocks?
   - Human-wildlife conflicts?

8. What do you think will be the **outcome** of your actions?

- Impact on biodiversity/nature conservation targets?
- Impact on resilience of the landscape?
- Economic and social outcomes (e.g. impact on income generation of the local community, reduction or increase in management cost, ...)?
- Will your approach/action be sustainable in the long term (e.g. financial viability, practical viability, ...)?

9; How do you anticipate any potentially **unwanted side effects**?

- Do you need additional (scientific) research or consultancy in order to get this clear?
- What adjustments are possible and acceptable?
- Is the effect of your actions reversible if necessary?

9. Contacts

Inverde

Inverde is the brand name for the training centre that is part of Natuurinvest and provides vocational education and training in nature related themes, both theoretical and practical. With over 7 000 trainees annually, Natuurinvest/Inverde is the main training centre in nature conservation in Flanders, with a very broad scope: forestry, nature conservation, urban green space management and arboriculture, both for professionals and the public. It also provides information, training and guidance for private forest owners.

Natuurinvest was founded in 2006 to support the policy and goals of the Flemish government's Nature and Forestry Agency. Apart from Inverde, also Ecopedia, Natuurlocaties and Houtverkopen are brands of Natuurinvest.

What did we learn from the project?

We discovered the different elements of a process oriented nature conservation approach and learned that the interaction between all of these determine your goals. There's different ways of doing it, but you have to look for the right solutions for each specific case. The question whether it is possible in a man-made landscape is definitely answered: yes, it is possible and several sites in Flanders already prove it can be a success. It's not necessarily about conserving what's there, but it's an exercise in letting go and finding a new balance with all actors present.

Getting to know the regenerative agriculture movement opened up new doors for us to come up with even more opportunities to combine agriculture and nature management. The idea of a fruitful interaction of the two and seeing it into practice during field trips in Sweden helps us to believe that we can achieve similar results in Flanders.

www.inverde.be

www.natuurinvest.be

Tom Joye | tom.joye@vlaanderen.be

Alexandra Mannaert | alexandra.mannaert@vlaanderen.be

Pro Natura

Pro Natura was created as a cooperative research and consultancy company at the end of the 1980's. Pro Natura works primarily with issues related to nature conservation and has a wide level of competence within the majority of fields within terrestrial ecology. Pro Natura also works regularly with vocational training delivery in the areas of ancient trees, species identification and habitat management in Sweden and in other countries in Europe including the UK, Spain and the Baltic States. We also carry out surveys, monitoring, environmental impact assessments and produce management plans.

What did we learn from the project?

We got a greater insight into the challenges, opportunities, bottlenecks and solutions with regard to adopting a process oriented approach to nature conservation. The project has put emphasis on the understanding of ecological processes that shape ecosystems and create a basis for interactions between species in these ecosystems. We saw examples in the field and were able to learn a lot from others' experiences. It has given us an excellent network of colleagues, which allows sharing of knowledge even after the end of the project. We have gained more confidence when talking to site managers and livestock farmers. The option of working more closely with the regenerative agriculture movement as a possible solution for nature conservation grazing is also very exciting for Pro Natura. The experiences that we have gained will increase our ability to work with conservation issues at the local geographical scale but also, and perhaps more importantly, on a landscape scale.

www.pro-natura.net

Vikki Bengtsson | vikki.bengtsson@pro-natura-net

Pro Natura

Milvus Group

Milvus Group Bird and Nature Protection Association is a non-governmental, non-profit organisation, dedicated to bird and nature protection, acting in the fields of conservation, education, research and consultancy in order to make Romania a better place for birds, wildlife and people. Milvus was established in 1991 and worked initially as a branch of the Romanian Ornithological Society (BirdLife Romania). Initiating and co-ordinating national and international projects and broadening its area of work, it became an independent organisation in 2001, also having a branch in western Romania. Their programs are scientifically based, co-ordinated by specialised personnel (most of the members are biologists, ecologists, PhD students), with the involvement of volunteers and 30 paid staff currently.

What did we learn from the project?

This project confirmed that species and habitat conservation is important in its own right, but in the wider context of conservation it is often just the tip of the iceberg. Focusing on these alone, one can overlook the importance of natural processes. Concentrating on how some ecosystems work can help to restore processes that may have been damaged or disrupted. Moreover, process oriented conservation strategies can have broader, positive impacts beyond the initial scope of species or habitat conservation.

Another lesson learned is that a strict focus on conservation measures alone is not enough for effectively preserving biodiversity. By including social dimensions in projects, we can empower local communities and stakeholders to actively participate in biodiversity conservation.
By engaging with them through educational programs, capacity-building initiatives, and showing recognition for their traditional knowledge and practices, we can nurture a shared understanding and collaboration that leads to more effective nature conservation.

www.milvus.ro

Zsuzsanna Aczél-Fridrich | zsuzsanna.aczel-fridrich@milvus.ro

ARK Rewilding Nederland

ARK Rewilding Netherlands is a non-governmental organisation founded in 1989, that restores nature by creating more space for natural processes. Our main focus is rewilding via a bottom-up approach, based on natural processes and linked to regional economic and social development. ARK is a pioneering organisation that looks across borders, whether natural, geographical, organisational or cultural. We restore natural processes in the Netherlands and other European countries, where we share our vast experience and innovative ideas on rewilding and ecological restoration. By organising excursions and field lessons, supervising internships and giving lectures and presentations ARK intends to bring nature and people together.

What did we learn from the project?

This project has given us insight into the strong link between nature and culture. Nature conservation and restoration is deeply embedded in and linked to local practices. Although challenges and solutions can differ per geographical location, there are many similarities to be found too. This means that we can all learn from each other, but have to adapt the process to our own environment to ensure the highest chance of success. Furthermore, we now have a better understanding of the concept of agriwilding, which helps bridge the strict divide between nature areas and agricultural lands. This project has provided us with knowledge and tools on how to engage farmers and help them realise a shift from conventional farming to regenerative agriculture.

www.ark.eu

Lucy Dötig | lucy.dotig@ark.eu

Judith Slagt | judith.slagt@ark.eu

Leo Linnartz | leo.linnartz@ark.eu

Agency for Nature and Forests

The Nature and Forest Agency aims for more nature, forest and greenery in Flanders. The agency not only aims to maintain and protect the present-day nature in Flanders, but also to develop it further. More nature also means restoring nature lost in the past. In addition, it is also necessary to develop new nature and park areas. The Nature and Forest Agency also wants to improve nature, forest and greenery in Flanders. Improving means that the agency is committed to sustainable management of nature, forest and greenery. The aim here is a sustainable natural environment and meeting the needs of the present and future generations. The Agency places nature, forest and green in the middle of society. In the middle of society means that the agency is working in interaction with society in regard to the themes of nature, forest and greenery. The Agency for Nature and Forest, in its policy and operation for the benefit of society, actively encourages society to engage in more and better nature, forest and greenery.

Furthermore, the Agency is committed to bringing nature close to people. This means we are opening up domains, operating visitor centres and organising all kinds of campaigns with a multitude of partners.

The agency currently manages more than 85.000 ha and has 745 people employed.

What did we learn from the project?

The Agency did not have a lot of experience with process oriented nature conservation. Our participation in this project can therefore be viewed from this perspective. Within the project team there was great experience of process oriented nature conservation, we wanted to learn from these experts and investigate if it was possible and advisable to translate into the fragmented Flemish nature. We gained a lot of knowledge within this project.

As a result of this project, a feasibility study has already been drawn up within the agency and we are looking at how and where we can start a pilot project on process oriented nature conservation and the introduction of large grazers in our smaller nature reserves. Furthermore, the agency has a lot of expertise with stakeholder management, but we learned quite a lot from this project around the specific approach of different stakeholders, thanks to the versatility of the partners.

www.natuurenbos.be

An Creemers | an.creemers@vlaanderen.be

Koen Thijs | koen.thijs@vlaanderen.be

AGENTSCHAP NATUUR & BOS

Fjällbete

Fjällbete: Fjällbete literally means “mountain grazing”. Fjällbete was founded as a social company in 2002 with a mission statement to connect agricultural primary production with end consumers in the Åre Valley of Jämtland. The initiative attracted 150 co-investors for the sake of revitalizing the landscape of the valley with grazing animals. Over the years Fjällbete has been serving as a laboratory within the original mission, experimenting with various ways of enabling multiple stakeholders of the landscape to have a sustainable and positive ecological impact. The valley was chosen, because of the intense tourism co-evolving with a diminishing agriculture sector. Fjällbete is also a training hub for Savory and shares their direct practical farming knowledge locally, nationally and internationally

What did we learn from the project?

Fjällbete and the Nordic network for regenerative agriculture benefited greatly from the PONC-project. As we are representing farmers who sometimes believe nature conservationist are unwilling and or unable to understand how we as regenerative farmers are striving for highest imaginable vitality within the ecosystems in our landscape. The PONC-project served as proof of the fact that Nature conservationists actually are on the same team with us farmers. The other big take away from the project was the revelation of how useful the knowledge of nature conservationists are when it comes to monitoring the trends of increasing or decreasing vitality within the landscape. Bringing knowledge about birds and butterflies etc are of crucial importance as management practises need to be adjusted.

Within our network of regenerative practises and teachings we are now able to see a “PONC-language” forming and we look forward as the long term effects are now becoming visible.

www.fjallbete.se

Jörgen Andersson | jorgen@fjallbete.nu

Knepp Estate

Knepp estate: Knepp is a 3,500 acre estate just south of Horsham, West Sussex, UK. Since 2001, the land – once intensively farmed - has been devoted to a pioneering rewilding project. Using grazing animals as the drivers of habitat creation, and with the restoration of dynamic, natural water courses, the project has seen extraordinary increases in wildlife. Extremely rare species like turtle doves, nightingales, peregrine falcons and purple emperor butterflies are now breeding here; and populations of more common species are rocketing. The vision of the Knepp Wildland Project is radically different to conventional nature conservation in that it is not driven by specific goals or target species. Instead, its driving principle is to establish a functioning ecosystem where nature is given as much freedom as possible.

