ALFRED TOEPFER NATURAL HERITAGE SCHOLARSHIP 2022

SHIFTING BASELINE SYNDROME

IMPACTS ON NATURE CONSERVATION AND PREVENTION

MARGAUX PIERREL

CONSERVATION RANGER, NATIONAL PARKS AND WILDLIFE SERVICE (NPWS), IRELAND

EUROPARC FEDERATION

ALFRED TOEPFER STIFTUNG F.V.S.

Contents

Summary

Shifting baseline syndrome (SBS) is a psychological and societal phenomenon describing a gradual change in the accepted norms for the state of nature due to a lack of memory, knowledge or experience. In other words, SBS is the situation in which each new generation consider the state of nature when they were born and raised as the normal or healthy baseline.

In the current dual climate and biodiversity crises, as we collectively face global, regional and local environmental degradation and loss, this results in a continual lowering of people's accepted thresholds for the 'normal' state of nature.

SBS is therefore considered one of the aggravating factors of environmental degradation and species decline; as well as one of the major obstacles to nature protection and climate justice.

Presently working as a conservation ranger in Ireland, I face the consequences of SBS in my daily activities, from law enforcement to site monitoring, through environmental education. By applying for this scholarship, I was eager to learn more about the implications of SBS on nature conservation in European protected areas, in order to understand better this relatively unknown phenomenon and how it affects the professional sector.

Thanks to targeted study visits in the UK, the Netherlands, France and Bulgaria, and by comparison with my experience in Ireland, not only have I learnt about the effects of SBS for professionals, I was also able to identify 'solutions' or ways to prevent it.

The main goal of this scholarship and report is to raise awareness of the causes and consequences of SBS and to suggest an open discussion on strategies to prevent and reverse the shift.

1. Introduction

1.1. About the author

Originally from France, I grew up surrounded by nature in the Forest of Tronçais, considered one of the most beautiful oak forests in Europe. The landscapes and wildlife of this region have been a constant source of inspiration and have led me to pursue a career in nature conservation.

Figure 1. The author at the meander of the River Arda (Bulgaria)

In 2013, I obtained an Engineer Diploma (equivalent to a master's degree) in agronomy, territorial development and environmental sciences at VetAgro Sup, France. Following my studies, I have had many different roles in various companies, from volunteering for a sea turtle conservation organisation in Greece, to being a head guide in the Burren National Park, or working as an ecologist for several environmental consultancies.

Since 2021, I have been working as a Conservation Ranger for the National Parks and Wildlife Service (NPWS) in Ireland. The role of a Conservation Ranger is diverse, from species and habitat surveying to law enforcement, through project management, site monitoring and education. NPWS is an executive agency under the Minister of State for Nature, Heritage and Electoral Reform, within the Department of Housing, Local Government and Heritage.

1.2. The concept of Shifting Baseline Syndrome (SBS)

Growing up surrounded by a pristine natural environment, I have developed a personal vision of what the woods surrounding my home house are like – or should be like –, not based on scientific data but mostly on childhood memories. In my mind, I do not even question that *my* forest was in a better natural state in the 1990s than in 2023. But, what I refer to as a 'pristine natural environment', older people might consider damaged or impoverished from what it was 50, 70 or 100 years ago, prior to my own baseline.

With ongoing environmental degradation at local, regional, and global scales, people's accepted thresholds for environmental conditions are continually being lowered. This psychological and sociological phenomenon is called "Shifting Baseline Syndrome" (hereafter SBS) and is defined as a gradual change in the accepted norms for the condition of the natural environment due to a lack of experience, memory and/or knowledge of its past condition (Soga & Gaston, 2018). In other terms, what we consider to be a healthy environment now, previous generations might consider degraded, and what we judge to be degraded now, the next generation will consider to be healthy or 'normal'. SBS is also referred to as "environmental generational amnesia" (Kahn, 2002).

SBS was first described in 1995 by fisheries scientist Dr Daniel Pauly in an essay on fishery practices. He pointed out that fishers and marine scientists tend to perceive faunal composition

and stock sizes at the beginning of their careers as the unaffected baseline condition against which catch size is subsequently judged, and that this is likely to result in a gradual acceptance of the loss of fish species (Pauly, 1995).

To quote Dr Pauly in a Ted Talk recorded in 2010: "we transform the world, but we don't remember it. We adjust our baseline to the new level, and we don't recall what was there". Adding that: "every generation will use the images that they got at the beginning of their conscious lives as a standard and will extrapolate forward. And the difference then, they perceive as a loss. But they don't perceive what happened before as a loss."

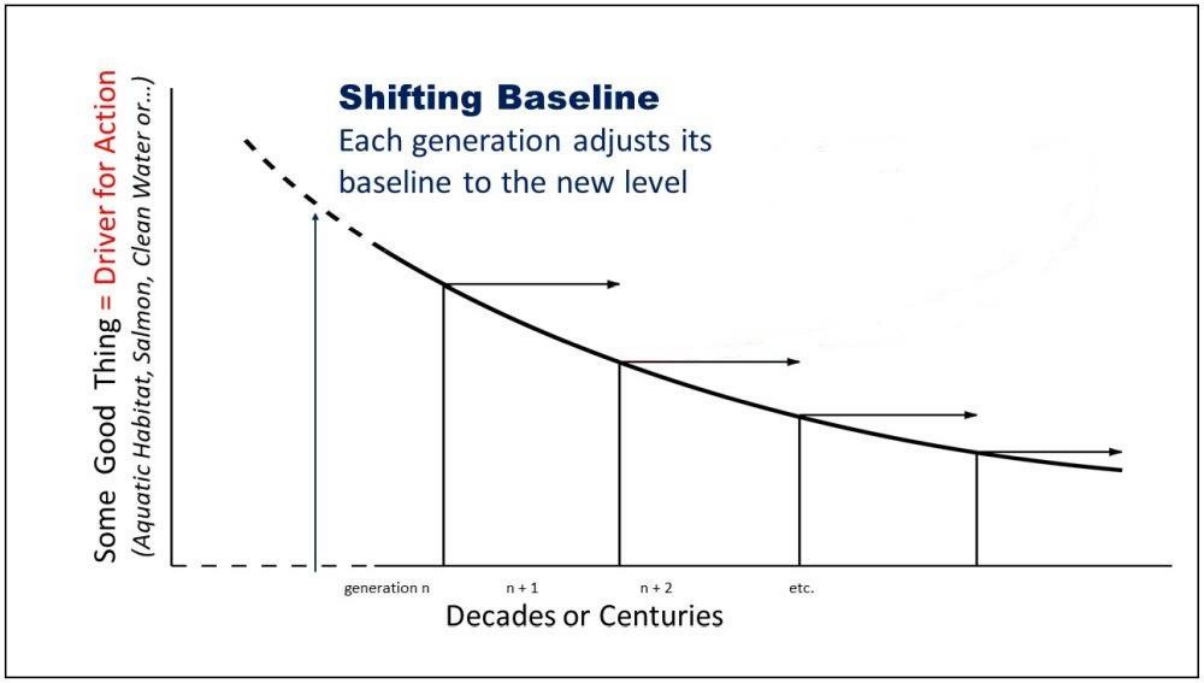


Figure 2. Illustration of SBS (Pauly, 2002).

I first became aware of SBS after reading 'Wilding' by Isabella Tree, co-owner of Knepp in Sussex, UK. In her 2018 book, Tree explores Pauly's theory and applies it to a terrestrial context, particularly in ornithological data collection and targeted conservation efforts.

1.3. Objectives of the study visit

"We forget that there was once more. Much, much more". (Tree, 2018)

This sentence has resonated in me since reading it and raised many questions, especially in my job as a conservation ranger. Is what I am trying to preserve only a very, very small part of what used to be there? How is my baseline affecting the conservation efforts I put in protecting habitats and species? Can this loss of memory/knowledge causing SBS be reverted? How can I take SBS more into consideration in my daily activities?

The objectives of my study visits in European protected areas were to answer these questions. My initial hypothesis was that conservation is influenced by people's ideas of what should or should not live there, and that this threshold is slowly but surely decreasing with a sanitisation of the natural world and fewer species accepted.

The overall goal of my study is to create an awareness of SBS in conservation and ecology, and to find ways to reverse the shift.

I carried out my study visits in very different protected areas, either on public or private lands, dealing with conservation conflicts or integrated in the community, within the EU borders or beyond. This diversity of areas allowed my research to draw parallels with regard to SBS, rather than focus specifically on any of these places.

During my five study visits, I interviewed 15 people from many various backgrounds, from junior ranger to conservation officer, from project manager to ecologist, from administrative coordinator to rewilding officer.

Throughout this report, I compare my study findings with observations I have made during the seven years I have lived and worked in Ireland.

1.4. Overview of the study visit

I divided my study visits into three parts to facilitate my absence at work while minimising back and forth trips. The schedule was as below.

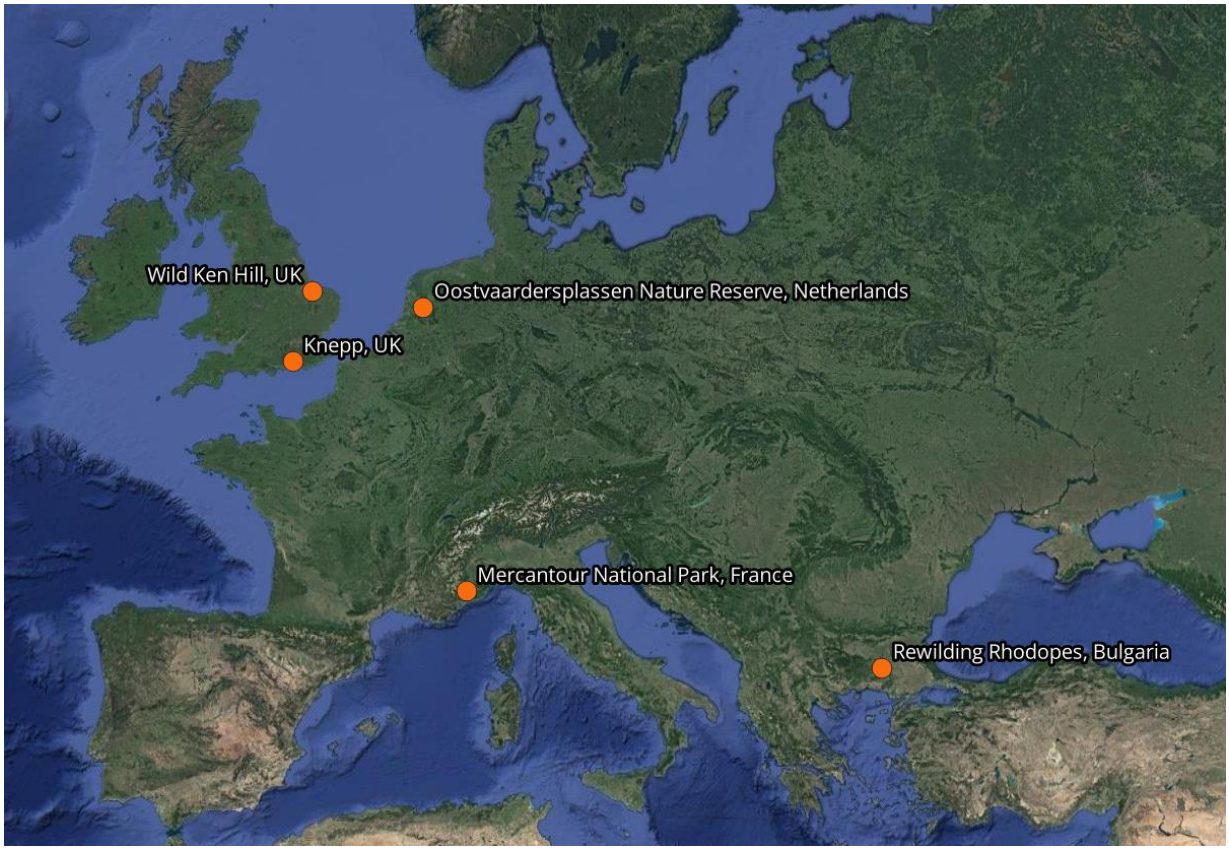


Figure 3. Overview of the five visited sites.

- From the 3rd to 6th of April 2023, I flew from Dublin to London and travelled via public transport to Wild Ken Hill in Norfolk, UK. I had booked accommodation in the vicinity for the three nights and walked to the study area each day.

