

*Master in Advanced European & International Studies (MAEIS) 'European Integration & Global Studies'*



# **Rewilding Europe and The European Union environmental policy**

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# Introduction

The European continent has one of the greatest population densities in the world. Most of the European natural landscapes are directly impacted by human activity. What could wilderness signify in a continent where, over centuries, nature has been reshaped and managed through agriculture, forestry, and livestock farming? In addition, Europe's territory is highly fragmented due mainly to rail and road infrastructures<sup>1</sup>. Nature in Europe is therefore greatly impeded by enclosure. Is there merely any room for wilderness in Europe? In short, can wilderness be witnessed in a continent which combines one of the highest densities of population and one of the most fragmented territory in the world?

Human influence and activity can be seen almost everywhere in the European continent, and the areas perceived as natural are very often the result of human management. Thus, at least since the Middle Age, rivers are confined, forests are managed in homogenous timber plantation, when not burnt to create open areas for cattle. The living resources are intensively exploited to exhaustion.

However recent studies and figures<sup>2</sup> led on national parks and natures reserve have shown how incomparably flourishing the natural environment can be when it is released from human pressure or management.

The wild ungulates like the bison of Europe or the elk which used to be present on the whole continent came to extinction or found refuge in the most remote areas. For a time at least, the mountainous regions and the far north lands where humans hardly dare to settle became a haven for biodiversity. The bears went into hilly and steep reliefs where they were less easily chased than in the plains, while the chamois reached the high altitudes which had never been their predestined environment.<sup>3</sup>

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<sup>1</sup> PERAZION [2018]

<sup>2</sup> COCHET [2018]

<sup>3</sup> *Ibid.*

Indeed, in the late 20th century, the European most iconic wild species has disappeared locally or totally. These species are, among others, the Bison, the wolf, the bear, the elk, the whale, the pelican. These extinctions were all due to human activity, from the destruction of natural habitats to the pollution, and the overexploitation of resources by hunting and fishing. Besides, the eradication campaigns led against an incalculable number of animals labelled dangerous or perceived as rivals in the conquest of natural resources increase even more the current list of endangered species.

The extinction of species is never insignificant in ecosystems where everything is interconnected in what biologists call the food web. Each one is either the consumer or the resource of another, this relationship binds several species together. Yet what about those at the top of the food chains? What about the large herbivores and giant carnivores that biologists gathered in the category of Megafauna, which from their predominant position could be seen as only benefactors of the system? The Megafauna are the actual architects and regulators of the natural landscape. The large herbivores, by grazing and interacting with their environment, create a diversity of habitats from undergrowth forest to grassland. The great predators and rough winters ensure the regulation of the herbivores and limit their pressure on the vegetation. The remains of dead herbivores are besides a precious resource enabling the return of the scavengers, for a long time persecuted and collateral victims of the scarcity of wild ungulate.

With the Megafauna disappears a key-function in the ecosystems which ensure the natural environment's capacity of autoregulation and resilience. European nature is no longer optimal, and we get used to these incomplete ecosystems which require (as it is often claimed) our management to not become impoverished. Very soon indeed, almost everywhere in Europe, Humanity became the main engineer and gardener of Europe's natural landscape, evicting the natural actors it has brought to extinction.

9000 years ago, the beginning of livestock farming, first in the middle east and rapidly spread up to the west, with the domestication of the sheep, the goat and the cow triggered a 4000 years long process during which the greatest part of the original European primary forest cover is replaced by pasture<sup>4</sup>. However, according to recent studies, Europe before the onset of agriculture was not a cheer closed old-growth forest as formerly believed. Europe already had a great diversity of landscape: forest but also grass-land, shrub lands, open and semi-open areas.

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<sup>4</sup> PERREIRA [2015]

Agriculture did not create the landscape diversity as it was hitherto thought. The large herbivores did. This affirmation is a result of a total change in the scientific paradigm. Instead of seeing the herbivores as only following the ecological successions and as passive actors adapting themselves to their changing environment, they are now thought of as being one driving factor in the evolution of their whole ecosystem.