Knepp Estate was an associated partner in this project, which means they took upon the role of an advisor, relying on their many years of experience in the field.

knepp.co.uk

Charlie Burrell | admin@knepp.co.uk

10. Literature list and inspirational resources

In this chapter, you can find some inspirational resources we came across during the project, including criticisms. We share them with you without value judgment, so you can check them unprejudiced and open-minded, as we did.

Books

Benbow, M. et al. (eds.) (2016). Carrion ecology, evolution and their applications.

Bond, W.J. (2019). Open Ecosystems, Ecology and Evolution Beyond the Forest Edge.

Gow, D. (2020). Bringing Back the Beaver: The Story of One Man's Quest to Rewild Britain's Waterways.

Macdonald, B. (2019). Rebirding. Restoring Britain's Wildlife.

Montbiot, George. (2013). Feral - rewilding the land, sea and human life.

Multiple authors. (2017) Perspectives in Ecology and Conservation (Rewilding). https://www.sciencedirect.com/journal/perspectives-in-ecology-and-conservation/vol/15/issue/4

Pereira, H. and Navarro, L. (eds.) (2015). Rewilding European Landscapes. https://link.springer.com/book/10.1007/978-3-319-12039-3

Pettorelli, N., Durant, S.M & du Toit, J. T. (Eds.). (2019). Rewilding.

Tree, Isabella. (2019) Wilding: The return of nature to a British Farm.

Tree, Isabella & Burrell, Charlie. (2023). The Book of Wilding

Articles

Allen, B. et al. (2017). Can we save large carnivores without losing large carnivore science? https://doi.org/10.1016/j.fooweb.2017.02.008

Bennet, A. et al. (2009). Ecological processes: a key element in strategies for nature conservation. https://doi.org/10.1111/j.1442-8903.2009.00489.x

Bonavent C. et al. (2023). Grazing by semi-feral cattle and horses supports plant species richness and uniqueness in grasslands. https://doi.org/10.1111/avsc.12718

Fuerdean, A. et al. (2018). Biodiversity-rich European grasslands: Ancient, forgotten ecosystems. https://doi.org/10.1016/j.biocon.2018.09.022

Garrot, R. et al. (2020). Generalizing wolf effects across the Greater Yellowstone Area: a cautionary note. https://doi.org/10.2193/0091-7648(2005)33[1245:GWEATG]2.0.CO;2

Gu, X., Haelewaters, D., Krawczynski, R., Vanpoucke, S., Wagner, H. G., & Wiegleb, G. (2014). Carcass ecology: more than just beetles. Entomologische berichten, 74(1-2), 68-74.

Krawczynski, R., 2022. Mehr Toleranz für verwesende Leichen. In: Spektrum.de, 13.03.2023:

https://www.spektrum.de/news/kadaveroekologie-der-wald-braucht-mehr-kadaver/2012221

Lemoine, R. and Svenning, J-C. (2022). Nativeness is not binary - a graduated terminology for native and non-native species in the Anthropocene. https://doi.org/10.1111/rec.13636

Lemus, R. (2011). What is mob grazing and does it really provide grazing advantages. Forage News, Mississippi State Univ. Ext. Serv, 4(7).

Olech, W. and Perzanowski, K. (eds.) (2022). European Bison (Bison bonasus) Strategic Species Status Review 2020. IUCN

Schreefel, L. et al. (2020). Regenerative agriculture - the soil is the base. https://doi.org/10.1016/j.gfs.2020.100404

Shamon, L. et al. (2022). The Potential of Bison Restoration as an Ecological Approach to Future Tribal Food Sovereignty on the Northern Great Plains. https://doi.org/10.3389/fevo.2022.826282

Sovinc, A. (2021). Protection study of the Vjosa River Valley based on IUCN protected area standards - IUCN. https://portals.iucn.org/library/node/49471

Svenning, J-C. et al. (2014). Global late Quaternary megafauna extinctions linked to humans, not climate change. https://doi.org/10.1098/rspb.2013.3254

Svenning, J-C. et al. (2022). Megafauna restoration as a legal obligation: International biodiversity law and the rehabilitation of large mammals in Europe. https://doi.org/10.1111/reel.12443

Wagner, M., Waterton, C., & Norton, L. R. (2023). Mob grazing: a Nature-based solution for British farms producing pasture-fed livestock. https://doi.org/10.1016/j.nbsj.2023.100054

Websites

www.knepp.co.uk

savory.global/

regenerativeagriculturepodcast.com/

www.europeanbeechforests.org/

rewildingeurope.com/

gleasonbison.com/land-regeneration/

Video

- For more wonder, rewild the world (TED talk George Montbiot): https://www.ted.com/talks/george_monbiot_for_more_wonder_rewild_the_world
- Let's make the world wild again (TED talk Kristine Tompkins): https://www.ted.com/talks/kristine_tompkins_let_s_make_the_world_wild_again
- How to fight desertification and reverse climate change (TED talk Allan Savory): https://www.ted.com/talks/allan_savory_how_to_fight_desertification_and_reverse_climate_change
- This farm in England is run by its animals | Pioneers for Our Planet (Knepp Wildland Estate): https://www.youtube.com/watch?v=2DnLOzdFsEY
- The Power Of Holistic Management (on grazing in regenerative agriculture systems): https://www.youtube.com/watch?v=hRg1hOj-0iQ
- Keys to building a healthy soil (Gabe Brown): https://www.youtube.com/watch?v=9yPjoh9YJMk
- Grazed and confused (criticism on the climate benefits of grazing): https://tabledebates.org/publication/grazed-and-confused
- Responses to criticisms of regenerative grazing with Dr. Richard Teague: https://www.youtube.com/watch?v=gbR8tONdcXU

On stakeholder participation

Chadwick, Robert (2013). Finding new ground - Beyond conflict to consensus.

Robert Chadwick's book 'Finding new ground' on how to manage change. There is always a solution where every stakeholder will be happy. It's not about finding common ground, but about finding new ground.

ECOLOGICAL PROCESSES				
Biotic processes (caused by living things)	**Natural factors**	**Proxy**	**Proxy effect**	**Note**
General note: in nature, the interaction between animals, plants and landscape is very diverse and complex. Human simulation of any of these interactions is often poor and incomplete. Reintroducing the original species is the best action (proxy) to restore nature, especially when the species is a key player in the ecosystem.				
Herbivory mega herbivores	elephants, hippos, rhino, etc	tractor pulling (uprooting) of trees	poor	These megaherbivores used to be part of the European fauna in all climate zones
Herbivory large herbivores	wild horses, aurox, wisent, wild water buffalo, moose	domestic horse, domestic cattle, domestic water buffalo	good, but note that numbers just below carrying capacity give excellent biodiversity and high survival rates during winter or dry periods. With numbers at or slightly above carrying capacity, biodiversity decreases and annually a significant number of animals die of in periods of food shortage during winter or dry periods.	Supplementary feeding increases grazing density far above carrying capacity, resulting in a strong biodiversity decrease. Seasonal grazing is only natural when there is natural winter habitat for the animals, e.g. in summer at mountain meadows and in winter in valley grassland or forest (see herbivore migration). Note that feral or dedomesticated animals are better survivors in nature, need less or even no human assistance and are a better proxy than highly productive individuals of the same species. Large herbivores keep forbs and grasses low and green, reducing fire risk and intensity.
Herbivory large herbivores	Domesticated and wild large herbivores	mowing	Highly depending on how it is performed. If everything is mowed at the same time, insect and flower populations are depleted or even exterminated. Ant hills are destroyed. Heavy machinery compacts the ground. Mowing puts evolution aside. Herbivores recycle what they have eaten, via dung, soil invertebrates and fungi. Mowing removes minerals.	Grazing, grasses and herbs are in an evolutionary competition. Herbs produce toxins or needles to prevent being eaten. The best are almost never grazed. The downside is that production costs energy. So less expensive toxins or needles gives extra growing energy and allows for competition with other plants. Grazing keeps the different strategies in a competitive balance as 'cheap' plants are more heavily grazed. Many insects live in dead standing grasses and herbs, or feed on live ones. Mowing destroys them partly and removes the eggs, cocoons, etc. when removing the hay.
Herbivory large herbivores	Roe deer, fallow deer, red deer, ibex, chamois	goats, sheep	Good, depending on the area. But note that sheep and goats are mountain species that do not naturally occur in lowland areas and are very vulnarable to predation in lowland areas. Also, sheep are very sensitive to parasites, demanding veterinary care with chemicals that are (very) bad for nature, especially for insects, soil invertebrates and aquatic life.	Large herbivores facilitate medium sized herbivores as they transform rough grasslands into short grazed grasslands. High numbers of medium sized herbivores outcompete large herbivores.
Herbivory large herbivores		reintroduction of missing wild species	Good, but note that deer numbers can rise above natural carrying capacity when unchecked by predators or otherwise.	Predation effects medium sized herbivores much more than large herbivores, counterbalancing the effect of competition.
Herbivory small herbivores (mammals/birds) etc	Rabbits, voles, geese	(Tame ducks/geese)	Poor	Smal herbivores are heavily effected by predation and their occurrence tends to avoid predation. E.g. geese only breed on fox-free islands.
Herbivory small herbivores (mammals/birds) etc		reintroduction of missing wild species	Poor when underlying causes of decline are not repaired, good otherwise	
Herbivory "microherbivores"	Arthropods	None really	NA	