- For the second section of my trips, I combined two study visits. On the 11th of June, I flew to Amsterdam (Netherlands) and reached Lelystad by train. I then cycled to the Oostvaardersplassen Nature Reserve on each day of my study visit. On the 14th of June, I took several trains from Amsterdam to London and then on to Knepp in Sussex, UK. I camped on site for three days before flying back to Ireland.
- Finally, I arranged my last two trips for the end of September. On the 20th, I flew to Nice (France) and visited the Vésubie Valley in Mercantour National Park and the general office of the Park in Nice for two days. From there, I flew to Sofia in Bulgaria on the 23rd of September. I travelled to Plovdiv, gateway to the Rhodope Mountains over the weekend, before renting a car for five days to explore the Rewilding Rhodope project in the Eastern Rhodopes. I retruned to Ireland on the 30th of September.

1.5. Visited Protected Areas

Wild Ken Hill, United Kingdom

Wild Ken Hill is a project to restore nature, fight climate change and grow healthy food across a family-owned coastal farm in West Norfolk, England. The project started in 2018 and stretches over 4,000 acres, with varied habitats such as coastal scrub, freshwater marshes, heathland, wood pasture and nature-rich farmland. This private farm is divided into three blocks: a regenerative farming area, a rewilding area and a traditional conservation area. These three practices are used side-by-side in an innovative approach.

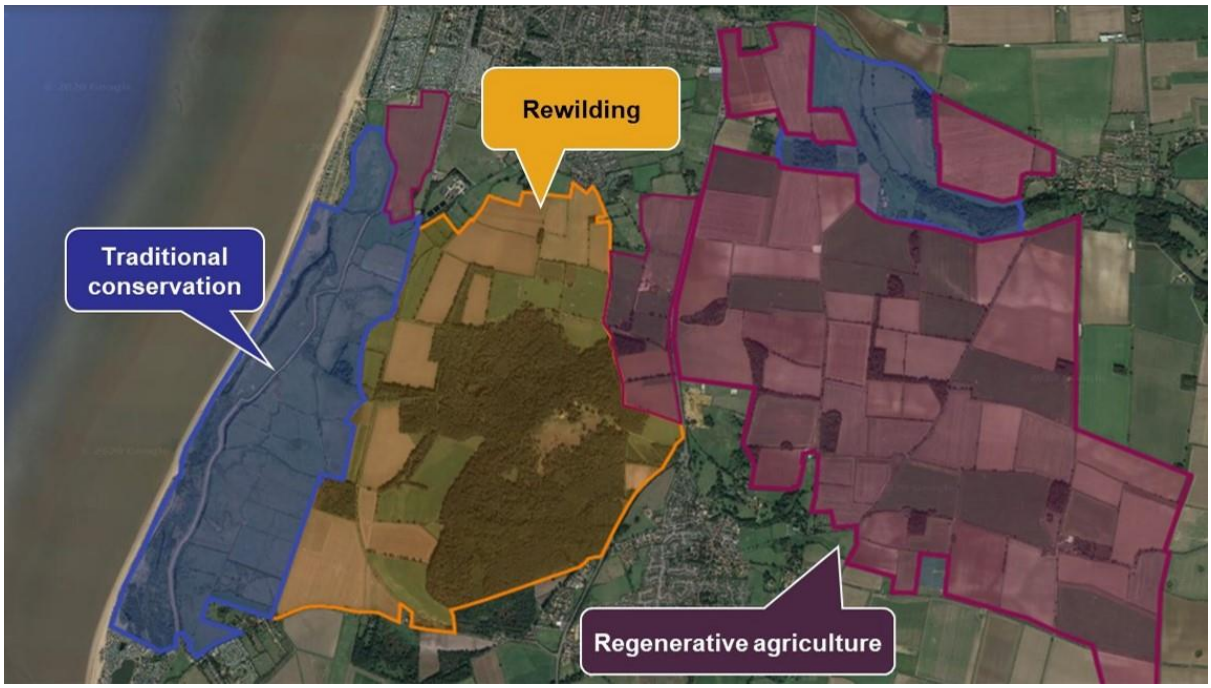


Figure 4. The three areas of Wild Ken Hill.

- The regenerative farming part allows for the farm to be commercially sustainable while hosting biodiversity and storing carbon in the soil. The principles are to minimise the cultivation of crops (wheat, barley), to use cover cropping, to reduce the use of fertilisers and pesticides until complete removal, to control farming traffic to avoid soil compaction or to use poly-cropping. Restoring soil health is fundamental to their

approach. Several farmland species, such as lapwing (*Vanellus vanellus*) and brown hares (*Lepus europaeus*), have returned to this area to breed in recent years.

- The rewilding area is composed of woodland and grassland with sandy soils deemed unsuitable to productive farming. Large herbivores have been introduced to this area and allowed to roam it freely. This rewilded land is better suited for carbon sequestration and ecological restoration. Part of the woodland is home to beavers, the first beavers to be reintroduced to Norfolk after hundreds of years. The rewilding project recently joined the constellation of Europe's leading projects in the European Rewilding Network.
- The traditional conservation area comprises high levels of existing conservation interests and focuses on maintaining those and creating more habitats. The majority of the area is composed of freshwater marshes and scrub and has public footpaths and roadsides. The water levels and grazing patterns are managed to support the breeding of target species, such as avocet (*Recurvirostra avosetta*), lapwing, redshank (*Tringa totanus*) and marsh harrier (*Circus aeruginosus*), among many others.

Oostvaardersplassen Nature Reserve, Netherlands

The Oostvaardersplassen Nature Reserve in the Netherlands is managed by the Staatsbosbeheer (State Forest Service) and is part of the Nieuw Land National Park. Located between the towns of Almere and Lelystad, it covers an area of approximately 5,600ha composed of wetland and dry habitats. The site is built on a polder, a tract of lowland reclaimed from the sea by the construction of a dyke in the 1930s. This area was drained in 1968 for industrial purposes but remained unused. Nature seized the opportunity and thousands of geese and waders rapidly colonised the lowest and wettest part of the polder in the 1970s. In 1986, the management of the site officially changed from industrial development to nature reserve, particularly targeting the conservation of the wetland by controlling water levels.

The reserve is part of the Natura 2000 network and is listed as a Special Protection Area (SPA) on the European Birds Directive (79/409/EEC) for 31 bird species. Special Conservation Interests (SCIs) include bittern (*Botaurus stellaris*), spoonbill (*Platalea leucorodia*), barnacle goose (*Branta leucopsis*), white-tailed eagle (*Haliaeetus albicilla*) and hen harrier (*Circus cyaneus*).

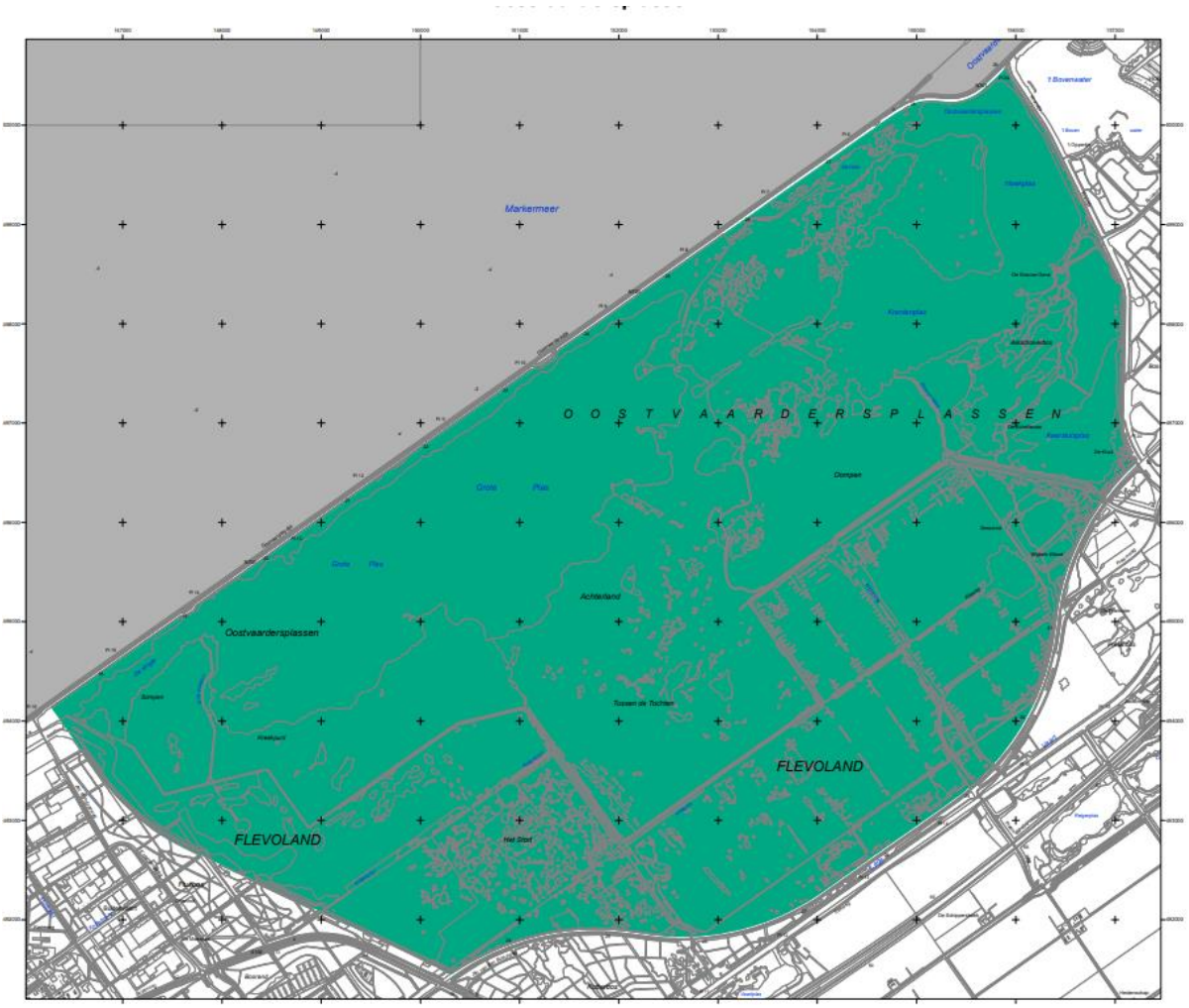


Figure 5. Oostvaardersplassen Natura 2000 site (in green).

Knepp, United Kingdom

Knepp Estate is a 3,500 acre rewilding project located in West Sussex, England. It has been owned and farmed by the Burrell family for decades. The heavy clay soil made farming very difficult and in February 2000, after years of financial struggles, the two owners took a leap of faith and decided to convert the dairy farm into a rewilding project.

In 2001, Knepp received Countryside Stewardship funding to restore a part of the Estate. It led Charlie Burrell, co-owner, to carry out conservation as a non-goal-orientated project where, as far as possible, nature took the driving seat – an approach that has come to be known as 'rewilding'. The project is inspired by the grazing ecology theory that the biologist Frans Vera implemented in the Oostvaardersplassen. In 2010, the Knepp Wildland project received support from the government with Higher Level Stewardship funding.

In twenty years, the Knepp project has become a leading light for conservation in the UK, particularly after the publication of the book 'Wilding' by Isabella Tree, co-owner. Since then, thousands of visitors travel to Knepp every year, eager to learn more about the recovery of some rare species, such as the turtle dove (*Streptopelia turtur*) and nightingale (*Luscinia megarhynchos*), in such a short time. Ecologists, volunteers, locals and enthusiasts alike have formed a strong community in Knepp.

In this rewilding project, high quality ecological research combines with a will to inspire others and get people excited about nature. Monitoring and surveys of wildlife and vegetation cover are carried out annually by a team of on-site ecologists while species-specific surveys are also undertaken. The project offers a wide range of extensive workshops for professionals along with 'safaris', camping/glamping opportunities, public footpaths and a newly-opened restaurant.