From abundance and even over-abundance, as shown by the archaeo-zoology but also by many testimonies over the past centuries, of naturalists, explorers, hunters and fishermen, the natural living resources of Europe went scarce, if not in some cases exhausted. One relatively recent example is particularly striking, the case of the herring which made the wealth of the British east coast in the second half of the 19th century. In 1857 *The natural history of the North Sea* reports ‘glut’ of herring, during which millions of them brought by the wind covers miles of the coast.<sup>5</sup> Not far away from this, in 1845 the naturalist Marcel Serres<sup>6</sup> gives incredible figures: for the whole Baltic Sea, over 400 millions of herrings are caught by fishermen every year. Since 1938 the volume of this natural resource has drastically diminished. For instance, industrial fishing is said to have reduced to 94% the biological productivity of the British waters in only one hundred and eighteen years (since 1889). For the same number of fish caught, nowadays English fishermen, provided with all the modern equipment, need to stay 14 times longer at sea than sailboats fishermen in the beginning of the 20<sup>th</sup> century!<sup>7</sup>

It is undeniable that the 20<sup>th</sup> century of the industrial revolution and the overexploitation of natural resources after the two World Wars has greatly accelerated this environmental catastrophe. Nevertheless, a lot has been done since the 1990’ to raise awareness on what eventually appeared to be a global major concern.

The EU biodiversity strategy *Bringing nature back into our life*, is published in may 2020 by the European Commission as one core element of the European Green deal presented in 2019. It reaffirms the European Union’s commitment to the protection of the environment. The president of the Commission is well aware that the climate neutrality target by 2050 cannot

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<sup>5</sup> see SEBALD’s novel *The Rings of Saturn*, 1995

<sup>6</sup> cf. COCHET [2018]

<sup>7</sup> *Ibid.*

be achieved without further protection and restoration of the European natural landscapes which are “an ally in the fight against climate change and disease outbreaks”.<sup>8</sup>

The loss of natural habitats has been a major concern in Europe. Europe’s nature conservation policy really started in 1992 and 1994 with the *Habitats and bird’s directives* aiming at the protection of endemic species of wild fauna and plants all over Europe, followed by the creation of a network of areas of high environmental value, the Natura2000 network. Following these directives, the LIFE funding program was created in 1992 setting a budget for the environment and climate action. The main goal of this present essay would be to see to what extent the Rewilding project could be integrated in Europe and EU environmental conservation policies.

I will first try to provide a most complete explanation of what Rewilding is, and why it is a very specific and new environment conservation approach for Europe. The challenge in Europe is not much to protect wild areas, which virtually no longer exist (or at least not to such extent as in America for instance) but creating a new kind of wilderness that covers the whole continent and in which humans and human activity are fully integrated.

I will then try to have a closer look on what is Rewilding in practice and question its compatibility with the Europe and EU environmental policy.

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<sup>8</sup> see Consilium.eu, biodiversity strategy 2030

# I. What Rewilding means in the European specific context

## A. The heavy environmental cost of the last centuries, from abundance to indigence

### 1. *the European landscapes, a theatre deprived of its actors*

#### *Biodiversity loss: a Global issue*

Biodiversity or biological diversity refers to the wide variety of species of plants, animals, and microorganisms across the world. According to the Convention on Biological diversity, biodiversity is “the variety of life on Earth and the natural patterns it forms. The biodiversity we see today is the fruit of billions of years of evolution, shaped by natural processes and, increasingly, by the influence of humans. It forms the web of life of which we are an integral part and upon which we so fully depend.”<sup>9</sup> The web of life is itself enshrined in very diverse habitats or ecological diversity of Earth. The various types of habitats or ecosystems (e.g., grasslands, deserts, tropical rainforest, forest and alpine and arctic regions, aquatic ecosystems) have led to many different life’s strategies and adaptation to thrive in a given environment.

To further explain this diversity of species and habitats, biologists generally consider three theoretical phases in the structuration of the population over time in a given environment following the vegetal successions. Biologists assume that a given habitat will always evolve toward a climax point, that is the most stable state in ecological evolution. (1) There is a first stage of colonization during which few pioneer species have virtually no interactions among each other. Resources are not a limiting factor. This stage is characterized by low diversity, the presence of vegetal robust species with few needs and providing high effort of reproduction and expansion. The thriving of these pioneer species triggered a change in the habitat, rapidly modified by biomass accumulation. The habitat first characterized by soils poor in nutrient but with great availability of light turn into a habitat rich in nutrient but with less light availability.