Biotic processes (caused by living things)	Natural factors	Proxy	Proxy effect	Note
Herbivore migration	Almost all large species migrate to avoid inundation or deep snow and to move to better grazing areas.	human transport of grazing animals including shepherding (walking) animals to different grazing patches.	Both natural migration and human assisted migration promote plant seed and fungi spore dispersal over long distances. Facilitation of step plants, predators using migration routes. Moderate as knowledge of ancient natural migration is lacking.	Free roaming herbivores (even horses and cattle) will learn the best places to survive in each season and how to get there. Keeping stable herds of animals in the area is very important for this learning process. Lessons learned are transferred to their young and other young herd members. Old and experienced herd members have valuable memories.
Beaver activity	Beaver	Reintroduction beaver	Good. Facilitating hundreds of organisms connected to swamps. Beaver ponds are important breeding ponds for juvenile salmon.	Dam building beavers cause upstream flooding, re-meandering of the stream, diminished flooding downstream, filling up the stream valley with sediment and levelling out the valley floor. Beavers build a dam for multiple years and only shift to the next area when food runs out and/or the distance to unfelled trees becomes too large (predation risk). The unmanaged damm will break or be bypassed and a new shallow stream is formed, transforming the former beaver pondvaley into a mud flat and later a swampy wet meadow. Attention, beavers can cause problems in densely populated areas, such as near farmland and residential areas.
Beaver activity		felling (dam-building)	poor	Beavers constantly repair and enlarge their dams and burrows. That's a lot of work. Furthermore, they fell trees in and around the beaver pond and debark them. Large trees are sometimes only ringdebarkedring debarked and left as a dead standing tree. Other trees drown because of the flooding.
Soil disturbance	wild boar, water buffalo, wisent, auroch, wild horse	pigs, domestic cattle, domestic horse, domestic water buffalo	Good, facilitating pioneer plants, basking spots for reptiles and insects and breeding possibilities for digger wasps and sand bees	All these species disturb the soil. Mostly to take good care of their coat, but wild boar and pigs also in order to find food. Trotting on wet meadows, these animals make holes of barren soil, allowing all kinds of plants to germinate. These holes capture rainwater and reduce surface runoff.
Soil disturbance		artificial soil disturbance	Acceptable, but note that natural soil disturbance is a small scale disruption and that animals choose preferred spots to act upon, regularly visiting the same spot for several years. That is difficult to imitate.	
Soil disturbance	Wisent, water buffalo, auroch, deer	Domestic cattle, domestic water buffalo	Good if multiple uncastrated males are present	During rutting season these species create barren bull pits in order to impress competitors and females. Bees, wasps and pioneer plants profit.
Well digging	(wild) donkey, (wild) horse, probably also other wild equids	domestic horse, domestic donkey artificial well digging	Domestic animals may have forgotten it, but once feral they will learn sooner or later. Artificial digging helps, but the resulting pool often differ from the natural shallow wells opened up by animals. Animals maintain a well following dwindling water levels and create new ones on a continuous basis. This allows wetland vegetation to germinate and grow in these wells.	This trait has been shown in feral populations of introduced donkeys and horses in both Australia and North-America. It would be especially helpful in dry steppe habitats of e.g. Southern and Eastern Europe.
wallowing	wild boar, water buffalo	pigs, domestic water buffalo	To take care of their skin (both) and to cool off (water buffalo) they create mud ponds by wallowing at wet places.	abandoned or rarely used pools make good ponds for amphibians, with some even specialised in this type of habitat.

Biotic processes (caused by living things)	Natural factors	Proxy	Proxy effect	Note
rubbing	wild boar, water buffalo, wisent, auroch	pigs(?), domestic water buffalo and domestic cattle	good	Especially water buffalo has a huge effect on large trees. They rub their entire coat away on trees with rough bark, often rubbing all the bark away and leaving dying big tree behind. They open up forests and select different tree types than grazers that debark trees. Bovines and wisents also rub their coats on bushes, sometimes destroying them completely. Wisents deliberately break branches, twigs and leaves of birch and black cherry and rub the oily substance in their coats, probably to suppress coat and skin parasites.
rubbing	red deer, fallow deer, roe deer, elk	none		Deer annually rub their new antlers free of skin and debark young (pine) trees while doing so.
debarking	Herbivores, beaver	debarking/ring barking	Poor	Animals debark selectively, avoiding trees with strong anti-feeding agents. Only heavily debarked trees die. Animals sometimes have to learn the edibility of the different bark types. This may take some years.
trampling	large herbivores moving around	vehicles?	No vehicle can imitate the space and time effects of walking, standing and resting of large herbivores.	Some plants easily accept or even profit from being trampled, some not at all and others accept intermediate levels, creating niche diversity as different places show different intensities of trampling.
trampling	large herbivores	vehicles?	Tracks of vehicles are continuous, guiding the water downhill through a track, promoting surface water runoff and erosion instead of infiltration.	Trampling of large herbivores facilitates water conservation, especially on slopes. Each footprint acts as a little pond.
Large predator activity	Wolves, bears, lynx etc	Hunting by humans	Good with respect to prey population reduction, often poor with respect to selection of unhealthy individuals, year-round effect, dead animals remaining in nature and spatial and temporal heterogeneity of hunting pressure	Large predators hunt all year with different species avoiding interaction and covering day and night. Wolves and bears select for young, old and unfit animals, lynxes select poorly vigilant prey. By taking out the unhealthy individuals, large predators sanitise prey populations.
Scavenging	Vultures, raven, foxes, jackals, wolves, bears, insects, fungi, bacteria	Removal of carcasses from nature and burn them in a funace.	The removal of carcasses from nature not only derives scavengers of food, but also depletes the area of minerals.	By eating carcasses, scavengers avoid diseases from spreading. Minerals are returned into nature.
Animal diseases	Viruses, bacteria, parasites	None	NA	High densities of herbivores are more susceptible to diseases. Diseases reduce these densities of large predators are not present and/or additional food is supplied to these herbivores. Diseases also cause temporary very low densities of herbivores, allowing trees and bushes to successfully colonise an area. When herbivores recover, trees and bushes are already beyond their critical juvenile phase.
Animal decomposition	Fungi, bacteria, insects (apart from larger scavengers)	None	NA	Predators, food shortage and disease cause animals to die. Scavengers, insects, bacteria and fungi recycle the body. Large dead mammals attrackt a greater biodiversity of invertebrae than small bodies.
Plant diseases	Fungi, bacteria, insects	None really (felling, clearing)	Poor	Monotonous stands of trees or other plants are susceptible to diseases. Plant diseases change monotonous stands into a more diverse vegetation.
Hole formation in trees	Fungi, woodpeckers etc	Veteranisation, nestboxes	Veteranisation decent (-to good??), nestboxes poor because of poor climate conditions?	

Biotic processes (caused by living things)	Natural factors	Proxy	Proxy effect	Note
Tree hollowing and decay (dead wood)	age, fungi, lightning	none	NA	Open grown trees feed for centuries on the hollow inside and decomposed insect-, bird- and bat dung. Many specialist beetles and fungi profit. Hollow trees withstand storms better, being more flexible than non-hollow ones.
Tree decay (dead wood)	competition	ring barking	Ring barking a healthy tree often results in an 'unnatural' artefact: a drying out massive stem. In time, this becomes interesting for biodiversity as the tree decays, but in general in nature trees die more slowly, allowing for fungi to colonise.	Fungi, beetles, flies, birds, mammals etc. profit from dead standing trees, which take decades to rot away.
Natural succession	grassland turns into shrubbery, which turns into a woodland, which gets darker and darker. That is, when nothing interferes. Interference is however common in nature, as herbivores eat young trees or debark old ones, and a.o. fungi, storm, fire and drought take their toll	cutting and pulling out young unwanted trees	poor as often permanent management is needed	The dark monotonous end stage of succesion is rarely reached as not much biodiversity develloped around it. In practice succession turns out to be circular, as it is on a regular basis locally reset to a more open stage by both abiotic large scale processes or small scale biotic processes.
Burrowing	Moles, voles, rabbits, badgers, marmotts etc.	None really	NA	Burrowing under trees gives strength to burrow walls by the root network, the holes in return provide oxygen to the roots.
Mineral cycle (small)	(large) herbivores	none	NA	By eating and trampling vegetation, dung and dead plant material become available to ground dwelling organisms and fungi that store carbon and recycle the minerals. In turn these are used by the roots of plants, shrubs and trees.
Mineral cycle (large)	Rain water dissolves minerals and flushes them towards seepage areas and river valleys. Vegetation there is rich, luring hungry large herbivores. After feeding they return to dryer areas to rest and defecate, returning and spreading minerals into the hinterland.	Artificially adding minerals like grinded (lime)stone	Highly depending on the type of stone used and on the local problem situation.	Large predators facilitate longer distance travelling of large herbivores as they try to avoid being predated upon.
Abiotic processes (caused by non-living things)	Natural factors	Proxy	Proxy effect	
Natural fire	Lightning	controlled burning	Controlled fires are often done in an unnatural season, giving different effects than natural wild fires. Controlled burning is often done in winter, to avoid extensive burning and the loss of animals.	Many fires in Europe are of non-natural origin. Fires have a huge impact on plantations and ungrazed areas, whereas grazed woodlands are much less affected. Regular fires and grazing keep the amount of potential fuel low and the intensity of the fire down, allowing mature trees to survive. Frequent fires create open forests and reduce closed canopy situations. Natural fires occur mostly in the dry summer season.
Storm/wind effect in woodlands	Storm	Felling, tractor pulling (uprooting) of trees	Felling is poor, uprooting is better. The uprooting of groups of trees is often the side effect of human intervention in the forest, such as harvesting or clear felling neighbouring patches with trees.	In natural forest heavy storms pick individual trees and break the top or large branches and sometimes uproot the whole tree. In winter mostly conifer trees are effected; in summer more often broad leaved trees. With a heavy storm mostly 1 or 2 trees per hectare. Hurricanes make long, narrow meandering tracks of twisted off braches and uprooted and broken trees.
Storm/Wind sandy areas	Storm, high winds, waves	Diggers, tanks, motor cross, etc.	Decent to good	Note that wind creates shifting sand dunes, but that tanks, motor cross and migrating animals flatten the area.