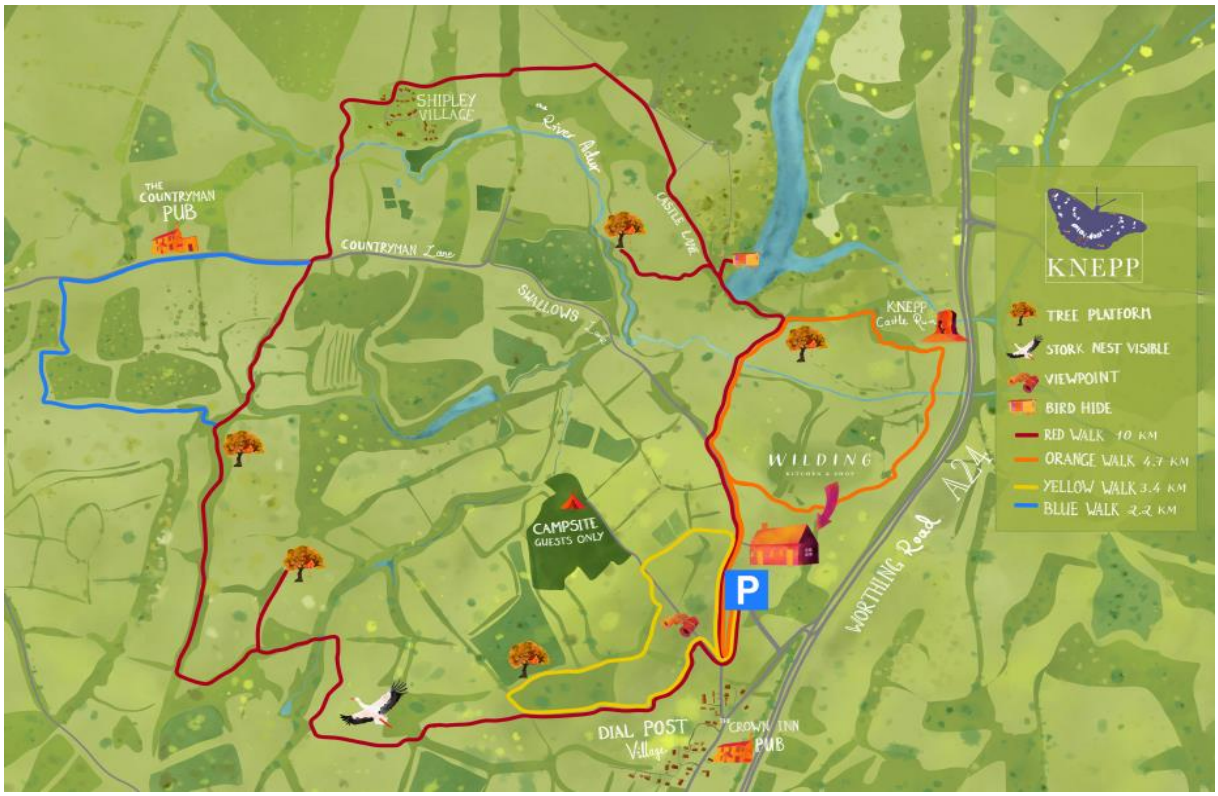


Figure 6. Public footpaths crisscrossing Knepp rewilding project.

Mercantour National Park, France

The Mercantour National Park is located in the French Alps, in the southeast of the country. It was established in 1979 and covers an area of 1,801km^2 (180,100ha). As with all French National Parks, it is divided into two areas: a core area (679km^2) and a peripheral area (1122km^2). The core area is protected under strict regulations where most human activities potentially harmful to the conservation of the site are either regulated or prohibited. The peripheral area, also called membership area, follows the same principles as a regional natural park. Once the membership has been agreed upon, the municipalities adhere to specific obligations (e.g. limited motorised traffic) while engaging in a partnership with the National Park and carrying out policies and actions for the sustainable development of the territory. The peripheral area of Mercantour National Park has around 20,600 inhabitants across 24 municipalities. The Park's missions are carried out in these two zones and complement each other in order to make Mercantour a space of harmony between protection, recreation, local development and respect for traditional activities.

Located at the convergence of multiple climatic, geological and altitudinal influences, the Mercantour National Park is composed of a mosaic of highly diverse natural habitats with that supports and enhances the exceptional richness of the fauna and flora. The Mercantour National

Park extends over six valleys: Verdon, Var-Cians, Ubaye, Tinée, Vésubie and Roya-Bévéra, each with its own distinct character. The Mercantour massif is the last promontory of the southern Alpine arc before a sharp plunge into the Mediterranean Sea.

On the other side of the massif, Italy established the Parco Naturale Alpi Marittime in 1995. No physical border separates the two protected areas, and since 1987, they have twinned as the Alpi Marittime Mercantour European Park with the common ambition of promoting territorial continuity.

Figure 7. Mercantour National Park territory.

Rewilding Rhodopes, Bulgaria

Located in the Eastern Rhodopes, at the crossroads between the European and Asian continents, Rewilding Rhodopes is one of Europe's remaining biodiversity hotspots. It is one of ten large pioneering landscapes within the Rewilding Europe programme.

The Rhodope Mountains hold a captivating array of flora and fauna and are the stronghold of vultures in south-eastern Europe. It is the only breeding spot in Bulgaria for griffon vultures (*Gyps fulvus*), thanks to the conservation efforts of the Rewilding Rhodopes team and the Bulgarian Society for the Protection of Birds (BSPB). The area is also an important site for the globally threatened Egyptian vulture (*Neophron percnopterus*) on the Balkan Peninsula. Additionally, rare cinereous vultures (*Aegypius monachus*) can be spotted soaring above. Eastern imperial eagle (*Aquila heliaca*), Saker falcon (*Falco cherrug*), Levant sparrowhawk (*Accipiter brevipes*) are among the dozens of other raptor species that can be found here.

Amid predators, the whole region is a key spot for wolf and jackal. In recent years, brown bears have begun naturally recolonizing the Rhodopes, and the possibility of bear-watching is

emerging in the landscape, particularly in the western part of the mountains. The Rewilding Rhodope programme is divided into four sub-projects (Madzharovo, Student Kladenec, Byala Reka, Kardzhali), each targeting different conservation efforts and community engagement.

Figure 8. The four sub-project areas of Rewilding Rhodopes.

The project team has developed strong relationships with the local community and collaborate with numerous partners, like the Bulgarian Society for the Protection of Birds (BSPB) or the EU Life programme.

2. Contextualisation and origins of SBS

2.1. Overview of the current state of nature

Global trends: biodiversity loss and climate change

Biodiversity is crucial to human well-being and is increasingly threatened. The Living Planet Report 2022 shows an average decline of 69% in the abundance of vertebrate populations since 1970 (WWF, 2022).

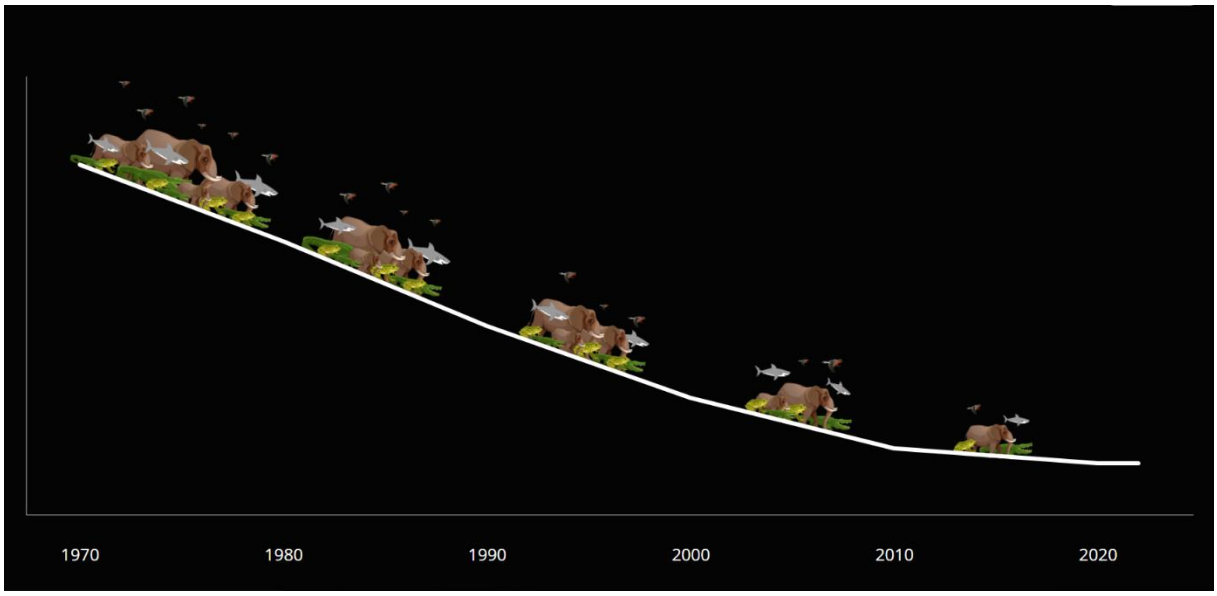


Figure 9. Average change in wildlife populations sizes from 1970 to 2018 (WWF, 2022).

Land-use change, habitat destruction or deterioration, invasive species, overexploitation, intensive agriculture, pollution and climate change all contribute to the decline in wildlife populations (IUCN, 2023).

Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface temperatures reaching 1.1°C above 1850-1900 in 2011-2020 (IPCC, 2023). Every degree of warming is expected to increase the wildlife losses and the impact they have on people.

In Europe

The European Environment Agency (EEA) 2020 report describes the state of nature in the European Union (EU), based on reports from Member States under the Birds (2009/147/EC) and the Habitats (92/43/EEC) directives and on subsequent assessments at EU biogeographical levels.

In Europe, much of our nature and biodiversity has already been lost, and the continuing downward trend is highly alarming. Of the three main groups studied, habitats and birds lag particularly far behind while the group of non-bird species nearly met its 2020 target. The proportion of bird species with poor and bad status has increased by 7 % in this 6 year-lap to reach a total of 39 %; and as much as 81 % of EU habitats are in poor condition, with peatlands, grasslands and dune habitats deteriorating the most (EEA, 2020).

Unsustainable farming and forestry, urban sprawl and pollution are the top pressures to blame for a drastic decline in Europe's biodiversity, threatening the survival of thousands of animal species and habitats. These threats are compounded by alterations to rivers and lakes, such as dams and water abstraction, invasive alien species, and climate change. Abandonment of agricultural land contributes to the continued decline of semi-natural habitats, like grasslands, and their species (e.g. butterflies, farmland birds) (EEA, 2020).

A 2017 study carried out in 63 nature protection areas in Germany estimates a greater than 70% decline over a 27 year-period in total flying insect biomass (Hallmann *et al.*, 2017). Overall in Europe, recent studies point out declines in insect numbers of 70-80% over the past several decades particularly in areas dominated by human activities and intensive agriculture (based on a study under the leadership of the conservation organisations Kent Wildlife Trust and Buglife, 2022).

Moreover, EU nature directives and other environmental laws still lack implementation by Member States. Most protected habitats and species are not in poor or bad conservation status and much more must be done to reverse the situation (EEA, 2020).

In Ireland

In 2005, researchers at the National History Museum of London developed a Biodiversity Intactness Index (BII), which measures the percentage of nature that remains in an area by comparing average abundance of native terrestrial species with their abundances before pronounced human impacts. In the BII 2018, the Republic of Ireland ranked 13th lowest and Northern Ireland ranked 12th lowest of 240 countries and territories, making them some of the most nature-depleted nations in the world.