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<sup>9</sup> cf. Convention on Biological Diversity’s definition of Biodiversity



The second stage (2) occurs when many species are now present and compete for more limiting resources. The new species are more demanding with notably the appearance of phytophagous animals (i.e. insects or larva eating plants). This stage is characterized by the competition of species over resources. In order to survive, the species have to specialize their consumption, therefore creating ecological niches. The food web becomes more complex, with greater ramification. The soils become richer by accumulation of organic matter and minerals. During the last phase (3) the principle of competitive exclusion has caused the disappearance of some species, the clear distinction of niches makes the specialized species no longer competing among each other. This last stage pictures the moment of perfect ecological segregation and of the most stable and diverse environment. This description relies on the vegetal succession theories according to which different kinds of natural disruption caused biological upheaval and triggered a new colonization of the habitat. These disruptions can be extreme, clearing the habitat from all living things and destroying soils richness like for instance volcanic eruption, landslide, violent flooding, or fire. They can be also much more local, provoked for instance by the felling of a tree, which would open a clearing triggering a new colonization of the environment. This model demonstrates that the evolution of species toward a greater diversity is due to external factors and to the evolution of vegetation. Species are mainly adapting to vegetal successions. These successions are due to extraordinary events, disturbing to various degrees the previous habitat stability, enabling a new generation of plants and animals to thrive. It also means that if a habitat is constantly disrupted by heavy biomass export like in agricultural areas, the ecological processes being blocked, it would mechanically lead to a state of impoverishment of the land.

However, conversely and maybe less obviously, some animal species also provide a large range of ecological services that shape in return the whole ecosystem. Biologists call them keystone species or “ecosystem engineers”<sup>10</sup>. A keystone species would by its interaction with its environment create local changes within a given ecosystem providing niches for several other species, and thus creating endemism. In other words, the biodiversity is multiplied regionally at smaller scales by these natural actors. For instance, the beaver would by felling trees transform the riverbanks in an open area and modify locally the ecosystem structure. By making dams, it would also enhance a more heterogeneous river habitat, creating patches of slow running water suitable for fish reproduction and water insects.

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<sup>10</sup> A.H. SCHWEIGER [2019]

The impact of species over their environment can also be more global and in fact essential to the sustainability of a given ecosystem. For example, the elephant by uprooting trees ensures the maintenance of a Savannah-like landscape, and prevents it from becoming a closed forest (i.e. a forest whose density prevents the light from reaching the floor). The role of this ecosystem engineer is comparable to the function large wild herbivores used to provide in the European landscapes. Indeed, the Aurochs and the Tarpan horses, wild ancestors of the cow and of the domesticated horse, used to populate the European continent, contributing to biological diversity before they became extinct respectively in 1627 for the aurochs and 1880 for the Tarpan.

Biodiversity encompasses the structure and the dynamics of the environment. It is a fragile equilibrium of resources and consumptions, vegetation encroachment and pressure of herbivores, predation and food availability or scarcity. Overall, it depends on the interconnection of all living things into the food web.

The biological diversity is such that most of it remains unknown to us. According to the Convention on Biological diversity, there are over 13 million existing species of animals, vegetal and microorganism whereas only 1.75 million are identified and described<sup>11</sup>.

However, biodiversity is put at stake by human activities. Intensive consumption destroys natural habitats and empties natural resources. Pollution and anthropogenic climate change disrupt the whole biosphere. Accelerating urbanization and demography put ever more pressure on the environment and encroach natural habitats. Indeed, the leading cause of species extinction is the destruction of natural habitat. For example, since the Convention on biological Diversity was ratified by 196 States in 1993, one quarter of all the tropical forests on Earth have been cut<sup>12</sup>.

The current phase of the modern era is characterized by the homogenization of the fauna and flora, the massive extinction of species and the direct impact that humanity has over the evolution of the remaining species. The responsibility of humanity in the impoverishment of the biosphere is not questionable. Some ecologists even refer to it as the Sixth Great Extinction since life began, with around 1 000 species becoming extinct every year. 20% of the species

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<sup>11</sup> cf. Convention on Biological diversity <https://www.cbd.int/convention/text/>

<sup>12</sup> *Ibid.*

could become extinct in the next decades and half of all species could be wiped out of the globe by the next century<sup>13</sup>. The International Union for Conservation (IUCN) established in 1964 the Red List of Threatened Species, precious indicators on the dramatic situation of today's biodiversity loss. According to IUCN more than 37,400 species are threatened with extinction, that is almost 30% of all assessed species in the world.