Biotic processes (caused by living things)	Natural factors	Proxy	Proxy effect	Note
Dune formation	wind, storm	Diggers	Poor	Wind selects for fine sediment to make shifting dunes. Artificial creation of dunes does not select for particle size and causes large and heavy particles to be part of the dunes.
Erosion and sedimentation	Waves, wind, free running water	Hydrological restoration (rivers, streams etc) The removal of structures that prevent erosion	Good. The removal works good, but the erosion itself is done by running water, waves and wind. Many watercourses are frozen in time by constructions, rocks and debris placed by humans in the eroding outer curve. Removal of this will free the watercourse and let it meander again, although it may take time and sometimes an extra trigger to restart the meandering.	Re-meandering only works well when rivers are allowed to run wild afterwards. Disruptions of the flow should be allowed, e.g. by trees or landslides falling into the stream and forcing the stream to find a new course. Actually these disruptions are a major cause of the start of meandering. Material that is eroded will settle down further on: downstream or just at the top of a dune. Meandering causes the outer curve to erode and the downstream inner curve to accumulate sediment. When trees are eroded, they tend to block the stream locally or downstream, often promoting further erosion but sometimes also sedimentation.
Flooding	Natural flooding/springs	Hydrological restoration (rivers, streams etc) Removing surplus sediment from floodplain by sand, gravel or clay extraction	Good, depending on how extensive the hydrological restoration was. See also beaver activity.	Flooding causes river sediment and natural debris to accumulate in the floodplain, slowly filling up old river courses, oxbow ponds, etc. Meandering creates new ones. Without meandering, the floodplain will build up and the stream will erode downwards, reducing flooding events and draining marshy areas in the valley.
Flooding	Dam building beavers		Dam building beavers are a second cause of flooding, but has a different timing. I.e. flooding is seasonal whereas beavers build a damm for multiple years and only shift to the next area when food runs out.	Beaver dams causes new meanders to be formed and makes the river bed more shallow as it is being filled up with sediment behind the dam.
restoring natural ground water levels	Dam building beavers raise ground water level in a large area surrounding the dam.	filling up deep draining streams with dead wood and local soil, often soil that was dug out of the stream sometime in history.	Good. Wood seems essential to prevent soil from eroding away and allow a new river bed to establish.	Both natural beaver dams and human action can improve the end effect. However, beaver also cause trees to fall into the water, create beaver ponds, shallow streams and valley sedimentation, and allow the river water to pass in many tiny streams.
restoring natural ground water levels	Seepage water often flows slowly from a source towards a stream	removal of artificial drainage from wetlands and source areas	Good, but also depends on the completeness of the action	
Landslides	Landslides, mudslides	None	NA	Landslides and avalanches produce bare areas where succession can start from scratch and are therefore important in mountainous areas.
Avalanches	Avalanches	None	NA	
Freezing	Low temperatures (causing drought effects, etc.)	None really	NA	Trees can freeze to death.
Drought	Prolonged periods of dry, warm weather	None really	NA	Drought turns grasslands into a field of flowers instead of grass, but it also reduces grazability and makes the area susceptible for wild fires
Other types of severe weather	Heavy snow, thunder	Arborists	Decent to good	Ice rain or heavy snow can bend or break trees and bushes, etc.
Ice-damage	Ice disturbing shore-habitats and floodplains	None really, (felling or ringbarking trees)	Felling/ringbarking OK?	Inundated river valeys can freeze up, with the ice sheets ripping trees and bushes of their branches. Drifting Ice sheets can cut trees and bushes from the winterbed of a frozen river. Ice damms can block a rivier and induce good meandering.

Annex 2: General guidelines for stakeholder involvement

1. **Ecological stumbling blocks**
    - 1.1. Effects of fauna
    - 1.2. Flora
2. **Landscape stumbling blocks**
    - 2.1. Fragmentation and scale
    - 2.2. Minerals and nutrients
    - 2.3. Hydrology
3. **Economical stumbling blocks**
    - 3.1. Finances
4. **Legislative stumbling blocks**
    - 4.1. Legislation in general
    - 4.2. Fauna legislation
    - 4.3. Flora legislation
5. **Social stumbling Blocks**
    - 5.1. Change and uncertainties
    - 5.2. Lack of co-operation
    - 5.3. Management issues
6. **Human-wildlife conflicts**

1. Introduction

A major influencing factor on the success of process oriented nature conservation is the participation of stakeholders. For the handbook of this project, we decided to focus on specific PONC-related guidelines in the first phase of setting up a project (Chapter 7). We called it the 'inspirational phase, the phase where you want to inspire and engage to start working with you and not against you. The phase where you want to find a spark of interest in each and one of your stakeholders. A spark that can become a flame and that will hopefully entice other people to take part.

In this annex we also share our guidelines which are more generalistic for stakeholder involvement in nature conservation projects and are not specific for a PONC approach. Nonetheless they are based upon the experience of the Agency for Nature and Forests (BE), one of the partners in this project, in numerous workshops dealing with stakeholders in nature conservation projects. Asking yourselves these questions will guarantee a bigger success of your project results.

2. To do's before the start of the participation process

A number of conditions need to be considered in the participation process. Below you can find a non-exhaustive list of parameters to be considered for the start-up of the process.

2.1 When to participate:

Participation does not have to take place in all phases, but the later people are involved, the greater the chance that they will not agree with the results of the decision-making process.

Questions to ask:

- Does the stakeholder participation start before the start of the process
- Does the stakeholder participation start during the elaboration of the process
- Does the stakeholder participation start during the evaluation
- Does the stakeholder participation start during management/maintenance of the project

2.2 Objectives and rules of the participation process:

Disagreement among initiators is detrimental to the quality of the process. Lack of clarity for participants increases the chance of incorrect expectations. Initiators need clear goals of what they want to achieve with these workshops and have to agree on the overall values of the project.

Questions to ask:

- Are the objectives of the participation process clearly formulated?
- Is it clear what policy decisions have been made and on what points participation is still possible?
- Is this clear for both the initiator and the participant?

2.3 Is the participatory process about the right points of discussion?

The decision-makers can choose which decisions to take in consultation and which not. But participation processes about subjects that are not important or relevant to the participants are obviously not very useful.

If decision-makers take controversial decisions behind closed doors and then only raise the less important or less dangerous topics in a participatory process, this usually leads to frustration. The chances are that the participants will use the participatory process to protest against the controversial decisions.

Questions to ask:

- Is there a consensus with the decisions already taken or are they being contested by (some) stakeholders? For example, is there discussion about the problem formulation or about certain solutions that have already been decided?
- Would (some) stakeholders have preferred to participate in other discussions than the ones on the table?

2.4 Are all stakeholders around the table?

Often only a limited group of stakeholders get a say because initiators forget people or parties. In this way, the private interests of that one group of people get the upper hand over other interests.

If stakeholders who have an important influence on the decision, do not have any contact with the participants, those parties cannot get to know and enrich each other's points of view.

Questions to ask:

- Was there sufficient opportunity to communicate with all other parties and stakeholders involved?
- Was there sufficient opportunity to really disagree with other stakeholders?
- Should all stakeholders be around the table at the same time or better split up by sector?

2.5 Is the participatory process open to all who wish to participate?

If stakeholders choose not to participate in a participatory process, that's OK. But if someone feels it is important to participate, it is unfortunate if they are not given the opportunity to do so.

If, for some reason, the participatory process only accommodates a limited number of stakeholders, it is important that everyone knows why they are allowed to participate or not.

Questions to ask:

- Do all stakeholders with an opinion get a say (including non-experts)? Think about how to handle strong opinions and personalities before the start of the participation.
- On the other hand, if only a limited selection of people are allowed to participate in the participatory process, are the selection criteria for those representatives clear and objective?

2.6 Are the techniques of the participatory process suitable for the participation?

Additional efforts are needed to involve people who are more difficult to involve in the participation process. It might be about people and groups who are not traditionally represented in the process, whom you need to encourage, sensitize or actively seek out. e.g. individual farmers, because we easily assume that they are represented by the farmers' union.

Questions to ask:

- Is the rhythm, place and time of meetings and gatherings realistic/attainable for the participation of the relevant groups?
- Is the communication about the participatory process suitable for different target groups?
- Do the methods used really encourage all the participants to participate, also those who are more difficult to reach?

2.7 Are the competent leaders involved in the process?

Organising participation requires expertise; it is work for specialists. In most cases, the quality of the participatory process and also the quality of the decision-making process will increase when external facilitators are added. If facilitators are sufficiently independent, this also helps to reduce any distrust the stakeholders may have. It is essential that the initiator and the facilitators make very clear agreements about the mandate, the rules of the game, the level of participation, etc.

Questions to ask:

- Is the participation process led by competent facilitators?
- How are the initiators involved?
- Are they sufficiently independent from the decision-makers and initiators?
- Are the mandates and roles of these facilitators sufficiently delineated and defined?

2.8 Information and feedback

Decision-making processes often require a lot of knowledge and expertise. In order to involve people who have less experience in this area, you need to invest in good, understandable information, long enough in advance.

A report is very important in a participatory process. Otherwise the participants have to continue without a basis for reflection or foundation.

Feedback and information after the participatory process contributes to the level of satisfaction.

Questions to ask:

- Do you (as a participant) get enough information to understand the policy and its context and to form your opinion? Is that information understandable?
- Does the information arrive on time?
- Is follow-up and feedback provided?

2.9 Does the initiator draw lessons from the participation process

Questions to ask:

- Does the initiator make an effort to correct any mistakes made in the participatory process?
- Does the initiator make an effort to copy the good experiences of the participatory process in other decision-making processes

1. Ecological stumbling blocks

1.1. Fauna & effects of fauna

Uneven distribution of grazing pressure

Stumbling Block

Undergrazing can occur for example when an extra area of rich former agricultural land is added to an area. The animals often prefer this newly added land and as a result the forests and shrublands in other parts of the area suddenly grow quickly, because of the lack of grazing pressure.

Overgrazing is a problem for example when wanting to transform pine forest into broadleaved forests, because the grazing animals will eat all the palatable broadleaves they can reach. Forest development, diversity and succession can suffer from a high grazing intensity.