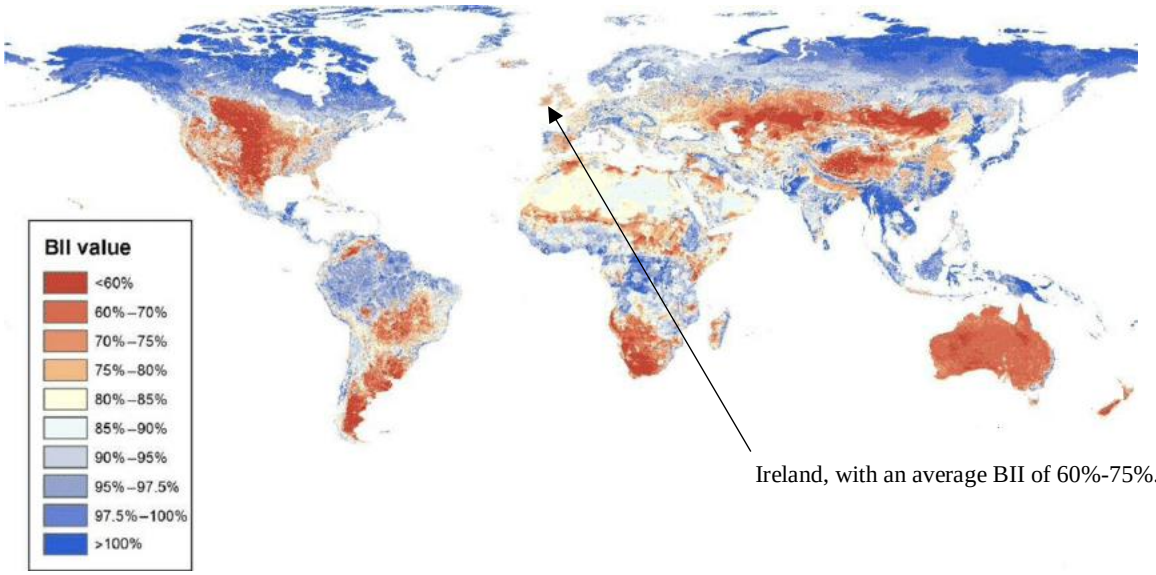
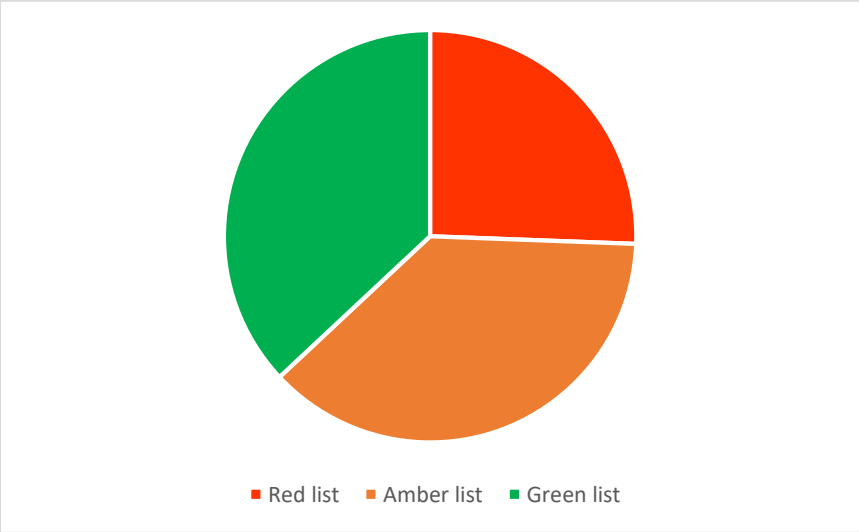


Figure 10. Map from showing the Biodiversity Intactness Index as estimated by Newbold et al. *(2016) using high resolution land use estimates from Hoskins* et al. *(2016).*

In May 2019, the Dáil voted upon and declared both a National Climate and Biodiversity Emergency, making Ireland the second country in the world, after the UK, to do so. This amendment importantly called on a Citizens' Assembly to examine how the State could improve its response to the issue of biodiversity loss.

According to the Article 17 Report to the European Commission on the implementation of the EU Habitats Directive, 15% of species in Ireland have an "inadequate status" with another 15% identified as having a "bad status". Species are now in decline by 15% compared to a 10% decline between 2007 and 2013, showing a negative trend from six years previous (NPWS, 2019).

Of the habitats protected under the Habitats Directive, 91% were assessed as being in "Unfavourable Conservation Status" with 31% in a declining condition and only 16% in an improving condition (NPWS, 2019). These findings coincide with a ruling from the European Court of Justice (ECJ) in a long-running case taken by the European Commission against Ireland, over failures to introduce adequate conservation measures and to protect habitats including wetlands under the Habitats Directive.



Regarding birds species, a study, based on 211 species, placed 54 birds (26%) on the Irish Red list, 79 (37%) on the Amber list and 78 (37%) on the Green list which means that 63% of Irish birds are of conservation concern (Gilbert *et al.*, 2021).

Figure 11. Proportions of bird species red-, amber- and green-listed in Ireland (from Gilbert et al., 2021)

The direct key pressures impacting Ireland's habitats and species include habitat loss and deterioration (e.g., peat cutting); wetland drainage/reclamation; over and under grazing; water pollution; intensive agriculture and change of use; unsustainable exploitation (e.g. overfishing; forestry); recreational pressures; climate change and invasive alien species (EPA, 2023). Indirect pressures include human population growth, the effects of which are exacerbated by limited public awareness of biodiversity and its benefits and economic value to society.

The climate and biodiversity crises are two sides of the same coin and must be dealt with in conjunction. However, while conservation efforts help to stabilise the trends, these estimates are inevitably for many quite abstract, with people referencing to personal and local anecdotes and examples of environmental change.

2.2. Main causes of SBS

Unfortunately, there are good reasons to believe that such contextualizing can serve to understate the changes that have taken place. In fact, SBS occurs when conditions of the natural environment gradually degrade over time, yet people (e.g., local citizens, natural resource users

and policy makers) falsely perceive less change because they do not know, or fail to recall accurately, how the natural environment was in the past (Soga & Gaston, 2018).

SBS result from three major causes explored below.

2.2.1. Lack of historical scientific data

The majority of biodiversity monitoring schemes in Europe were initiated late in the 20th century, well after anthropogenic impacts had already reached more than half of their current magnitude (Mihoub *et al*. 2017). Without reliable historical environmental data, people cannot comprehend the long-term environmental changes that have occurred, therefore they draw baselines according to their own knowledge and experiences. It is also important to emphasise that inappropriate data storage and consultation deterrence contribute to this aggravating factor.

Practical example: The first Atlas of Breeding Birds in Britain and Ireland, organised by the British Trust for Ornithology (BTO) and Irish Wildbird Conservancy (IWC), was published in 1976 (Sharrock, 1976) and covers the period 1968-1972. The second, complementary, atlas was The Atlas of Wintering Birds in Britain and Ireland (Lack, 1986). Fieldwork was carried out over three winters 1981/83 – 1983-84. Both atlases are considered the first monitoring schemes for bird populations in UK and Ireland, still in use nowadays to inform planning applications and conservation measures (e.g. partially through the Birds Directive (79/409/EEC)). In fact, most European bird studies use the beginning of the 1980s as a baseline, even though major environmental changes had most certainly already occurred by that stage and it is possible that many species already have depleted populations at that time (Reif *et al*., 2021).

Figure 12. Reed bunting photographed in the Oostvaardersplassen NR (June 2023).

2.2.2. Extinction of experience

The lack of interaction with the natural environment is one the main causes of SBS. Nowadays, more and more people live in large urban areas where access to the natural environments and the possibilities to interact with nature are limited. This ‘extinction of experience’ is aggravated by the loss of natural areas and an unprecedented rate of environmental degradation. A recent study by the French CNRS (Cazalis, Loreau, Barragan-Jason, 2022) shows that individuals currently live at an average distance of 9.7km from a natural area, 7% further than compared to results from 2000.

Secondly, as highlighted by Soga & Gaston (2018), this loss of orientation towards engaging with nature is associated with the rise in alternative leisure time activities (e.g., social media, television, internet), and the possibility of vicarious interactions with nature (e.g., through books, television).

Thirdly, current societies and ways of living are dictating people to be productive at all times, which includes productivity during leisure activities. Even when an activity is spent in nature,

it is rarely to connect and to enjoy fully the natural environments, but with another or several more objectives in view e.g. walking the dog, exercise, make a phone call, listen to a podcast, etc. Nature time, if any, must be functional.

Practical example: Unlike the case in England and Northern Ireland, there is no statutory right to access to the countryside in Ireland. A recent study carried out by the Government of Ireland (Byrne & Murray, 2023) shows that only 8.47% of Ireland is public lands, of which 5.7% of public forestry (including non-native conifer plantation), 1.7% owned by Local Government, 0.7% by the Fuel and Energy sector and 0.3% by Central Government & Agencies. Additionally, 13.9% of terrestrial area of Ireland is currently designated as protected areas, which is below the EU value of 26.4%. In the marine waters of Ireland, protected areas coverage is currently only at 2.28%, which is significantly lower that the EU value of 12.1% (EEA, 2023). Compared to land ownership spatial data set, public protected lands accounts for only 11.07% of all protected lands, while private protected lands covers 67.44% of all protected lands in Ireland. Put into perspective, it means that only 1.79% of designated areas are accessible to the public.

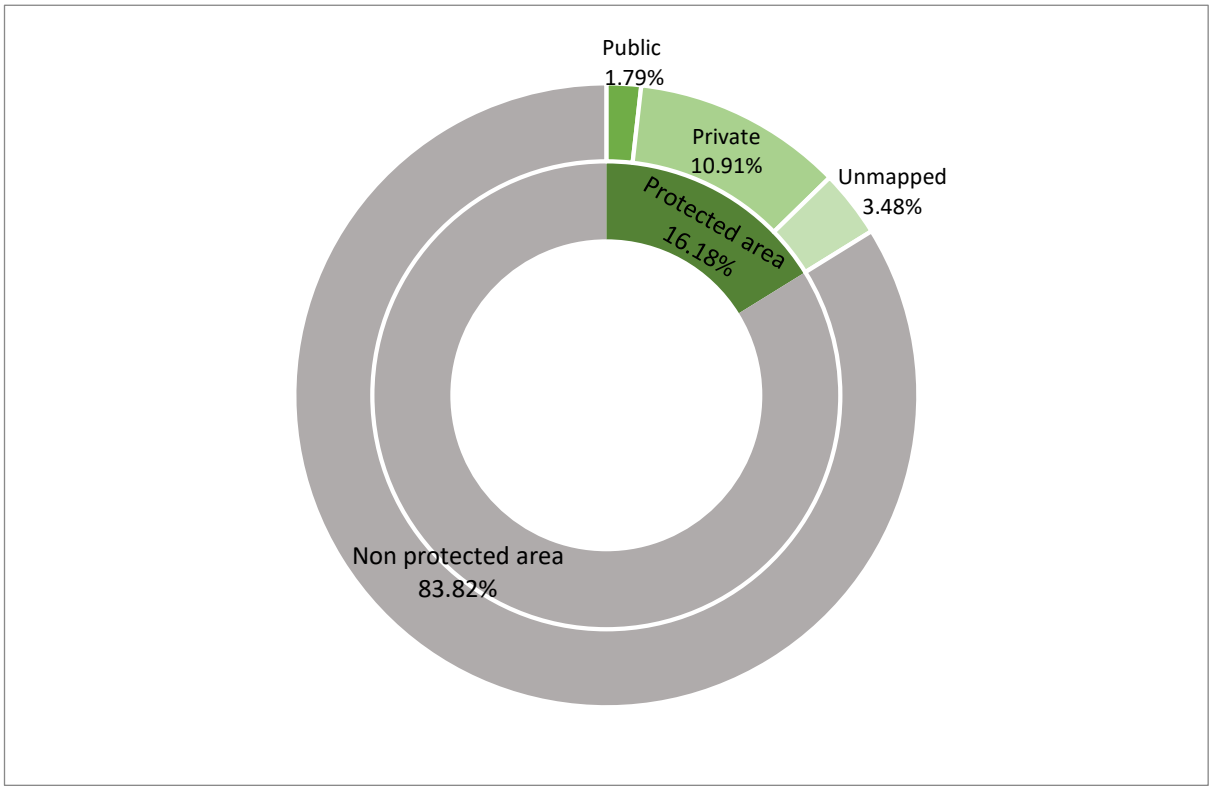


Figure 13. Estimated percentage of protected area and land ownership in Ireland from Byrne & Murray (2023) & EEA (2023).

2.2.3. Loss of familiarity with the natural environment

As well as direct engagement with the natural environment, familiarity with it is also crucial for people to accurately assess its condition. Natural history knowledge (e.g. identification skills for local plants, birds and other animals) is fundamental to feeling familiar with the natural environment. However, this knowledge is slowly but surely disappearing, especially in developed countries (Leather and Quicke 2010; Tewksbury *et al*. 2014).