However, contrary to previous biotic crises, due to glaciation, volcanism or asteroids, the cause of the current massive species extinction is somehow exogenous to natural hazard or natural climate disruption. According to the *National Geographic*, extinctions are occurring hundreds of times faster today than they would naturally. They are mainly due to human activities like deforestation, hunting and overfishing but also the spread of invasive species and disease resulting from human trade<sup>14</sup>. In addition, human-caused climate change is a long run threat that somehow imitates past volcanic eruptions which released trillions of tons of carbons and greenhouse gas, triggering global warming and mass extinctions<sup>15</sup>. One could say, even more surprisingly, that the current upheaval is in fact endogenous to biodiversity itself since there is no reason to consider humanity apart from it. For the first time in life history a living organism is able to threaten by itself the natural processes whose disruption leads to massive extinctions.

Consequently, scholars went even further considering the current period as a new era characterized by the deregulation of all major natural dynamics, from nutrient cycles of the soils to the atmospheric constituents, and the temperature levels. The 1995 Nobel prize in Chemistry, Paul J. Cruzen, theorized the debatable notion of the Anthropocene as a new geologic era when human beings become the central actors and potentially the major threat for the entire biosphere. "For the past three centuries, the effects of humans on the global environment have escalated. Because of these anthropogenic emissions of carbon dioxide, global climate may depart significantly from natural behaviour for many millennia to come. It seems appropriate to assign the term 'Anthropocene' to the present, in many ways human-dominated, geological epoch, supplementing the Holocene — the warm period of the past 10–12 millennia"<sup>16</sup>. In Europe centuries-old development of land-use all across the continent completely has transformed our perception of nature. The abundance of large mammals which

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<sup>13</sup> IUCN's Red List of Threatened Species <https://www.iucnredlist.org/about/background-history>

<sup>14</sup> National geographic <https://www.nationalgeographic.org/article/global-biodiversity/>

<sup>15</sup> DASGUPTA [2021]

<sup>16</sup> CRUTZEN, P. *Geology of mankind*. Nature 415, 23 (2002). <https://doi.org/10.1038/415023a>

was one main feature of prehistoric Europe leave the place to empty sceneries. Meeting these now very discreet animals became a lucky and extraordinary event.

### *Who were the ecosystem engineers in Europe?*

The definition of wilderness given by the European Commission in a technical report in 2013 does not mention the large mammals as constitutive to wilderness although it addresses the importance of natural processes and the undisturbed functions of the ecosystem. The crucial role these animals play is nonetheless indirectly considered.

*A wilderness is an area governed by natural processes. It is composed of native habitats and species, and large enough for the effective ecological functioning of natural processes. It is unmodified or only slightly modified and without intrusive or extractive human activity, settlements, infrastructure or visual disturbance.*<sup>17</sup>

In this definition, the European Commission puts the stress on two decisive factors, the absence of all kinds of disruption due to human activities, and the size of the natural area that must be large enough to ensure a fully optimal ecosystem. The size of the area refers to the great mobility of wild ungulates covering long distances in search of food but also great carnivores and birds of prey. The capacity of the wolf to cover long distances and adapt to new environments is well known. It is mainly due to this endowment that the wolf is now able to recolonize spontaneously continental Europe. A pack of about ten wolves is estimated to live in a territory of around 300 km. The case of the wolf is particularly revealing, and his presence is an indication of the good health of a European natural area. The wolf used to be present everywhere in continental Europe. Considered as a pest, it has been systematically chased since the Middle age everywhere there is livestock farming. Yet the main reason for the extinction of the wolf in most European countries during the 19th century is due to the dramatic change of natural areas in Europe marked by deforestation and the near disappearance of wild ungulates. The deer, the roe and the wild boar went extinct in the Alps whose mountainsides were greatly impoverished by overgrazing. The cliffs were no longer the realm of the ibex and the chamois whose number had been decimated by hunting. Until recently the wolf had abandoned most of Europe territory at the exception of the Iberian, Italic and Balkan peninsulas and in the

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<sup>17</sup> EU Guidance on the management of wilderness and wild areas in Natura 2000 technical report 2013

Carpathians.<sup>18</sup> However, the protection of the wolf, the better regulations of ungulates hunting, and the creation of national parks and natural areas has permitted the recent and progressive return of the great predator all across Europe.