Possible solution

- Make sure the grazing pressure is adjusted to the area and to your idea of what the area should become. If that idea is a succession from pine towards mixed or broad-leaved forest, then make sure the grazing pressure is sufficiently low.
- Temporarily fence a (part of) the area off, to avoid grazing. This will allow species, such as broadleaved tree species, to establish.
- Monitor the development of the area. E.g. check in early spring if there is enough to eat for the animals, and if not, lower the grazing pressure.
- Fertilised grassland will become less productive once the fertilising has stopped, and the distribution of the grazing pressure will return to normal.
- Meanwhile, accept what happens as a kind of natural disturbance. E.g. diseases would in a natural situation also lower the grazing pressure for several years.
- Accept that uneven grazing pressure is also natural and may result in greater variety in terms of biodiversity.

Landscape goals and grazing pressure

Stumbling Block

Some landscapes require high grazing pressure and others low grazing pressure. On poor sandy soil, heather can only be maintained with a high grazing pressure, as pioneer forest will otherwise rejuvenate in the open heather landscape. Forests on poor soil have a slow succession from pine forest to a mixed or broadleaved forest with e.g. oak, birch and rowan. This succession only takes place at a low grazing pressure. Combining both goals in one area with an even distribution of grazing is difficult.

Possible solution

- Monitor the development of the area.
- Adjust the grazing pressure to the landscape goals, and adjust your goals to what is happening in reality.
- Use sheep flocks and a shepherd to maintain landscapes such as heather, in addition to grazing by large grazers such as bovines and horses in the rest of the area.
- Add more forest while not increasing the amount of grazing animals, as the grazing animals only spend limited time in the forest, thus lowering the grazing pressure in at least parts of the forest.

Domestic or semi-wild animals

Stumbling Block

Standard high productive cattle breeds are often not adjusted to graze outside year-round, because they cannot endure the weather or are unable to fend for themselves, e.g. they need supplementary feeding or are not able to give birth to their offspring without human intervention. Also, because of their build, they might not be able to cope with the land, e.g. develop problems with their hooves. When grazing in natural areas with domestic cattle, this might cause problems, because it can prove difficult to maintain the health of the animals. In some countries (e.g. Sweden) year-round or winter grazing may even be against the law and special permits may be required.

Possible solution

- Switch to grazing with semi-feral bovines and horses. Horse breeds that are often used are Exmoor ponies, Gotlands russ, Koniks and Bosnian Mountain horses. Semi wild bovine breeds are Highland cattle, Galloway, Tauros, Sayaguesa and Rode Geus. Also semi-wild water buffalo or wild European bison can be used.
- Make sure that the individual animals you use have experience with living outside in winter and are well adapted to the local climate. If not, give them extra care in the first winter and when necessary even take them into a stable. In the second winter, animals will be

more adapted and some additional food will suffice. Let the animals slowly adapt, without maltreating them. Offspring will do better than parents and from some point onwards the herd will be fully adapted.

- Long-legged breeds are better adapted to flat lowland conditions and short-legged breeds are better adapted for mountainous areas. Local breeds are often well adapted to local conditions, but not all local breeds are suitable as they are turned into high productive breeds.

- Larger herbivores in self-selected social groups (~60% female, 40% male) are better able to fend off attacks by predators such as a wolf.

- Some species that were present in the past no longer exist, e.g. auroch, which was an ancient bovine. Don't focus solely on species that were present historically, but use so-called proxy species, which have the same ecological effect as the extinct species. One example is the Tauros, which is a bovine species bred to resemble the auroch.

- In some countries, special permits are possible to apply for to allow year-round grazing even for domesticated animals.

Loss of traditional grazing

Stumbling Block

In Transylvanian landscapes grazing sheep flocks are still a common sight, always accompanied by shepherds and shepherd dogs. In some areas this practice is in decline, and there is a conversion to large-scale farming. Dairy cow herds are now rarely present in villages, however you still see small goat flocks grazing freely. Adequate grazing (which is dependent e.g. on grazer species, number, grazing period and duration of grazing) is key to maintaining diversity of the landscape. The abandonment of grazing with domesticated animals has a negative impact on biodiversity.

Possible solution

Managers of nature areas should monitor changes in grazing and the impact of grazing on the landscape and biodiversity.

After total land abandonment, one can start with rewilding in the area and use free roaming grazing animals to replace traditional grazing.

1.2 Flora

Development of vegetation

Stumbling Block

When starting a project, the present vegetation in the project area is very influential. For example, the area might consist of planted coniferous forest for the purpose of harvesting. Efforts to mechanically convert homogenous coniferous forests into mixed forest, broad-leaved forest or open habitats (heathland and land dunes), are costly and not always very effective. Seeds from the old coniferous forest will dominate the seed bank and especially in open areas the coniferous forest will try to return. These regenerating coniferous stands cause high maintenance costs or cause suitable open habitats to eventually close up again. Another problem might be that the available amount or diversity of the seedbank in the area is very low, leading to low or no germination of species that are hoped for.

Possible solution

- Thinning a pine forest allows it to transform naturally and at a higher pace than without intervening, however it is important to ensure variation when thinning (e.g. not even-spaced).

- Large grazers can help create a mosaic in the landscape, creating more heterogeneity. However, they have a preference for broadleaved trees, so when transforming from pine to mixed forest, the grazing pressure should be low enough for trees to be able to rejuvenate naturally. An alternative may be to put the plantings in an enclosure until they are not vulnerable anymore.

- As intermediate feeders, deer have a larger effect on broadleaved trees and bushes than grazing species such as horses or any of the bovine species, which prefer grasses. So reducing the amount of deer and increasing the amount of horses and bovines, reduces pressure on the broadleaved woody plants.

- Introducing flora species, transplanting flora species or using seeds from natural grasslands. As an example: One could use hay from a flora rich area to enrich an area that currently lacks a seedbank for these species.

Invasive plant species

Stumbling Block

Both indigenous and exotic species can be invasive and can cause problems when spreading in (new) nature areas. Ragwort and creeping thistle are examples of indigenous species, giant hogweed and black cherry of exotic ones. They can spread to neighbouring areas, causing nuisance and less support for the project among neighbours. Large seed sources in surrounding areas can pose a problem and increase the chance of invasion, e.g. in the case of black cherry.

Possible solution

- Reintroducing natural processes can create more balance, and push invasive species into a less dominant place in the ecosystem so novel ecosystems appear.
- Mowing a strip of 25 to 30 metres will keep the wind propelled seeds from spreading to neighbours.
- Grazing with large herbivores such as European bison, bovines and horses helps to reduce several invasive species. Grazing suppresses exotic invasive species such as Himalayan balsam (Impatiens glandulifera) and Japanese knotweed (Reynoutria japonica). European bison eat black cherry (Prunus serotina), giant hogweed (Heracleum mantegazzianum), bracken (Pteridium aquilinum) and Red oak (Quercus rubra).
- Natural predators may be more likely to have an impact when allowing natural processes to develop e.g. painted lady caterpillars demolished the population of creeping thistle at Knepp.

2. Landscape stumbling blocks

2.1 Fragmentation and scale

Fragmentation and scale

Stumbling Block

Fragmentation of natural areas by human infrastructure, such as roads and canals, makes migration and colonisation difficult, as well as posing difficulties for enlarging the area or connecting to neighbouring areas. Another problem could be when starting with several smaller project areas, instead of one larger area, which prove difficult to connect.

Possible solution

- Connect areas by building wildlife crossings such as a green bridge or a fauna tunnel.
- Many animals are good swimmers and all it takes is to create an area where they can easily get in and out of the water on opposite sides.
- If there are several smaller areas, herds of large grazers can be moved between these areas or the herds can be small. To avoid inbreeding, bulls can be rotated between small herds. Or two-year-old horses can be taken out of the herd, as this is the natural age at which they are expelled from the herd.
- If grazing is key then using alternative grazing systems such as 'holistic grazing management' which involves moving the graziers regularly can help reduce these problems and the dispersal of seeds with the animals helps with colonisation of plants.
- be aware that every herd requires a minimal area size. if the area is too small, reconsider your options and maybe grazing or other natural processes are not recommendable here.

Infrastructure development

Stumbling Block

Due to slow economic growth, Romania is in the fortunate situation to have larger naturally diverse areas with more connectivity between them, compared to some other western countries. However, this is rapidly changing. More investments are carried out and there is a continuous infrastructure development, catching up with western countries. Unfortunately, there is less emphasis on the impact of this progress on nature, as short-term human wellbeing is prioritised.

Possible solution

- Infrastructure investments should make an analysis on the effects on nature, and green solutions must be taken in consideration more seriously.
- NGOs as well as governmental organisations could propose solutions and authorities should force investors to implement these within their projects.

2.2 Minerals and nutrients

Minerals and nutrients

Stumbling Block

Due to previous agricultural use, most of the time nature restoration on arable land has to start from a phosphate rich soil. Or due to intense agricultural use of the surrounding area, calcium, magnesium and potassium have been rinsed out of the sandy soil, causing mineral depletion. Furthermore, an excess of nitrogen causes certain species, such as purple moor-grass, to dominate and out-compete rarer plants. The water quality can also be influenced by this, as it is polluted with pesticides and fertilisers coming from the agricultural areas upstream.

Possible solution

- Traditionally this is counteracted by removing vegetation or hay from the project area, thereby removing phosphate- and nitrogen-rich vegetation. This is however only useful when the current high nitrogen deposition stops. Otherwise, the ration between phosphorus and nitrogen deteriorates further, with adverse effects on biodiversity. Also, depletion of the phosphate levels by removing vegetation can take tens of years before good results are obtained.

- Remove phosphate by scraping off the top soil. This is a very expensive solution that will also promote pioneer tree species like birch and pine to colonise the area. It also removes other minerals and prevents the natural redistribution of minerals. Like the previous solution, this one deteriorates the ratio between phosphorus and nitrogen.