Old practices and stories, such as forecasting the weather by looking at the clouds; growing and eating aliments according to the seasons; finding pain relief remedies in a plant book, are also being forgotten. The rapid loss of cultural and linguistic knowledge (e.g. Irish language) may also contribute to the loss of familiarity and connection with nature. Overall, the loss of historical ecological knowledge is surely aggravated by a lack of intergenerational communication and personal experience.

Practical example: A British survey carried out by Leather and Quicke (2009) indicates that more than half of Britons think the countryside is boring and that a third never even consider visiting rural areas. The survey also found that 10% of interviewed people were unable to identify a sheep, 44% could not identify an oak tree, 71% could not identify a pine tree, 74% could not identify a horse chestnut tree and 83% failed to recognise a bluebell.

As a conservation ranger in Ireland, I carry out public outreach about nature, with children and adults alike. During these exchanges, I often notice the lack of knowledge and vocabulary concerning local plants and animals: blue tits, hen harriers, puffins, starlings are now all called ‘birds’; pine marten, foxes or stoats are ‘furry animals’ or ‘pests’; oak, hawthorn, ash, pine, guelder-rose are only recognised as ‘trees’. However, if shown a picture of an elephant, a lion or a toucan, everyone will get the right answer.

3. ‘Symptoms’ of SBS: consequences of a common shift of perception

The majority of ecologists, conservationists and protected area managers I interviewed during my study visits were familiar with at least the concept of shifting baselines, if not the term itself. Additionally, it is a subject I vastly discussed with NPWS colleagues. Under the below points, I have compiled and analysed the answers to these questions: Do you reckon SBS is affecting you and your job, and how? By comparing them to the research I undertook on the consequences of SBS on nature conservation, I identified the main effects of SBS on the general public, stakeholders and professionals.

3.1. Gradual habituation to degradation and loss

As people have become more accustomed to habitat deterioration and species loss, current environmental degradation is regarded as less significant. Therefore, as people are getting more used to limited access to nature and unhealthy natural environments, future damage and loss will be considered insignificant. In other words, due to the biodiversity decline in the majority of ecosystems, wildlife abundance is not observable anymore with species becoming rarer and numbers fewer, leading to a gradual societal tolerance to population decline.

Figure 14. Female Marsh Harrier dropping in reedbed in Wild Ken Hill (April 2023).

Secondly, not connecting with nature - whether due to its scarcity or to a lack of familiarity - leads to a loss of a sense of belonging. By not knowing a blackbird from a carrion crow, having never experienced a night out under the stars surrounded by frog calls, having not observed the low V-shaped flight of the hen harrier over a foggy reed bed, the vast majority of people do not relate to the natural environment anymore. And if one does not connect with nature, one will not notice the deterioration occurring, neither will one want to safeguard it. More worryingly, the increased lack of familiarity with nature causes people to be uncomfortable in a natural setting, therefore disconnecting further. A growing number of people are showing signs of fear, disgust, phobia and other negative emotions with regard to the environment, implying a cycle of disaffection toward nature (Soga & Gaston, 2016). More than a gradual acceptance to degradation and loss, there may be a gradual unacceptance for natural habitats and wildlife.

Fundamentally, it may be considered that removing people from nature in order to protect it is not the solution, in particular when extinction of experience is such an important SBS driver.

Practical example: Corncrake (*Crex crex*) is a shy, secretive bird of hay meadows found in Ireland. Up to the 1950s, this gorgeous little bird could be heard making its loud breeding call *krrex, krrex*, from all Irish parishes. Due to changes in agricultural practices in the middle of the twentieth century, corncrake populations have plummeted, falling from around 4,000 pairs in the 1960s-70s, down to approximately 151 calling males in 2020 (Teagasc, 2021). That is a

96% decline. In consequence, corncrake is on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al*., 2021). Older generations remember the night call of the corncrake coming from the semi-natural grasslands and waking up all occupants of a house. An elderly lady once told me that, as a child, she used to bang her shutters open at night in an attempt to prevent the loud birds from calling under her bedroom window.

Despite being such a charismatic and once abundant little bird, the corncrake has slowly disappeared from pastures, from people's ears and from common memory and culture. In my seven years in Ireland, I have never heard a corncrake, the bird now breeding in only a few places off the north and west coast. New generations may never experience the call of the corncrake, and more dramatically, may never know that such a bird once bred so plentifully in people's back gardens.

If species extremely common 70 years ago have been driven to near extinction in present days, one might question the fate of present native 'common' species (i.e. generalists such as crows and foxes). Will there be reintroduction programmes for red fox once gone from our grasslands?

3.2. Altered expectations for the state of nature

SBS is likely to alter people's expectations as to what is a desirable (i.e., worth protecting) state of the natural environment. This is not surprising as most people's beliefs about what is a "right" or "healthy" condition for the natural environment will be shaped by their personal experience, particularly during childhood, and earlier states are unimagined (Kahn, 2002; Soga & Gaston, 2018).

A good example of this is a possibly fictional story that was prevalent in the UK Forestry Commission in the 1990s (Leather & Quicke, 2009; Papworth *et al*., 2009). The story goes that in the 1950s, during the major afforestation of upland Britain with exotic conifers, an area of heath outside a small Scottish village was earmarked for planting with North American lodgepole pine. The local inhabitants were not happy and the local newspaper was full of letters of protest complaining that the glorious scenery and dog walking opportunities would be ruined by the planned forest plantation. Needless to say, the plantation was duly established. Forty years later, it became due for harvesting. The local press was full of letters of protest from the nearby residents complaining that the glorious scenery and dog walking opportunities would be ruined by the planned harvesting operation. Human memories are indeed only a generation long; environmental degradation, on the other hand is probably permanent (Leather & Quicke, 2009).

Furthermore, the disconnection and lack of familiarity with natural environments caused by SBS creates a misunderstanding of wildlife behaviours and ecosystem ecology. In that sense, altered expectations for the state of nature not only applies to what is worth protecting but it also results in a false belief of how nature should be and should behave. Wild animals are increasingly expected to behave like domesticated animals (i.e. tolerate to be touched, to be fed, etc.), while natural habitats are more accepted if listed useful for humans.

The expectation of a meticulously tamed and tidy nature, unthreatening and kept under control, seems to result from SBS, and aggravates the phenomenon even further.

Practical examples:

- In the 21st century, among the many threats to biodiversity, non-native invasive species are one of the main concerns. When the majority of invasive species would clearly appear exotic to the experts, the general public tend to consider them to be part of the natural environment, especially if such species have been established for several human generations. *Rhododendron ponticum* is certainly the most evident example of invasive species in Ireland. The plant, native from Europe and Asia, was introduced to Ireland as a garden plant in the early twentieth century. Due to its biology and adaptability, it has spread rapidly in many parks, nature reserves and national parks, thriving in moist and humid conditions, and suffocating all other plant life. Until recent years, the lack of data and familiarity have held back the fight against rhododendron. The plant is still viewed as postcard-pretty purple-flowered attraction loved by tourists, locals, stakeholders and surprisingly some managers working in the conservation sector.

- On the other hand, native species that have suffered from extinction or massive population declines are forgotten about. That is the case with the natural recolonization of the wolf (*Canis lupus*) in continental Europe. In France, wolves were driven to extinction in the 1930s, following years of hunting and persecution. In 1992, after a 50-year absence, a pair of wolves, originating from Italy, was observed for the first time in Mercantour National Park. Since then, the wolf population has been extending nationwide. Although difficult to count, it is estimated that there are now approximately 40 wolves in Mercantour National Park, grouped in 8 to 10 packs. The wolf is a protected species in the EU, but hunting derogations are granted every year due to pressures from lobbies. The return of this emblematic species is an interesting example of SBS and altered expectations for the state of nature. Five decades of absence have sufficed to create a new baseline and make people intolerant of the species, particularly from a political point of view.

3.3. Direct and side effects of SBS on professionals

Conservation complacency

With false perceptions of past environmental conditions, policy makers may set inappropriate or less ambitious targets for environmental conservation, restoration and management programs (Humphries & Winemiller, 2009; Bonebrake *et al*., 2010; Bilney, 2014). Unfortunately, given the long history of anthropogenic impacts on the earth's ecosystems and the paucity of relevant historical data, this kind of issue may be common in many parts of the world (Lotze & Worm, 2009; Bilney, 2014; Mihoub *et al*., 2017). For instance, as reviewed by Bonebrake *et al*. (2010), only 15% of long-term literature studies of population declines across a set of animal taxa used data older than 100 years, and 58% of the studies lacked continuous data.

If improper baselines are used as a target for nature conservation, restoration and management, the desirable conservation outcome will not be achieved because policy makers and resource managers might be more likely to become satisfied, and complacent, with the present state of the natural environment, and their current conservation efforts. Subsequently, stakeholders will feel less motivated to undertake further actions to improve the condition of that environment

(Bilney, 2014). In consequence, this may hinder the establishment of suitable and ambitious conservation and restoration targets. This is referred to by Bilney (2014) as 'conservation complacency'.

Additionally, the necessary conservation efforts might be altered by SBS. One very specific conservation measure might be applied to a restoration project while a more holistic approach may be more favourable. That is for example the case in breeding wader conservation where predation control may be the sole management tool used, without a more ambitious target of habitat restoration.

Practical examples:

- In the Netherlands, the Spatial Planning Act (WRO) sets down how the spatial plans of the state, provinces and municipalities are to be effected. Spatial planning policy and its implementation are, in so far as possible, shaped at the municipal level. The municipalities are able to set appropriate regulations based on their knowledge of the local situation. The state focuses on subjects that are of importance to the entire country, such as improving accessibility. The provinces focus on provincial interests, for example, landscape management, urbanisation and the preservation of green spaces. In its current regional plan, the Province of Flevoland listed the Oostvaardersplassen Nature Reserve as a "nature area/nature reserve". However, provincial plans listing the landscape classification are updated every four years by policymakers. If the Nature Reserve were to be downgraded from a green space to peri-urban area (for example), the consequences for nature would be drastic of course, but the baseline would also be changed for the future of many people, stakeholders and project managers.

- With severe declines in upland breeding birds in Ireland (e.g. curlew, hen harrier, red grouse, merlin, etc.), the heath and bog upland habitats show little biodiversity in the present day. Due to SBS and the lack of historical environmental data, ecologists rely principally on current monitoring data and trends to assess planning applications and inform development plans. In consequence, the baselines considered nowadays are probably much lower than those perceived/recorded. Since the twentieth century, many uplands have been commercially exploited, with most planted/partially planted with non-native conifer plantations and/or subject to renewable energy projects and developments. By their presence, in lieu of conservation measures, these developments may prevent the restoration or recovery of breeding bird populations, notably due to habitat loss or displacement.

Lack of consideration for alternative historical data

It is in the nature of scientists to question facts and methodology. As Pauly highlighted in his Ted Talk (2010), scientists will contest historical evidence presented to them if "it is not in the way they would like the evidence presented" e.g. not developed in a 21st century scientific research. He continues: "of course, it has its merit, but one might wonder the data/experience that has been lost in the process."

In fact, alternative historical data is available for ecologists, conservationists, project managers and policymakers, whether through old maps, historical nature books and journals, photos, drawings, stories, toponymy, etc.

In the absence of robust historical data (generally over 60 years old), is it preferable to use a recent baseline ignoring previous ecological states, or to consider a less scientific approach in order to take into account pre-baseline changes? By not consulting less-academic historical data, scientists may also incorrectly assign a certain species to a particular habitat; especially in the absence of their optimal habitats due to degradation. This could lead to inappropriate conservation efforts targeted at certain species.

Practical example: in her book *Wilding* (2018), Isabella Tree describes the unexpected return of the nightingale to her farm as a scientific surprise due to SBS. "The British Trust for Ornithology (BTO) describes the nightingale as a woodland species – shy, reclusive, hiding deep within thickets in the understory of woods."

By 2001, the year the Knepp project started, nightingales had disappeared from the estate, in line with a national decline. In 2012, after 11 years of rewilding, a BTO student recorded thirty-four nightingale territories on Knepp's scrubby habitats, revealing that the nightingale might not be a woodland bird. In fact, while conducting a thorough research, Tree found that the Victorian ornithologist John Gould describes the nightingale nest as 'being generally placed on the side of a bank, and occasionally in a shrub or bush'; while in 1938, John Walpole-Bond describes in Birds of Sussex how the bird was found all over the place, in woodland outskirts, 'spinneys; shaws; thickets on down, common and waste ground generally'.