The wild large mammals are crucial actors of the ecological succession, but they virtually no longer exist in the European continent where they have been imperfectly replaced by domestic grazers. Yet these animals used to be present in almost every European ecosystem. The current situation is extremely rare at the scale of evolution time when the great mammal's population is shrinking away to nothing. The megafauna at the top of the food chain plays a predominant role for their whole ecosystems. However nowadays scientific ecology has been mostly thought for landscapes without megafauna although they have shaped the landscapes in the past. According to Yadvinder Malhi, professor of ecosystem science at Oxford, the natural processes of regeneration of an environment deprived of megafauna takes around ten years, whereas it is a matter of weeks in an environment rich in megafauna. We observe in the latter case a fast acceleration of phosphorus, nitrogen, and nutrient cycles in time and also in space mainly due to the great mobility of these animals.<sup>19</sup> The presence of megafauna multiplied natural processes and enhanced the dynamic of the whole environment.

The European continent is particularly marked by intense agriculture, forestry and fisheries that leave little room for such imposing animals whose sudden apparition often provokes bewilderment. Besides, the recreational value of wildlife, as we will see it later in further details, is a key point of the Rewilding project whose ambition is to connect wild nature and modern economy by creating new natural assets. The promoters of Rewilding in Europe, among them biologist, scientific searchers, conservationist, naturalist, NGOs (among others Rewilding Europe, ASPAS, WWF) international organisations (UN environment programme, EU environment) put the stress on the fact that Wilderness is a valuable capital good which misuse can cause an irreversible depreciation whereas its "passive management" can promote innovation and enterprise related to natural areas intrinsic values.

Rewilding Europe aims at recovering the function large mammals used to have in pre-industrial times even though the objective is not to recreate a past nature. The auroch by its size

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<sup>18</sup> COCHET [2018]

<sup>19</sup> Yadvinder Malhi, *Megafauna and ecosystem function from the Pleistocene to the Anthropocene Proceedings of the National Academy of Sciences*, 2016

and its social organization in large herds has been the main architect of the European landscape. It was present everywhere in Europe. The auroch was a large size, long-legged animal that allowed it to cover great distance, its large horns enabled it to defend itself against wolves.<sup>20</sup> Yet since it had come extinct in 1627, scientists and ecologists have tried to find a substitute in its domestic descendant. The auroch's primitive features can still be found in various cattle breeds, which have led scientists to think the Auroch is still living in the genetics of its predecessors. Several rewilding projects, in Portugal in the UK and in the Netherlands, have consisted in the "de-domestication" of a robust breed of cattle, physically close to its ancestor. For example, in the Netherland in Oostvaardersplassen a polder of 5600 hectares, Franz Vera had set free herds of Konik Horses, Heck cattle-breeds known for having primitive features and deer. He has studied for several decades the way they interact with their environment. The three species are complementary, horses graze a shorter grass than cattle, and the latter goes in areas of little interest for the horse. From a hundred head of cattle, the herd is now as big as 5000 heads, a size that would have been impossible in Europe before. The variability of the mammal's presence has a direct impact on vegetation and birds in insects which colonized areas or disappear locally in function of the number of herbivores. The study has proven the viability of such an environment with large mammals' dense population. Most of all it has clearly shown the way megafauna conduct the vegetal evolution. If not for them, bushes and reeds would have inevitably encroached the area causing a loss in biodiversity richness. They maintain open-areas and meadows and ensure a new autonomous dynamic of the land.<sup>21</sup> Nevertheless The greater impediment of large mammals' dispersal across Europe is undoubtedly the fragmentation of the territories together with urban sprawl.

## *2. A fragmented territory and the unequal repartition of natural environment*

The areas the most fragmented in the world are in Europe and North America mainly due to growing urbanization and transportation infrastructure. Half of Europe's territory is less than 1,5 km from the nearest road and anywhere on the whole continent is on average only 9 km from the nearest road. The notion of fragmentation and of urban sprawl encompass many

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<sup>20</sup> PERAZION [2018]