- Wetlands and beaver lakes soak up nutrients. American studies show that 40% of the nitrate can be deoxidised and taken out of the water by denitrifying bacteria. Phosphorus is used by the vegetation and grazing animals will redistribute that over a vast area.

- Work together with neighbours in a collective plan.

- Convert surrounding areas to less intensive agricultural practices, such as regenerative agriculture.

- Detour polluted water around the project area instead of letting it flow through the area. If water quality improves enough, this water can become part of the natural hydrology of the area.

- Add large grazers. When former agricultural land can be added to a grazing area on impoverished sandy soil, large herbivores will feed mainly on the rich former agricultural land but will also defecate elsewhere. This will slowly redistribute the abundance of minerals from places with too much minerals towards places with a deficit.

2.3 Hydrology

Hydrology

Stumbling Block

Hydrology has a large impact in a project area, while it is not always possible to control the hydrological conditions due to surrounding stakeholders. For example, water extraction for drinking water or agriculture can lead to desiccation, lands that are ploughed have a high evaporation, and ditches to ensure the drainage of agricultural lands lead to drought in neighbouring nature. Lower ground water tables can cause ponds to dry up, leaving animals without drinking water.

Possible solution

- Close ditches where possible, to avoid water being transported too quickly, heather bales are effective and cheap ways of doing this.
- Turn drainage ditches into a series of ponds. Use the soil that comes out of the pond to block the outflow of water towards the next pond, etc.
- Buy up surrounding land so you gain more influence on the hydrology
- Weirs can be used to restore the water level.
- Large herbivores in social groups are very effective in closing ditches, especially steep and deep ones. Every time they cross a ditch, soil from the sides is pushed down into the deepest part, turning these crossings into a small dam. Wallowing patches and bull pits are often found in the sides of a ditch, pushing even more soil into the lower parts. Even within one year a difference can be noted and in five years a large difference. Especially bulls, horses and wisent are very active at such spots.
- If drinking water for the animals is not guaranteed, look for access to river valleys or ponds that do keep water. If that is not possible, dig an extra pond.
- When the groundwater is too deep, new ponds can be dug out bigger and deeper, get a layer of loam with sand on top and you have a new pond that holds water.

3. Economical stumbling blocks

3.1 Finances

Funding

Stumbling Block

Funding is needed at all steps of the project. Already at the start of the process it is needed to devise a project plan and to involve and convince all stakeholders. A lack of funding can therefore be a stumbling block for a project. Agricultural subsidies may not always be possible to use when different approaches are being adopted with grazing systems. Available grants may be short term. Funding may be available for the start of a nature conservation project, but not for long term monitoring and maintenance.

Possible solution

- If you want to (re)wild a specific site, costs can be very high. It is better to aim wide and be flexible in project aims.
- Take ecosystem services into account: If your project can help avoid damage by flood water, you might be able to get money from e.g. the waterboard.
- Consider ways in which income can be generated from the project and find diverse income-streams e.g. safari business, nature-tourism, converting buildings to commercial rentals, sell meat from excess livestock.
- Consider adopting a regenerative agriculture approach as this can provide a steady and reliable source of income for the livestock owner.
- Local farmers, animal owners and citizens can contribute to the maintenance of the site's wilderness parallel to their benefit from this (local brand for their products, touristic activities etc.).

Loss of income

Stumbling Block

If efforts are made to convert an area to process oriented nature, this might lead to a loss of income for some stakeholders. For example, when converting agricultural lands to nature or due to lower wood production or due to loss of subsidies. Farmers adjacent to your project area might fear that if forests grow, those trees will cast a shadow on the agricultural field, which causes production loss.

Possible solution

- Make a financial viability study at the start of the project. Use numbers based on examples.
- wilding can also lead to less work being needed, which leads to lower labour or maintenance costs.
- Timber: harvest high value trees instead of low value clear cut trees.
- Combining grazing and forestry can cut costs in the early phase and bring at the same time income from grazing. Combining tree harvesting and grazing can continue, as this was the case all over Europe for millennia. For a fruitful combination the level of grazing is somewhat lower. The species composition should be adapted too, with less deer and more horses and bovines, increasing the pressure on grasses and allowing thorny bushes to appear and broadleaved trees to grow up inside the bushes.
- Income from (eco-)tourism can be a giant support for your project, e.g. the European bison in Romania.
- Real estate values might rise due to their vicinity to a (new) nature area.
- Shadow from trees: Where this may be true on some days in springtime, it is not true in dry and hot summer weather. Under the shadow of trees, the grass remains green for a much longer time.
- Having more varied nature areas nearby can provide a source of predators for insects that may otherwise be a pest, such as in areas with vineyards, where shrikes increased and ate many of the fruit-eating insects.
- Diversification of income sources can also ensure greater stability of income in the longer term.

Example

Millingerwaard (NL) The municipalities of the rural villages were very critical at the start of the project but the surrounding larger cities were enthusiastic. In the end, the project added 300 jobs in the recreational sector and created €25 million revenues per year in the tourist sector. So all municipalities are now in favour of the project. What would have been even better is if formal arrangements would have been made, that the revenues of the local entrepreneur (a tea room in the middle of the area) would flow back into the management of the area. Now this entrepreneur greatly profits from the newly developed nature, but nature does not profit from having him there.

Loss of value

Stumbling Block

Turning agricultural land into nature can lead to resistance, because some people might feel that this leads to a loss of valuable arable soil, which is capable of producing food. Productive soils however also give rich results for nature.

Possible solution

- Communicate: Nature is not useless, but also valuable. It offers all kinds of soft values, is good recreation ground and is often a better combination with other functions than agriculture, e.g. nature above drinking water sources or flood prevention.

- Food production may still be possible, by implementing different ways of managing the livestock.

Improve income

Stumbling Block

Small, traditional mosaic usage of the landscapes is a cultural tradition, which is disappearing in sites such as Transylvania. This is mostly because it does not offer enough income. As a result, large scale farming is becoming more common in Romania. This scaling up of farming practices causes damage to valuable natural landscapes.

Possible solution

- People can benefit from selling local products, which can mean an important source of income. Often these are sustainable or organic products, and they can be promoted on a larger scale. Similar examples, or e.g. developing food hubs can influence the mindset of locals and could help them see the long-term profit without harming biodiversity.

4. Legislative stumbling blocks

4.1 Legislation in general

Obtaining permits

Stumbling Block

Procedures for permits and expropriation are time consuming. For example: obtaining permits to change the hydrology might be difficult, since the water board is afraid locals or farmers might claim damage when water levels are too high. Another problem might be that in the management plans for the local forest reserves 'grazing' is not included, so the animals need to be fenced out.

Possible solution

- Make a realistic time schedule and communicate this.
- Start pilot projects (optionally together with other stakeholders) to see what can be changed.
- Move forward step by step.

Tenant agreement

Stumbling Block

Long lasting tenant agreements cannot be changed and can sometimes be inherited by a farmer's son or daughter. When the area is needed for process nature, the tenant can block change when he refuses to leave or move with his livestock to another area. This can delay the project or force you to work around it. A similar problem might arise with existing hunting permits, which reduces the amount of available prey for predators in the area, forcing them to look for livestock as prey.

Possible solution

- Offer an alternative grazing area to the farmer: buy lands closer to the farm and swap this for the land you want, which will create a win-win situation.
- Talk to the tenant, but this takes a lot of time and not always a good chance of a positive result.
- Have patience and wait until the land comes free.
- Buy out the current tenant, although this can be a costly business.

- Own land that has a tenant on it: make sure you stop the tenant agreement in time (put it in your agenda).
- Decrease hunting permits.
- Bring in another livestock owner/grazier that is doing well from a different approach that could talk with the tenant farmer to show that it is possible to make new systems work.

Lack of ownership data

Stumbling Block

One of the most important problems in Romania is the lack of official and open information about the categories of land use and their ownership. This can lead to misappropriate use of lands, wrong management of naturally valuable areas (eg. grazing instead of mowing) or even to the disappearance of important habitats (ex. grasslands converted to arable land, wood-pastures transformed to forests, abandoning of lands).

Possible solution

- Authorities should have a transparent database which could be accessible by protected area managers, researchers, conservationists, etc.

Feral dogs

Stumbling Block

Feral dogs are quite common in Romania and can cause damage to wild or domestic animals. In discussion, the focus is usually on large predators such as wolves and bears. Feral dogs should be included in this discussion too. Freely roaming shepherd dogs attacking or scaring tourists and other people can also be a problem.

Possible solution

- The presence of wolves reduces the presence of feral dogs.
- Shepard dogs should be trained to ignore people and be kept close to the flock.
- Problems can be reported to authorities and enforcement comes from animal welfare and environmental watchdog institutions.

4.2 Fauna legislation

Migrating animals

Stumbling Block

Free roaming bovines and horses can cross borders, e.g. between countries or owners. This poses legal problems if for example the status of the animals, or the veterinary requirements differ between these countries.

Possible solution

- Try and get the whole area (consisting of different owners/countries etc) appointed as one single unit.
- Design and implement cross-border grazing permits.
- Consider these herbivores as wild animals and adapt the legislation to this.

Example

Grensmaas (BE, NL): Konik horses and Galloway cattle are grazing on both the Dutch and the Belgian side of the river Meuse, but can swim across the border that runs through the area. Especially stallions or bulls that live on the Dutch side like to swim towards the female-only herds on the other side. This causes problems because the veterinary rules differ per country, e.g. Belgian cattle have to be free of IBR (Infectious Bovine Rhinotracheitis), which is not the case for Dutch cattle. And since it is a viral disease, it can be easily transmitted. There is no solution as of yet.

Cadavers

Stumbling Block

Having decomposing cadavers in an area is desirable because animal bodies contain a multitude of minerals and nutrients, which all can be recycled and released back into nature areas after death. Also, a huge number of insect species, especially beetles and flies, are specialised in decomposing cadavers and many of them are specialists that depend on large dead animals to complete their life cycle. Also several mammal and bird species are obligatory scavengers and depend on the availability of dead animals in nature. Sometimes however, dead animals cannot be left on site due to legal prohibitions or are removed because of health concerns, or public perception.