Figure 15. Thickets in Knepp, a preferred habitat for the elusive nightingale (June 2023).

Tree continues: "Yet, these observations, made by punctilious field naturalists only a century or so ago, are rarely consulted by modern science. In academic papers the onus is on referencing contemporary research" illustrating another example of SBS. Nightingales had been observed and solely studied in woodland habitats over many decades, because that is where they were left. In the absence of their optimal habitat, they were found in sub-optimal ones. Tree concludes that: "our baselines are entrenched in a landscape of human activity. We talk of 'woodland', 'wetland', 'heathland', 'moorland', and even 'farmland' birds. But their true context, before man began parcelling up the landscape and assigning bio-geographical and 'habitat' categories for species, may be much more complex and amorphous, as denizens of the shifting margins where one habitat blends into another."

A possible deeper impact on the newer generations of professionals

In a study on SBS carried out by Jones *et al*. (2020), evidence of generational amnesia was found as an age-related difference in perceptions of past ecological conditions. The perceptions of older participants had significantly higher agreement with biological data than the perceptions of younger participants. The results support the expectation that younger, less experienced people are less aware of historical ecological conditions and show greater evidence of SBS.

Interestingly, the study also finds evidence of SBS in relation to perceptions of conservation need, demonstrating a negative impact of generational amnesia on conservation support for species in decline. In that instance, older people were found to give significantly higher conservation attention scores than younger people for two out of three declining bird species included in the study, representing potential negative impacts on future conservation support for these species (Jones *et al*., 2020).

Among biology undergraduates, Leather & Quicke (2009) also report a very conspicuous decline in the average level of both zoological and botanical knowledge. They observed that hardly one in twenty could recognise a plantain (*Plantago*) or dock (*Rumex*) as such. The great majority of those now studying for degrees in biology have had virtually no training or experience in identifying organisms, and sadly, the drive towards ever more molecular and hands-off meta-analysis type study in universities is exacerbating the situation (Leather & Quicke, 2009).

However, these observations should be viewed with caution. Recent years have shown that young conservationists, graduate ecologists and climate activists are very well aware of the biodiversity and climate crises and are continuing the fight for environmental protection via powerful and vocal activism.

Indirect implications on the professional sector

To protect the environment, one must be able to comprehend and recognise its complexity and understand how its varied components interact and respond to change. To achieve this mission, we not only need a cohort of well-educated environmental scientists, but also a general population with a reasonable understanding of nature (Leather & Quicke, 2009).

As previously discussed, SBS may have significant impacts on stakeholder interest, engagement and support for conservation due to an increased tolerance for degraded environmental conditions (Hayhow *et al.*, 2019; Papworth *et al*., 2009) and/or a rising intolerance for nature. This increased habituation to incremental environmental degradation is likely to diminish people's motivations for nature conservation as highlighted by Soga & Gaston (2018). In the field of restoration ecology, Wu, Petriello, and Kim (2011) suggested that stakeholders tend to only support environmental restoration efforts if they recognize the difference between past and current conditions, and hence can visualise the potential effectiveness of restorative action. The potential effects of SBS should also be taken into account when including local ecological knowledge in global research and policy (Turvey et al., 2014) due to its possible impact on tolerance for degraded conditions (Jones *et al*., 2020).

These indirect consequences of SBS on the professional sector are already visible, with further complex and strenuous conservation efforts to preserve fewer habitats and species. Without a

fundamental support (or minimum understanding) from the public and stakeholders, processes of restoration and conservation may take longer and be more costly, if not prevented altogether. This in itself is creating further SBS, with wider knowledge and communication gaps between the conservation sector, the policymakers, the various stakeholders and the general public.

Practical example: Some species reintroduction programmes have been put on hold due to people's pressures and SBS. That is the case in Wild Ken Hill, where a white-tailed eagle reintroduction licence was withdrawn a few years ago, following landowners' pressures and their fear of the eagles taking pigs, sheep and pheasants. Public consultation and small groups are increasingly delaying projects or causing constraints to restoration programmes, partly due to a lack of connection and familiarity with the environment, a miscommunication with conservationists and ecologists, and a habituation to degraded landscapes with no or little wildlife left, in particular predators and scavengers.

SBS is thus increasingly recognized as one of the fundamental obstacles to addressing a wide range of global environmental issues faced today (Soga & Gaston, 2018), since it directly affects people's ability to perceive changes but also undermines support for appropriate conservation measures.

4. ‘Treatments’ of SBS: ways to prevent and reverse the shift

As I applied for this scholarship, I started an important research on SBS and on ways to prevent it. I began to identify broad solutions, such as education and rewilding, to avert the main consequences of SBS. I decided to carry out my study visits in protected areas where SBS is an everyday challenge and because the dedicated ecologists, conservationists and managers who work there have developed ingenious and/or surprisingly simple ways to prevent or halt the ‘syndrome’ (whether purposefully or not). From my research and the interviews I had during my trips, I have listed below the main solutions that may be applied, to prevent and reverse the shifting baselines. These suggestions are not mutually exclusive and non-exhaustive.

4.1. Restoration of the natural environment

Since the decline of biodiversity, at a local, regional and global scale, is the main trigger to SBS, restoring the natural environment appear to be critical in its prevention. In order to be able to counter balance the consequences of SBS, there are two obvious approaches, both requiring ambition and determination. The first is the restoration of nature in line with strong and aspiring conservation objectives, especially degraded habitats in protected areas; the second is the newer approach of ‘rewilding’, controversial for some, but spectacular where space allows.

Nature Restoration Law and ambitious conservation objectives

Whether with large-scale habitat restoration, result-based agri-environment payments schemes or species-specific conservation programmes, the urgency is to re-establish functional natural ecosystems that can also provide for humanity and the economy.

In 2022, the European Commission has proposed a new law to restore ecosystems for people, the climate and the planet. This proposal is the first continent-wide, comprehensive law of its kind. It is a key element of the EU Biodiversity Strategy, which calls for binding targets to restore degraded ecosystems, in particular those with the most potential to capture and store carbon and to prevent and reduce the impact of natural disasters. Via the restoration of wetlands, rivers, forests, grasslands, marine ecosystems, and the species they host, the proposal aims at increasing biodiversity, securing the things nature does for free, like cleaning our water and air, pollinating crops, and protecting us from floods, limiting global warming to 1.5°C and building up Europe’s resilience and strategic autonomy, preventing natural disasters and reducing risks to food security.

The proposal combines an overarching restoration objective for the long-term recovery of nature in the EU’s land and sea areas with binding restoration targets for specific habitats and species. These measures should cover at least 20% of the EU’s land and sea areas by 2030, and ultimately all ecosystems in need of restoration by 2050. It contains specific targets such as improving or re-establishing priority habitats (e.g. wetlands, forests, grasslands, freshwater ecosystems, etc.), reversing the decline of pollinator populations, increasing the total area covered by green urban space or restoring marine habitats.

The Natural Restoration Law would require EU countries to develop national restoration plans. These plans should define the restoration measures required to meet the binding targets set in

the law and specify the total area to be restored, as well as a timeline. It would require progress to be monitored and reported on. Examples of restoration measures include the removal of non-native plants in grasslands, wetlands and in forests, the rewetting of drained peatlands, or improved connectivity between habitats.

While the EU nature restoration law is an attempt to address the biodiversity and climate crises, it met with controversy and some outright hostility in several Member States. In November 2023, the Council presidency and European Parliament representatives reached a provisional political agreement on the proposed rules. Each institution will have to formally adopt the provisional agreement, before the final text becomes EU law.

Rewilding - or the absence of conservation goals

'Rewilding' is a progressive approach to conservation. Generally described as a way to put nature back in the driving seat, rewilding aims at enabling natural processes to shape land and sea, repairing damaged ecosystems and restoring degraded landscapes. A major role in this process is the return of key species that have become extinct or declined due to human activities. A significant part of the rewilding efforts includes the reintroduction of herbivores, deemed to be the most effective way to create a natural ecosystem with complex food chains. Where traditional conservation is a human-led outcome-focused approach, rewilding can be considered as nature-led, process-focused. Since conservation objectives may be subject to shifting baselines, via altered expectations for the state of nature from policy makers or possible conservation complacency from project managers, a restoration approach without set objectives may prevent these consequences resulting from SBS.

During my study trips, I have visited three areas that currently fully embrace or partially follow the rewilding principles.

Rewilding Rhodopes

The Rhodope Mountains area, with its mosaic of open landscapes, oak and beech forests, grasslands and rivers, rocky slopes and cliffs, has become one of the most exciting wild areas in South-Eastern Europe. Mostly regulated by natural ecological processes, the wildlife of this area thrives in its natural densities. While large parts have become much wilder and inter-connected since rewilding started in 2010, the area remains integrated within buffer zones where people use the land in different traditional ways such as grazing and farming. This rewilding dimension, supported by the local community, allows new sources of income and pride for the people who live there.

The Rewilding Rhodopes (RR) project is managed by a team of conservation experts and is divided into four sub-projects, connected by wildlife corridors. These four areas are:

- Student Kladenec: this area holds one of the densest populations of wild herbivores in all of the Balkans, mainly native fallow deer (*Dama dama*), whose grazing pressure keeps the landscape vegetation open. Red deer (*Cervus elaphus*) and semi-wild horses (Konik) are being reintroduced and a grazing experiment with European bison (*Bison bonasus*) is

Figure 16. European bison in the Student Kladenec area (September 2023).

being carried out, with bisons quickly establishing themselves as a major attraction for locals and visitors. The grazing and browsing effect from increased herds and diversity of large wild herbivores creates a kaleidoscope of different habitats. This stimulates the return of endangered species like the souslik (*Spermophilus citellus*), the marbled polecat (*Vormela peregusna*) and the Imperial eagle. A healthy wolf population manages the densities and distribution of the herbivores in a natural way and creates opportunities for healthy populations of cinereous, griffon and Egyptian vultures.

- Madzharovo: this area is targeted by the team for its bird and plant life, with several local endemic species that grow here but nowhere else. The area holds over 50% of Bulgarian plant species. By boosting the availability of wild herbivore carcasses, thereby restoring natural food webs and closing the circle of life, threatened European vulture populations are slowly but steadily recovering there.

Figure 17. Griffon vulture in the Rewilding Rhodopes skies (September 2023).

It is now an important breeding site for griffon vultures and the globally threatened Egyptian vulture. A reintroduction programme of cinereous vultures, overseen by the Rewilding Rhodopes team in collaboration with local partners like the Bulgarian Society for the Protection of Birds (BSPB), has begun there in 2022 and continued in 2023.

Figure 18. Cinereous vulture in aviary, as part of a reintroduction programme to the Rhodope mountains (September 2023).

- Byala Reka: in the south-eastern most part of the Eastern Rhodope, bordering Greece, this area includes the Byala Reka river valley and the surrounding mountains. Due to the limited population, combined with the previous very strict border regime, the area has remained relatively wild with clear unpolluted waters and extensive forest cover.

- Kardzhali: thousands of years of extensive grazing, mainly by sheep, have shaped the landscape there. Land abandonment in recent years has led to bush encroachment and an extension of tree coverage. Pines were also planted in many places, part of which are now being replaced by native broadleaf trees. The rocky cliffs have started to attract Balkan chamois (*Rupicapra rupicapra balcanica*) from the nearby Western Rhodopes.

The increased wildlife numbers and the reintroduced native species are providing a basis for a unique and varied tourism experience, firmly built on these assets. The Rhodope Mountains has become one of the best places in Europe for watching raptors and large herbivores, at close proximity. In addition to that, local businesses and regional products are benefiting from the rewilding activities and provide incentives for entrepreneurs to invest in the area, therefore contributing to its uniqueness and attractiveness. All new major infrastructure projects (such as windmills, power lines, dam constructions or mining) are planned to be held away from the area, to preserve the wild integrity of the landscape and to secure its connectivity with other areas.

Figure 19. Egyptian vulture in nest painted on a building in the town of Madzharavo, showing the integration of the project in the local community (September 2023).

By 2024, a more supportive legal framework will be in place allowing for further tangible rewilding actions, like legally listing the wild horse and bison as wild native species or allowing no-take and wildlife comeback zones.