<sup>21</sup> VERA [2000]

variables such as population density, road and railway density, houses build-up and spreading of agglomerations. Urban sprawl is a worldwide concern. Since 2008, half of the world population has been living in urban areas and this proportion is increasing rapidly together with the world human population. In Europe, nearly 73% of the population are living in cities and this percentage is thought to reach 82% by 2050. According to the European Environment agency, Europe loses 1120 km<sup>2</sup> per year of natural and semi-natural areas. In 2006, 35% of European forest was fragmented, that is to say cut in small-size patches intertwined with non-forest lands, agricultural, human-made areas and infrastructures. Overall forest and other natural areas lost connectivity because of agricultural expansion, transport infrastructure and building construction. On the one hand rural depopulation allows more land taken by urban expansion. On the other hand, the ever-growing food demands since the second half of the 20<sup>th</sup> century have led the European government to promote and subsidize intensive agriculture. Huge monocultures add a new form of pressure on land and furthermore accentuate the uniformity of landscapes. Aside from natural landscapes fragmentation, farmland has indeed grown increasingly uniform. The loss of habitat heterogeneity triggered a decline in European farmland biodiversity. It results in the progressive disappearance of the animals, the insects and the plants that use to find shelter in bushes, groves and shrubs most often cut to clear the way for tractors. The mechanization of agriculture led to a huge increase in the size of land plots where one single type of crop spread over thousands of acres. The semi-natural landscapes that used to border fields are wiped away and with them precious allies for crops against pests like beetles and predatory flies, their ‘natural enemies’. In France around 90% of the cultivated land is covered by no more than seven types of crops. Wheat and corn cultivation around 60% of all French agricultural fields<sup>22</sup>. Monocultures are more vulnerable to disease and pest hence the massive use of pesticide by farmers polluting water and the underground. The combination of intensive use of the land and pesticide combine to bring about the degradation of the habitat and its surrounding. The land is subject to the competition of agriculture and industrial activities linked to urban development. In addition, intensive agriculture mostly spread at the expense of forests in Europe. Yet forest provides humus, that is to say the superficial layer of earth resulting from vegetation decomposition, full of nutrients and indispensable for arable lands. Therefore, deforestation contributes to soil erosion and accelerates the impoverishment of the cultivated lands. While providing for food and biofuel in quantity, intensive farming, aside from not being

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<sup>22</sup> La Banque des territoires « Diversification des cultures dans l’agriculture française – état des lieux et dispositifs d’accompagnement » 2012

viable in the long term, has a dramatic impact on wildlife in the surroundings. Farmlands reduce diversity of plants and animals and thus impede vital functions of the ecosystem and ecological services. On the contrary a greater diversity of biotopes is provided to a certain extent by 'extensive' farming like small patches of meadows and scrublands surrounded by forest like one can see in North Portugal, in Peneda-Gerês national park.

Fragmentation of natural areas has disastrous consequences on biodiversity, most of all it hinders dispersal. Animals are reluctant to enter clearings and fragmentation is thought to have a negative impact on the natural habitat's capacity of adaptation, exposing wild species to fires, diseases, and invasive species.<sup>23</sup> At a local scale, within an ecosystem, fragmentation can result from dams in river obstructing migration routes of fishes like the sturgeon in the Danube River or salmon in the Loire. It hinders spawning and disrupts freshwater supply causing biodiversity loss. Dams are often perceived as an efficient and clean way to supply energy, irrigation, and offer protection against floods. Yet the environmental damage is huge, causing dramatic loss in species by fragmenting rivers habitats.

Apart from environmental concerns, high dams appear to be unprofitable, construction cost often proves to double the estimated cost.<sup>24</sup> A solution to dams' fragmentation is investing on smaller-scale dams provided with fish ladders to allow fish to run upstream to spawn. Another example of fragmentation is the building of fences notably in grasslands limiting private property in cattle and sheep. The accumulation of fences prevents migration of wildlife and notably large mammals.

### *Urbanisation adds pressure on environment*

Urban sprawl and the development of transportation infrastructure in cause of the fragmentation of the territory are correlated. The spread of urban areas triggers new demands for widening transportation infrastructure. Reciprocally the presence of roads impacts housing density. The more housing and activities are spatially dispersed, the more the demands on transportation are important. In brief urban sprawl and dense transportation networks contribute to reshaping the landscapes far beyond cities themselves.

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<sup>23</sup> DASGUPTA [2021]

<sup>24</sup> TORRES, *Multi-scale mismatches between urban sprawl and landscape fragmentation create windows of opportunity for conservation development*, Landscape Ecology, 2016



Landscape fragmentation has dramatic consequences on biodiversity. Many functions of the ecosystem are negatively impacted by fragmentation such as pollination, species dispersal habitat provision and climate mitigation. The proximity with roads and settlement facilitates the propagation of pest, water pollution and killing of wildlife (collision on roads). Species enclosed in natural areas reduced to small patches encounter difficulties to renew their genetic diversity which make them more easily driven to extinction. Smaller habitats and lack of food resources affects the ecosystem capacity of resilience, making it more vulnerable to natural and most of all human-related disruption.