Possible solution

- Make arrangements with local nature managers and hunters, that they leave animals that have been hit by a car (traffic victims) or leave the contents of the belly in the field after shooting an animal.

- Dead wild animals are not part of the Animal Health Regulations, so it is not necessary to dispose of them. Thus, having an animal species, such as wisent, declared and treated as "an indigenous wild species" offers opportunities.

- Dead livestock in nature cannot always be found in time or cannot be removed without destroying protected (N2000) nature. Make arrangements with the government that in such exceptional cases, the cadavers are allowed to stay.

- It is important to inform the general public via newsletters, social media, etc. and to inform farmers about the very limited risks of diseases, i.e. diseases can be monitored best on live animals or by a vet on a recently succumbed animal.

- Highlight the cost-savings that vultures for example can provide in ecosystem services and even how they can save lives.[4]

Wild versus domestic animals

Stumbling Block

Semi-feral horses, bovines, wisent or deer in a fenced area might be regarded as kept animals instead of wild, and thus fall under the same rules and regulations as farm or zoo animals. E.g. cattle need to be ear-tagged and have to be tested for certain diseases before being transported. It is much easier to give a farm animal a veterinarian treatment than a wisent, deer, feral horse or bovine. For that, the latter animals, and especially wisent and deer, have to be caught first or immobilised. Semi-feral or de-domesticated animals might not be used to human intervention, which will cause them a lot of stress. Also, by treating animals as cattle instead of wild animals, might be against the ethics of the project.

Possible solution

- Arrange an exemption for an area or certain areas, e.g. for nature areas larger than 100 hectares. Animals living in these areas are seen as semi-wild and thus do not need to be treated as domesticated animals.

- Use alternative ways of grazing domestic animals, such as agri-wilding. Accept that the results will probably differ.

4 https://www.livescience.com/26478-vultures-save-lives.html

Example

In the Netherlands, semi-feral or semi-wild large herbivores are acknowledged as an intermediate category between farm animals and truly wild animals. Care for these animals is also considered to be intermediate. The animals find their own food, water and shelter, but the owner is responsible that there is sufficient available. Also the owner has to intervene when an animal is severely wounded or ill. However, cattle still have to be ear-tagged and horses need to be chipped.

Liability for damage caused by animals

Stumbling Block

The owner of an animal might be responsible when that animal causes damage. This can mean that you have to pay when an animal harms a person (even when the person was the cause of the incident, not the animal), or e.g. when a horse damages a car by eating the coating of the car.

Possible solution

- Have appropriate insurance that covers this.
- Approach all grazing animals as wild animals, especially in the smaller nature reserves.
- Inform the public about the presence of large herbivores and how to approach them, e.g. through information boards, excursions, articles in newspapers, magazines and local papers.
- Prohibit the presence of dogs in the area to avoid conflicts between dogs and grazing animals.
- GPS tagging systems which allows visitors to see where the animals are and avoid them.

4.3 Flora legislation

Natura 2000 legislation

Stumbling Block

Natura 2000 goals are very static and hardly fit more dynamic nature areas. Grazed forest-grassland mosaics are inherently dynamic as are shifting sand dunes, intertidal areas and meandering rivers. Species come and go, e.g. caused by climate change. Also, clinging on to one successional stage prevents the next stage from developing. Process oriented nature conservation does not fit very well with static goals and typically allows for change and succession. On top of that, several habitat types require a very specific type of management based on human intervention, whereas the species involved are often much more tolerant to the type of management.

Possible solution

- Implementing Natura 2000 less strictly, less per square metre, more overall and more flexible would be a good solution.

- No protected status in an area allows for more flexibility and a more open attitude towards the kind of nature arising from dynamic natural processes. So, if there is a choice between implementing process oriented nature conservation in either a N2000 area or an area without this status, choosing the latter is therefore advised as it avoids above problems and allows for a more open mind on the outcome.

- Process oriented nature conservation might be interesting to apply outside of protected areas, as 'green infrastructure', ensuring connectivity in the landscape; we're not likely to lose anything (the main fear of many managers).

5. Social stumbling Blocks

5.1 Change and uncertainties

Resistance to change

Stumbling Block

People might feel sceptical or be against wilding in general, because they like what they have or they do not know what they will get after the project. For example, there can be resistance to cutting forests, or vice versa there can be resistance to the change of an open landscape into a forest which will dramatically alter the view. Changes in the landscape caused by wilding can be too fast, unwanted or unexpected for local communities. If their fears and concerns are not taken into account, this can lead to declining support for the plans. Farmers can be sceptical for many reasons (see also elsewhere in this document).

Possible solution

- Try to avoid taking something from the people without giving something in return. For example, if people can no longer take a dog into the area, make sure to create another area close by especially for dogs.
- You have to manage expectations. You have to make people enthusiastic about the process, not about the end result. It is important to ensure that people continue to believe in the project, even if it takes a bit longer.
- Educate and inform people. Also explain that 'letting go of strictly defined objectives' is part of process oriented nature conservation; Answer questions about what is going to be different as best as you can.
- Hold meetings to inform locals, give excursions, give field lessons to local children and open up a café: make sure you are visible.
- Positive media attention for the project can help local people become proud of the project or area.
- Make concessions if needed. This can be very straightforward, such as create railings at steep slopes or hiking paths to make the area more accessible.
- Include all local stakeholders in a project steering committee. Persevere in keeping the communication between all stakeholders up and running, even in times of opposition.
- Involve locals in the long-term management of the project area, e.g. as volunteer or guide.

Example

Sigma Plan (BE): At first, the general public was quite hostile, but in the end they became very enthusiastic. This was achieved by supplying information and an active policy of participation, by creating walking and cycling trails, natural playgrounds, bird watch spots, dog meadows, by the promoting of recreational benefits and the branding of regional products. A high degree of co-ownership of the projects was accomplished. Schools were actively involved. Local guides and 'nature parents' were trained to teach in an active way in the area. Educational packets were supplied, tree plant actions and other management actions with schools or youth movements were organised. It is important to gain attention of the media to convince the larger public and politics.

Cultural heritage versus nature development

Stumbling Block

PONC management might clash with cultural landscape heritage values. Stakeholders might view cultural landscapes such as heather, hedgerows and typical views as more important. The introduction of free roaming animals or the development of 'wilderness' nature might impede these cultural elements.

Possible solution

- Have extensive discussions with local nature conservation and heritage managers to gauge the level of acceptance for different natural processes. Both nature conservationists and heritage managers are potentially reluctant to change much to their current management.
- Tune down human intervention, but allow for a certain level of human intervention to be retained (e.g. coppicing, mowing), in order to maintain the heritage value of the landscape. This can be limited to specific areas, as part of the mosaic landscape.
- Given the heritage value of the cultural landscape, local stakeholders might prefer domesticated historic breeds instead of 'wild' herbivores. But even then, robust types can often be chosen that barely need human assistance.
- Implement systems like holistic grazing management (regenerative agriculture).
- Identifying opportunities to support nature conservation, e.g. focusing on the cultural history artefacts in the landscape can be a 'lubricant' for nature conservation efforts.
- Select other areas where the cultural landscape is less important or create pilot areas to highlight the changes.

Proof wanted

Stumbling Block

Sometimes, stakeholders ask for certainty; that a certain result will be accomplished or they ask for (scientific) evidence. For example, grazing of large herbivores will not negatively impact a certain plant species or restoration of a certain habitat type to be achieved.

Possible solution

- Take people on an excursion to areas which have already been wilded, to show how this can look in practice.
- Make a plan to monitor the flora and fauna in the project area to keep a track of changes.
- Give examples of natural processes that we may not think about e.g. that trees have the ability to produce new shoots because they have evolved to cope with grazing/browsing animals. Sand pits favour bees and birds, created by livestock etc.

5.2 Lack of cooperation

Divergent interests and opinions

Stumbling Block

There can be many different kinds of stakeholders involved in a project, who can have all kinds of divergent interests. This can include opposing interests such as nature conservation, water management, monetary profit, increase in tourism, farming etc. Sometimes working together with a certain stakeholder can be seen as working with the enemy. Individuals within one stakeholder group might also be of different opinion, e.g. a farmer near his pension might feel differently than a young person. Agricultural organisations and local farmers generally oppose the 'loss' of agricultural land to nature. Nature conservation organisations largely welcome this process, but persons within these organisations differ in their appreciation of process-oriented nature as opposed to 'classic' nature conservation.

Possible solution

- It takes time to convince all stakeholders of the benefits of the project, do not rush this process but take time to get to know each other and find a common way forward. Some stakeholders might not have cooperated together before, so it takes time to build trust.
- Let the stakeholder organise themselves (e.g. let farmers form a farmers group, which is represented by a spokesperson), so that they can be a discussion partner in the project.
- Install a project coordinator. The main role of the project coordinator is to bring people together, stimulating ongoing communication between all stakeholders.
- Find ambassadors that come from the specific stakeholder groups to help 'speak the same language'.

Vocal opposition

Stumbling Block

When implementing a project, this might lead to opposition. Sometimes this opposition can become quite vocal in e.g. social media or during meetings. This may tarnish the image of your project and can cost a lot of energy.

Possible solution

- You must try to get people to support your vision of the area: accept that you won't be 100% successful in that respect. Don't stop communicating because of the opposition.
- It is usually a small minority that will continue to be opposed. This minority will be very difficult -or impossible- to convince of the positive sides of the project.
- Focus your communication and energy on the rest of the people involved. You can choose to put a lot of energy into this small group, but the chances of success are small.
- Find ambassadors to help smooth the process.

5.3 Management issues

Black and white thinking

Stumbling Block

People think you have to choose to either do 100% process oriented nature management or 100% traditional. However, this is rarely ever the case in practice and especially smaller nature reserves it is even impossible. Viable populations of large herbivores require huge areas, let alone viable populations of their natural predators. Traditional managed nature reserves often also depend on natural abiotic processes.