Knepp

Knepp is considered one the leading conservation projects in the UK, since rewilding commenced there in 2001. With minimal human intervention, and herds of free-roaming animals - Exmoor pony, Old English long horn cattle, Tamworth pig and deer - enhancing the new habitats, the land at Knepp is now heaving with life. Rare species such as turtle doves, nightingale and purple emperor butterflies (*Apatura iris*) are now breeding at Knepp and biodiversity has rocketed.

Figure 20. Turtle dove in oak tree in Knepp (June 2023).

In the absence of large predators and diseases, the grazing animals are managed, ensuring that there are neither too many, nor too few. Keeping the populations within these parameters allows the project to take animals off the land to process into meat – becoming an important income stream. On top of the free-roaming, pasture-fed organic meat market, Knepp continues to farm Sussex red cattle and chickens under regenerative farming. Some of the products are sold at markets or directly at the property.

Despite a letting-go approach, some notable reintroductions of keystone species have been carried out in recent years. The main example is the reintroduction of beavers, once native to Britain and extinct since the 18th century. In 2020, Natural England granted a licence to Knepp as a trial site for beavers to be released within enclosures. In February 2022, a pair of beavers were introduced to a 2 hectare-pen in Knepp. The pair has successfully established in the woods creating a wonderful mosaic of wetland habitats and have raised two kits in 2023.

Wild Ken Hill

In Wild Ken Hill, the land managers consider rewilding as a low-intervention, natural process-focused variant of conservation. Contrasting the active management approach of traditional conservation, their aim is to repair natural processes and let them do the work. As such, the team consider rewilding another land choice available to land managers.

Figure 21. Tamworth pig roaming free in Wild Ken Hill (April 2023).

Currently, 25% of the total land area has been converted to rewilding; this land having historical low level of agricultural productivity and not offering other benefits to society. Since 2021, large herbivores and keystone species, such as Exmoor ponies, Red poll cattle, Tamworth pigs and beavers, have been progressively introduced and are managed by a conservation manager. Each herbivore type undertakes different techniques and methods of physical disturbance (e.g. trampling, rootling, grazing, browsing, etc.), promoting a complex mosaic of habitats.

4.2. (Re)connection with nature

Promoting people's positive interactions with natural environments is beneficial to limiting the consequences of SBS, especially the extinction of experience. Indeed, studies have shown that participating in first-hand experiences with nature, such as visiting urban greenspaces and observing local fauna and flora, increases people's levels of understanding of the condition of their surrounding natural environments (Lindemann-Matthies 2002; Shwartz *et al*. 2014, Soga & Gaston, 2018). To do so, it is fundamental to both increase people's opportunity to interact with nature and people's inclination to engage with natural environments.

As I witnessed in the five places I visited during my scholarship, the responsibilities of conservationists, ecologists and project managers is not only to support more people engaging in nature but also to encourage it.

Accessible green spaces and sense of belonging

Creating more public, accessible and local green spaces for all people, children and adults alike, to engage with nature is vital. It will profit both the people, via a wide range of benefits relating to health and well-being, but also nature itself, since having more natural areas removes pressures from the few ones we currently have (i.e. in Ireland). In that sense, the Right to Roam campaign in the UK challenges the embedded culture of not belonging in the local environment and the current restrictive access to nature. Giving people a responsible access to nature would probably elevate the sense of ownership and feeling in the right place.

By (re)connecting with nature, people will have the opportunity to become familiar with it again, encouraging positive emotions, attitudes and behaviours with regard to the environment. Reducing the extinction of experience and loss of familiarity with nature, through a reconnection with the natural world, will consequently make people more aware of changes, and more willing to step up and act to preserve it. It is in knowing the sound of a blackbird, the shape of an otter or the delicate perfume of ivy blossoms that people get a sense of belonging and feel comfortable in a natural environment.

In the Nature Connect Programme held at Wild Ken Hill, clients in the county with mild to moderate mental health challenges are offered opportunities to reconnect with nature. These opportunities include community gardening, regular local walks in lesser-known green spaces, foraging, growing healthy foods at home, forest bathing, and trips to important local wildlife habitats and projects. Visitors particularly enjoyed "returning to the same special local environment throughout the seasons, learning more about the rewilding and sustainable farming projects, and connecting with some of the incredible wildlife, flora and fauna, especially against the backdrop of the huge anxieties and challenges we face around climate change."

A responsible access to nature

At Knepp, there are 16 miles of walks within the rewilding project, with five tree viewing-platforms, close to public footpaths, offering panoramas of the surrounding countryside, and a bird-hide overlooking Knepp Lake. People are asked to remain on the public footpaths and to follow the Countryside Code for responsible access to nature. The same applies to the public footpaths in Wild Ken Hill.

It is by showing people how not to cause disturbance that disturbance can be avoided, not by restricting access. This could be seen as a feedback loop since creating and preserving more natural habitats will enable people's impacts to be more spread across a territory and controlled, if necessary, rendering a more responsible access to nature.

However, the best is the enemy of the good. Infrastructures (e.g. buildings, greenways, cycle ways, etc.), tourism or dogs have been steadily increasing in protected areas, adding tremendous pressure to already sensitive species, habitats and ecosystems. While access to nature is primordial to reconnect people with their environment, it should not be to the detriment of conservation. One might question if more development and amenities within protected areas is preferable to an increased access to nature outside preserved areas via slow tourism (i.e. reducing mobility and taking the time to explore local history, culture and heritage).

Figure 22. Walkers on a Wild Ken Hill public footpath with passing barn owl (April 2023).

Culture and arts

It is not just a case of time spent, quality also matters. This was picked up in a report by the UK Mental Health Foundation. The report notes that: "Activities that involve the senses can help to develop our connection with the natural world, as can activities where we feel emotions such as compassion, perceive beauty or find meaning in nature. For instance, we might notice the beauty of nature by listening intently to birdsong or touching the bark of trees. Smelling flowers or feeling the soil between our fingers whilst planting bulbs in the garden are also highly sensual ways to connect with nature. We don't always have to be in nature to further our relationship with the natural world: writing a poem about our favourite nature spot or reflecting on preferred walks helps us consciously notice, consider and pause to appreciate the good things in nature".

Bringing nature back in our culture, arts and mindsets can therefore also be used as a tool to fight SBS. So is watching nature documentaries or programmes, like the BBC TV shows Springwatch and Autumnwatch (Wild Ken Hill hosted the programme in 2021 and 2022, and Knepp's white stork reintroduction project was highlighted in it as well). Additionally, recreating a fascination for nature can be achieved with storytelling, art photography and videography, soundscapes, etc.

Environmental connection with all sectors

Finally, reconnecting with nature should not only be aimed at the general public and ecologists, but be applied to all sectors, such as agriculture, forestry, fishery, urbanism, transport, tourism, etc. Practical examples of this approach include favouring regenerative over traditional farming where possible (like in Wild Ken Hill or Knepp), enabling the development of native forests,

sharing knowledge via professional workshops, etc. Once aware of SBS, it is the responsibility of all to implement ways to reverse it.

4.3. Monitoring and data collection

Robust and accessible scientific data

According to Soga & Gaston (2018), further progressive SBS may be limited by accumulating more data about the natural environment. The monitoring and data collection on wildlife and habitats completed by professional scientists, ecologists and experts are therefore critical to reverse the effects of SBS now, and as important to refer to as a baseline for future conservation efforts.

Of course, this data must be scientifically robust, as well as safely stored and easily made accessible for reference. This ability to collect and pass on knowledge should be adhered to at the company/organisation, local, regional, national and international levels. Alternative data collection via photos, videos, or soundscapes should also be considered, to diversify the means.

As highlighted by Pauly (1995), new fishery scientists tend to consider the normal stock of fish when they started their job; therefore, having reliable and easily accessible data passed on to the next generation of scientists will alleviate this detrimental effect of SBS. Local data should be made available for all conservationists and ecologists when starting a new position, in particular for young people, but data should also travel across disciplines. After all, "knowledge is power".

Mercantour National Park

In Mercantour National Park, the priority is given to collecting and using robust data. Species-specific targeted monitoring is carried out on sensitive wildlife and habitats, while implementing new survey strategies, such as random sampling. In 2023, the National Park validated its second scientific strategy action plan for the period 2023-2027. This plan aims at building dynamics to monitor and collect the necessary knowledge for the conservation and development of the natural heritage. Intended primarily at municipalities, it also involves local stakeholders. Thanks to its results, it will enable targeted project management, conservation and enhancement actions for heritage. The plan aims to bring together stakeholders and build partnerships, and is based on a long-term commitment for research and data collection programs. Both plans (2023-2027 & 2018-2022) are available on the Mercantour National Park website for transparency and shared knowledge.

Figure 23. A chamois in Mercantour National Park (September 2023).

The action plan is also transboundary, integrating the Argentera/Mercantour cross-border character between France and Italy. The primary goal for this partnership is the continuation of cooperation

already underway, and the development of new approaches shared with the Alpi Marittime protected area on the Italian side. It forms part of a collaboration between national mountain parks. It is built with an interdisciplinary approach aimed at overcoming divisions and linking environmental sciences with human and social sciences, for nature and culture.

This strategy is made up of three axes which are the three main ambitions of the National Park in terms of knowledge acquisition: developing the scientific research in the territory, monitoring the state of conservation to guide the actions of the Park, and finally collaborating and sharing, in order to involve the community and public.

Oostvaardersplassen Nature Reserve

In the 1980s and 1990s, following Frans Vera's theory of a European forest-meadow landscape, large herbivores, including new breeds of Heck cattle (based on the aurochs), Konik horses (a breed resembling the tarpan) and red deer were introduced to the Oostvaardersplassen. It soon became a pioneering rewilding project. All animals were left uncontrolled, free to breed and roam as they wished in the fenced reserve.

In the winters of 2015/2016 and 2017/18, Oostvaardersplassen suffered from a publicised controversy when large numbers of grazers starved to death or were shot. Outraged members of the public began to throw hay over the fence in an attempt to feed the animals. The 'rewilding' approach suffered greatly from this polemic and questioned the relationship our societies have with death and what we consider to be natural (i.e. consequences of SBS).

Figure 24. Konik horses and red deer in Oostvaardersplassen Nature Reserve (June 2023).

At that time, this disagreement led to the formation of three groups or visions. Firstly, the current managers of the site (i.e. Staatsbosbeheer - State Forest Service) who, after years of wildlife monitoring, noted a drop in biodiversity due to the impact of over grazing by unmanaged animals, particularly in the absence of harsh winters, diseases and natural predators. Secondly, the former managers of the site, willing to pursue the experiment and let nature take its course, including 'free' uncontrolled grazer populations, and possibly consequent starvation; and finally a group of citizens worried about animal welfare and farm animals dying in plain sight within an enclosure.

Under current management, all grazer populations have been actively controlled since 2018, the nature reserve evolving from a rewilding project to a more traditional conservation programme for the management of the wetland and the conservation of bird species. Nowadays, the grazing animals still play a key role in the dynamics of the area. Heck cattle maintain open

grassland, the Konik horses graze the semi-arid landscape and the red deer keep the undergrowth in check.

By carrying out robust scientific surveys on biodiversity abundance and trends (in particular bird species for the designated SPA), the Staatsbosbeheer was able to review the conservation objectives of the nature reserve and Natura 2000 site and to act on a different management. Only thanks to a strong scientific base can complex scientific and strategic plans be successfully implemented.

Citizen science, community engagement and professional partnerships

One powerful tool to collect large-scale and long-term environmental data is citizen science: the practice of public participation and collaboration in scientific research. There are currently several large-scale citizen science projects of this kind, including on birds, mammals and plants. Large-scale citizen science programs have the potential to support national climate and ecosystem assessments by providing data useful in estimating both status and trends in key phenomena (Crimmins & Crimmins, 2020).

Other than a species-specific large-scale citizen science project, Bioblitzes are a fantastic tool to collect data while engaging people. A Bioblitz is an intensive, short-term effort to survey and document the biodiversity within a specific area. It typically involves a group of scientists, naturalists, volunteers, and community members coming together to identify and record as many species as possible within a defined time frame. Bioblitzes are often organised as community events with the goal of engaging people of all ages and backgrounds in celebration of nature. They provide opportunities for hands-on learning, citizen science participation, and promoting environmental stewardship. Bioblitzes can be conducted in various locations, including parks, nature reserves, school campuses, and even urban areas. They highlight the biodiversity that exists in our everyday surroundings.