Possible solution

- Much smaller social herds can be actively managed and still have their natural effect on the area. Another form can be regenerative agriculture.
- You can have process oriented nature and still manage unwanted invasive species.
- You can combine natural grazing with additional grazing with a shepherd and sheep or goats.
- You can restore abiotic processes and still manage an area traditionally.
- Provide examples of pragmatic projects where compromises have been made e.g. Knepp.

Additional management required

Stumbling Block

Sometimes process oriented nature management alone does not suffice and additional management is needed. This can be caused by fragmentation of the landscape, which impeded the reintroduction of certain natural processes (e.g. water table, tidal movements, large scale grazing). Also, additional management might be necessary to adhere to regulations, e.g. the amount of vegetation in floodplains must be regulated so it does not hinder the flow of water, and therefore additional mowing is necessary.

Possible solution

- In case of vegetation hindering water flow: they will enlarge the biggest side channel so the river can flow more freely. It will now be deeper or wider than originally planned, which compensates for the unexpected forest growth and the formation of river dunes.
- Accept that the outcome of process oriented nature conservation might be different than expected.
- Try to intervene as little as possible and stick as much to natural processes as possible.

Lack of skilled and/or trained people

Stumbling Block

Process oriented nature management differs from traditional nature management. This also means that specific skills are needed. For example, handling large animals that are in social groups and used to being outside all year, is very different from handling docile cattle. A farmer without experience with de-domesticated cattle might therefore not be the most fitting person for the task, and might have a different view on how to handle animals (also with respect to administering medicines, sorting out the animals etc.). This can lead to management that is not well adjusted to the wilding process.

Possible solution

Hire people skilled at the job, e.g. a grazier that is familiar with working with semi wild animals. Give them training on the job and don't send them only on agricultural training, as they will be taught the wrong attitude towards wild animals.

Try to raise ecological awareness amongst decision makers, policy makers, managers etc, to raise understanding and improve cooperation.

Establishment of a non-political nature management organisation with skilled staff and an openness towards collaborating with stakeholders.

6. Human-wildlife conflicts

Large predators

Stumbling Block

Large predators such as wolves have recolonised an area but come in conflict with livestock and give the large predator a bad reputation.

Possible solution

- Shepherds, herd guarding dogs and electric fences are proven solutions. However, it takes time to convince livestock owners to use these prevention methods and to educate them how to use them properly. Subsidies on proven prevention methods are important to help livestock owners.
- Active communication is very important, as well as active debunking of fake news and fake claims. Stories told by farmers who have used the above methods successfully are effective.
- An active group of volunteers and professionals that are helping livestock owners is an important success factor.
- Opposition from farmers will be strong in the beginning. Acceptance does take time.
- Good examples need to be encouraged (financially as well), as farmers must use these solutions. The application for subsidies for fences or carnivore attacks must be transparent and available to anyone. Authorities – animal welfare, protected area managers, environmental agencies – must come together with practical solutions to bring effective solutions and solve human-wildlife conflicts.

Example

In Germany, areas with older presence of wolves have more wolves but less conflicts, when compared to areas that are more recently colonised by wolves. The abundant presence of electric fences and guarding dogs in the former areas and the almost absence of them in new areas, explains the difference between these areas.

Fear of large animals

Stumbling Block

Some people fear large grazing animals such as the wisent or bovines with large horns. The introduction of large cattle can also be considered to be decreasing the accessibility of the site. Furthermore, occasional incidents might happen e.g. when a bull attacks an unleashed dog or a hiker approaches an animal with calves to close. This will lead to negative publicity, which can hamper the project.

Possible solutions

- Don't downplay the issue, as large grazers are big and wild animals.
- Inform the public of how to behave towards these large animals through signs and billboards explaining guidelines such as keep at least 25 metres distance from the animals, keep dogs on a leash/no dogs allowed. A visual aid of how far 25 metres is might help, such as two wooden sculptures 25 m apart, so people understand what distance they have to keep.
- Have rangers, volunteers or hosts present during busy hours and days.
- Have a contingency plan ready, which includes who to contact and how to communicate when an incident occurs.
- Don't go too fast, aim for compromise between stakeholders before introducing changes in the landscape. A strategy of 'done deals' might work in the short term, but will slow down the process in the long term, because of declining support and growing opposition.
- Remove animals that display unwanted behaviour.
- GPS on the animals allows people to avoid them if they want to.

Example

Slikken van de Heen (NL): While the bison were in the habituation area, the rest of the site was still open to the public, where the Konik horses and the Rode Geuzen roamed. In September 2020, bison were given access to the entire area and there was temporarily no access to the public. In January 2021, the public regained access to the entire area. Thus, possible human wisent conflicts could arise.

A schedule has been created to ensure that a knowledgeable host was often present at the entrance to the area or in the area to educate visitors. The deployment of an expert host/hostess has helped a lot for the acceptance of the locals. For example, an explanation was given about why bison live in the area and why this type of grazing was chosen. Contact with the public is very important.

Also a heavily used public path has been kept outside the grazing area. So people with their dogs can still use this path, while the rest of the area is kept free of dogs.

Animal welfare

Stumbling Block

Certain aspects of wilding can be too far from the comfort zone of the general public. For example, the fact that large grazers have no shelter, have to stay outside year round so also in snow, have less food available in winter which can lead to emaciation. Also, the animals can look untended, e.g. with burdock in their manes and tails. Furthermore, social structures in herds can lead to fights between the animals, e.g. stallions kicking and biting each other, which looks very aggressive and can lead to wounds. This can lead to public outrage or negative media attention.

Possible solution

- Communication: Communicate ahead of the problem, before you even introduce the animals. Try to educate the public by explaining that these animals are different from domesticated animals, suited to living outside year round.

- Excursions: By taking people in the field on excursions, they get a chance to ask questions and you get the chance to explain and show how these wild animals live.

- In most grazed areas in the Netherlands, additional feeding is only done in extreme circumstances such as flooding of most of the area. Self-healing wounds are mostly left untreated, but vets are called in when managers want a second opinion or deem treatment necessary.

Example

Oostvaardersplassen (NL): In the Oostvaardersplassen large herds of red deer, Konik horses and Tauros were introduced. No extra care was given to the animals, they had to fend for themselves. Surplus or sick animals were shot when it was clear that a specific animal wasn't going to make it by itself. And as the animals became more and more adjusted to this way of life, the grasslands became more and more very short grazed, up to the point that many people claimed it was overgrazed. Trees and bushes did not survive this grazing pressure. The barren landscape and the emaciated animals during winter were not acceptable to the public. Also birders started to complain when the amount of breeding birds went down as the number of herbivores went up even further. Especially when large grazers started to die of starvation and were not removed from the area, and where thus very visible to the public, led to public outrage. Also, the lack of large predators meant that most animals died during winter, whereas large predators kill more constantly and eat and thus remove their kill. In the end, politicians decided to switch the management of the area. The lesson is that animal welfare and public opinion can influence decision making and thereby curtail the amount of natural processes.

Damage inflicted by wild animals

Stumbling Block

Animals can have an impact that can be perceived as damage. Examples are the impact of red deer or wild boar on agricultural crops or residential gardens. Another example is the beaver: where beavers build dams, the water table rises. Agricultural fields bordering a stream can be flooded. But even long before that, higher ground water tables damage the roots of plants and cause production to decrease.

Possible solution

- Anticipate for the damage and manage expectations. Strive for a consensus between all stakeholders, e.g. on what amount of damage is acceptable.
- Prevent and protect: E.g. use beaver deceivers, protect valuable trees with mesh wire and lure bevers to a place where they can cause little or less damage.
- Is there a fear factor involved? Try to frame the 'negative' aspect in a positive way. E.g. when beavers flood a valley, tell the newspaper that beavers are the best groundwater managers around.
- Use a spokesperson. Make use of a famous person or politically important person as an ambassador for the species.
- Compensate damages.
- Soils that are sensitive to beaver damage are often also soils that are not very suitable for agriculture and at the same time can yield a lot of profit for nature. It is better to convert these areas to nature and compensate farmers for their loss by buying the land.
- Measure the cost savings and share that information e.g.

Humans altering the behaviour of animals

Stumbling Block

When an area is very busy with visitors, this can influence the behaviour of the animals. For example, tourists might feed the horses. This can lead to the animals associating humans with food, which will cause them to approach humans and become intrusive. People also might try and pet the animals, take pictures with them or put their children on the backs of young animals.

Possible solution

- Have a person dedicated to educating the public about the problems people cause.
- Put up signs and billboards with guidelines such as: keep 25 metres distance from the animals, keep dogs on a leash, don't feed the animals.
- Organise excursions in the area e.g. for locals, in which you explain the best way to interact with the animals.
- Explain that if an animal is perceived as a nuisance, that animal has to be removed and sometimes culled.

Interaction Domestic and feral horses

Stumbling Block

Having domesticated and feral horses in one area can cause problems. Feral stallions can try and bring a domesticated mare into their wild harem, irrespective of a human rider on the horse's back.

Possible solution

- Keeping both riders and drivers apart from natural grazing is a possibility, but often that means cutting out a large group of users and having a large part of nature ungrazed by horses.
- Take time to let the feral horses get used to the domesticated ones (see example below)
- Not having stallions in the group, or only for a short time.

Example

Maashorst (NL): In the Maashorst they introduced pregnant Exmoor mares without stallions. By the time the foals are born, the mares were used to domesticated horses and their riders, and ignored them. The foals grew up with this behaviour as their example and do not cause any nuisance later on.

They did not introduce any stallion groups at the start of the project. Now that things are going well, they will start with this carefully. Finally, they monitor the situation: if problems arise, they will intervene swiftly and remove the stallion that is causing nuisance. There is also a very good, personal communication with horse riding groups, facilitating swift reaction when necessary.

PONC

Co-funded by
the European Union