Such programmes involving citizens and communities provide the dual-benefit of gathering extra data and diminishing the extinction of experience and/or lack of familiarity by being more aware of one's environment.

Furthermore, while engaging citizens is critical to reversing SBS, communicating and working with landowners is just as imperative. To take an example in an Irish context, most lands in Ireland are privately-owned (see section 2.2.2). With good communication and partnerships with landowners, not only can conservationists and ecologists achieve greater conservation efforts, invaluable knowledge and data can also be accessed. Rewilding Europe and Rewilding Rhodopes have seized this opportunity and created Enterprise Officer positions within their team. Enterprise Officers contribute to the mission of the organisation by implementing the enterprise strategy of the organisation, aiming at facilitating the creation of a nature-based economy and conserving/rewilding the area for the benefit of nature, the climate and the local communities. The Enterprise Officer is responsible to engage with local businesses, landowners and stakeholders to develop innovative financing models to support and scale rewilding efforts. They also work to build engagement to foster an enabling policy and economic environment for rewilding.

From a professional perspective, a recent study (Alleway *et al*., 2023) recommends committing to pluralist perspectives and actively engaging in interdisciplinary programmes to respond to

environmental change and SBS. The study develops how pluralism in our understanding and presentation of information and knowledge, and ways of knowing, adds depth to our ability to perceive, share and respect conclusions more accurately (Alleway *et al*., 2023). Moreover, an interdisciplinary approach must be actively enabled through using and, if need be developing, appropriate methods or tools that facilitate effective engagement across disciplines. It is the responsibility of individuals and disciplines equally to implement authentic and respectful integrative approaches (Alleway *et al*., 2023).

Intergenerational communication and historical data recovery

In their study, Jones *et al*. (2020), show evidence of generational amnesia across an entire ecological community, highlighting a need for a shift of focus towards the promotion of intergenerational communication and knowledge-sharing (Fernández-Llamazares *et al*., 2015; Kai *et al*., 2014). Historical data could be accessed via old maps, naturalist books and notebooks, literature, photos, videos, etc.

In that sense, a recent analysis based on memories of ornithologists of an older generation carried out by Reif *et al.* (2021) showed several interesting patterns, such as population depletion of insectivores preceding the time period considered as a baseline by modern studies, which would have otherwise remained hidden for science due to non-existence of monitoring data.

This study shows that importantly, although inevitably subjective, the memories of older generation ornithologists reliably predicted the patterns in the recent bird population changes, largely corresponding with the objective atlas mapping data. Therefore, Reif *et al.* (2021) argue for the value of such memories for environmental indicator research, suggesting that the older generation of naturalists may be interviewed elsewhere and for different kinds of taxa to obtain a more complex overview of historical changes in biodiversity. Unfortunately, time runs against us and, without a swift investigation, we may quickly lose this non-renewable source of information.

4.4. Environmental education

Environmental education has two important roles to play in limiting or preventing SBS according to Soga & Gaston (2018). The first role is to forge people's familiarity with the natural environment and therefore contribute to the reinforcement of people's ability to assess the condition of the natural environment and aptitude to notice changes. This is, for example, achieved by increasing people's knowledge of natural history. Secondly, environmental education is key to accurately communicate to people about both current and past conditions of the natural environment. Improved transmission of environmental knowledge from older to younger generations will help accomplish this, as well as nature interpretation from professionals designed for stakeholders and the public.

Education for all

Schools and universities have a fundamental role to play in environmental education and programmes should be developed from a young age, as well as through familial or local knowledge transmission. Taking part in first-hand nature actions has been shown to be more beneficial compared to indoor presentations/talks and should be favoured. These actions can be achieved via various organisations, such as natural history museums, guided tours in

Figure 25. BSPB visitor centre in Madzharovo (September 2023).

protected areas (e.g. national parks and nature reserves), nature interpretation centres, botanical gardens, zoological parks or libraries.

These on-site experiences can also serve to reconnect with nature and bring awareness in order to access the natural environment in a responsible, respectful and safe manner. Learning ancient dialects/words on nature or practicing native languages (e.g. Irish) for wildlife or landscape idioms can also help to get more familiar with the natural world and its former condition.

Professional knowledge sharing

Environmental education is often targeted at children, which is a fantastic way to encourage early awareness and familiarity with the natural world. However, professionals working in ecology and conservation also have a role to play in sharing their knowledge and experience, either with adult individuals (which in turn can create positive "spill over" to the children) or with other professionals, for instance via the organisation of workshops. Both Knepp and Wild Ken Hill organise such workshops for those looking to learn more about specific parts of their projects such as rewilding or regenerative farming. These workshops aim at delivering informative and practical guides to some of the most exciting new land uses available to land managers, as well as connecting the projects with the community and raising awareness on biodiversity.

The use of new technologies

Finally, the use of new technologies to educate should not be neglected. All the projects I have visited are highly active in the media and on social media platforms, including Instagram, X (former Twitter) or via in-house podcasts (e.g. the Knepp Wildland Podcast, the Rewild Podcast). These new tools are used in different ways: to reach out and educate, to amaze, to bring joy, to discuss research and new data, to campaign or to connect with the community.

Since the consequences of SBS are particularly evident when change is not perceived, by using social media, conservationists have the ability to make a much greater impact for nature protection by either reaching out more people and stakeholders or being more visible, in order to fight fake news for example. Nowadays, it is important not to undermine this aspect of nature conservation; an emphasis on recruiting people with good education, communication, management and consulting skills could be considered.

5. Difficulties and limits

Although based on scientific literature research and on-site observations, this psychological and societal report aims at raising awareness of SBS, not at resolving it. Several key areas need to be addressed in future research such as the magnitude of SBS and if specific environmental conditions, ecosystems, stakeholders or populations are affected.

One might question why shifting baseline syndrome is such an issue, and why should we look at recreating old 'nostalgic' baselines rather than focusing on the future? This is true to a certain extent. Adaptation is and will be fundamental in our fight against the climate and biodiversity crises. However, knowing, understanding and remembering the natural states of our environments is simply as critical, particularly with the rapid pace at which we are losing species, habitats and ecosystems.

Regarding the direct impacts of SBS on policy makers and ecologists (i.e. conservation complacency), only limited data is currently available with no quantitative analysis on this issue. In fact, a study suggests that SBS may not be as significant a threat in conservation management as first thought (Jones *et al*., 2020).

In principle, SBS can occur not only when the state of the natural environment is progressively degrading, but also when it is improving, this is referred to as "lifting baselines" (Roman *et al*., 2015). In their study, Roman *et al*. (2015) explain how for the first time in generations, biologists and policymakers are encountering recovering populations of ocean predators, in opposition to decades of decline. These "lifted baselines" can lead to people perceiving native species as invaders or overabundant and can cause conflicts. Similarly, "lifted baselines" are observable on the EU territory with the natural recolonization of large predators in continental Europe, like the wolf, or smaller predators, like the pine marten in Ireland.

One of the recommendations to reverse SBS is monitoring and data collection. It can be argued that current availability of excellent evidence has rarely been sufficient to convince people of historical trends in environmental conditions (Soga & Gaston, 2018). Worryingly, recent examples of belief rather than evidence-based environmental policy making have been raising the spectre that SBS could become accelerated rather than mitigated in an age of increasing data availability (c.f., Sutherland and Wordley in press).

While SBS has been demonstrated as an aggravating factor to environmental degradation, it should not be considered its main cause. Implementing new regulations, enforcing the existing legislation, creating strong partnerships with other sectors is, and will be, critical to stop the deterioration of the natural environment and restore it.

Finally, I would like to highlight the complexity of this topic, where the consequences of SBS accelerate further SBS through progressive environmental degradation, resulting in a feedback loop (Soga & Gaston, 2018). The more I have been researching this subject, the more evidence I found, however, this report is not an exhaustive list of the causes, consequences and 'treatments' of SBS. My report will thankfully be challenged with time.

6. Conclusions

In May 2022, as I selected my study topic to apply for the Alfred Toepfer Natural Heritage Scholarship, I had a vague idea of shifting baseline syndrome and its implications on nature conservation. However, I was far from comprehending its complexity and magnitude across disciplines, countries and cultures. Thanks to the study visits I carried out in Knepp and Wild Ken Hill (UK), the Oostvaardersplassen Nature Reserve (Netherlands), the Mercantour National Park (France) and Rewilding Rhodopes (Bulgaria), I was able to learn more about the consequences of SBS in European protected areas and ways to prevent these.

Globally, regionally and locally, since a dual climate and biodiversity crisis unfolds, environmental degradation and species loss are reaching unprecedented rates. Shifting baseline syndrome, or SBS, can be described as a gradual acceptance of environmental deterioration due to a lack of knowledge, memory or experience of its past condition. There are three main causes of SBS: the lack of scientific data on past conditions, the extinction of experience (i.e. lack of interaction and orientation for nature) and the loss of familiarity with nature, leading to people's incapacity to assess an environment and thus notice change.

SBS has several consequences, of which some are aggravating factors of SBS ('feedback loops'). These include a gradual habituation to degraded natural environments and altered expectations for the state of nature (i.e. what is worth protecting or not). The professional sector of ecology and conservation is not exempted from these consequences, and other implications can develop such as 'conservation complacency' (i.e. policy makers may set inappropriate or less ambitious targets for environmental conservation, restoration and management programs due to false perceptions of past environmental conditions) or a lack of consideration of non-scientific or historical data leading to a knowledge shortage. With these effects in mind, researchers and policy makers need to focus more attention and efforts on understanding, and planning how best to limit and reduce SBS.

As a conservation ranger for the National Parks and Wildlife Service in Ireland, I observe the implications of SBS in my daily activities, from habitat monitoring, species surveys, community engagement, environmental education and law enforcement. Knowing alternatives or ways to raise awareness of SBS will benefit my work and the work of my colleagues, in Ireland and hopefully the rest of Europe.

To prevent and reverse the implications of SBS, I relied on what I observed from my study visits. In this report, I have highlighted four suggestions or 'treatments' against SBS. Firstly, reversing SBS must pass through the restoration of the natural environment, with Rewilding Rhodopes, Wild Ken Hill and Knepp being the perfect examples of commercially-viable and ambitious conservation and rewilding projects. Secondly, a connection or reconnection to nature should be encouraged by and for everyone, due to the positive benefits it provides for people's health and well-being. In addition, tuning in with nature will enable people to start noticing change again (i.e. deterioration in most cases), therefore giving people a sense of belonging and the wish to protect what they know and experience. Thirdly, access to robust monitoring data should be made available for all professionals, particularly within companies and across disciplines; this data should be saved on a safe and accessible interface and should be used to inform conservation objectives and strategic plans for protected areas (as demonstrated by the Mercantour National Park and the Oostvaardersplassen Nature Reserve).

Finally, an emphasis should be given to inclusive environmental education, for all age groups, and across rural and urban areas, as well as designated for professionals thanks to workshops and partnerships.

Recommendations

Our responsibility as ecologists, conservationists and project managers is to consider and research the past and current state of nature, in order to make informed management plans and implement targeted conservation measures if necessary. To summarise, numerous actions are available for professionals to alleviate the effects of SBS on nature conservation in and outside protected areas:

- Challenge your beliefs and question your expectations; is SBS affecting your vision of nature conservation, and how?

  (In that sense, do not grow accustomed to 'small' or 'minimal' habitat degradation and species loss (i.e. SBS); in a biodiversity and climate crises, every inch of remaining natural space is precious and worth fighting for.)

- Collect and offer robust data, across units, services and departments, without neglecting the importance of historical non-scientific knowledge gained through other channels.

- Attend and organise workshops for shared knowledge and expertise, learn from international colleagues and other projects, network and create collaborations/ partnerships.

- Encourage greater intergenerational communication via data collection, meetings, interviews and knowledge sharing sessions.

- Consider the benefits of environmental education, arts, communication, leadership and activism to recreate fascination for nature and re-establish the narrative (i.e. spokesperson in media, communication officers on social media platforms, participation in TV programs, etc.).

- Reinforce people's sense of belonging, for human well-being and for nature protection, by providing more public, accessible and local green spaces and footpaths in the countryside.

- Raise awareness of the causes, consequences and implications of SBS, for professionals, stakeholders, policymakers and the general public.

- Last point, as I learnt during the 2022 EUROPARC conference, let's think big, let's be vocal and let's take space!

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