*Fragmentation brought into nature, the Landes forest, a fragile man-made ecosystem.*

These causes of the deteriorations of the environment are not only affecting the animals but the vegetation as well. A good illustration is the question of the sustainability of the forest of 'les Landes' in France, the largest man-made forest in western Europe. The Landes forest started with the seedling of an autochthone tree species, the maritime pine, over one million hectares in the end of the 19<sup>th</sup> century mainly for industrial purposes. This region has since then been devoted to the monoculture of this pine tree. It is still nowadays the most important exploitation for French forestry. Around half of the national production of wood comes from there. The area is nevertheless not homogeneous. It is divided among many little private owners, most of them making a living out of the forest natural resources. The forest is thus patched with clear areas from recent heavy felling but also fields of crops, and settlements. The trees are planted in a very square scheme in order to facilitate the passage of forestry machines. The fragmentation of the forest makes it easier for the wind to rush in and cause serious damage on the exploitations. Without human activity and watching this forest could not exist. The concentration of conifers in the region renown for its dry summers, make the forest extremely vulnerable to huge fires. Yet the most serious risk for the whole ecosystem may come from invasive species. On the one hand, global warming leads to some insect proliferation. On the other hand, international trade has caused the introduction of species in areas where they do not have natural regulators. In the INRA, the French National Institute of Agricultural Research, the entomologist Hervé Jactel has studied the proliferation of the pine processionary, a species of caterpillar that causes huge damage on the plantations. The study points at the monoculture system that causes forests to become much more vulnerable to pest invasion. A forest appears to be more resistant and resilient when it is tree species diverse, mostly because natural predators of the caterpillar nest in broad-leaved tree and struggle to adapt to pine trees

monoculture. Yet an even more worrisome threat for foresters is the pine wood nematode, a microscopic worm native to North America and spreading in Asia, hosted in insects like Capricorn beetles.<sup>25</sup> Pine nematodes have recently spread in Portugal. This ground worm multiplied quickly, it has invaded the whole Portugal in 5 years. It can kill a tree in three weeks, infiltrating it and blocking the tree's water circulation. The INRA had come to the conclusion that the only efficient protection would be to rely more on the resilience of mixed forest which proved more resistant and also more productive than exploitation exclusively planted with pine trees. The few plots of natural forest in the Landes forest have proved that environments with greatest biological diversity can better cope with drought, pest, and regenerate spontaneously after fires.

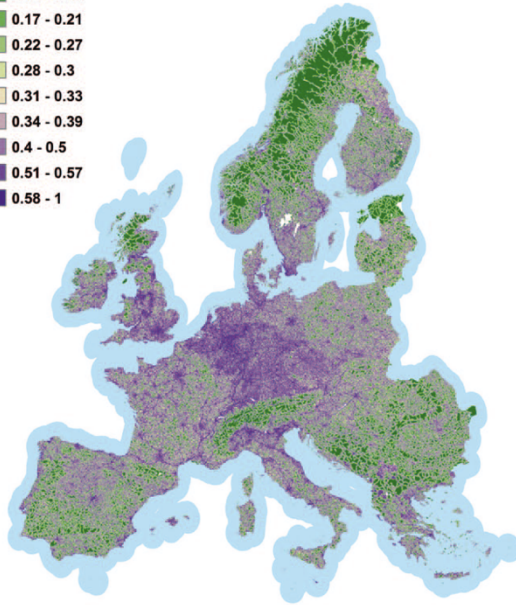
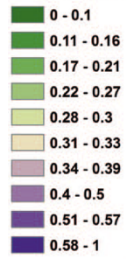
### *The crucial importance of large areas for wilderness*

The lack of wide natural areas may be the greatest challenge for the reintroduction of megafauna in Europe and for a more systematic implementation of the Rewilding project. The fragmentation of the natural landscapes prevents them from being fully optimum. As we saw previously the ecological function and processes of wilderness relies on its size, large enough to ensure the movement of big mammals and their uneven interaction and pressure on their environment. Most of the preserved nature areas are located in the East of Europe whereas the west is greatly urbanized.

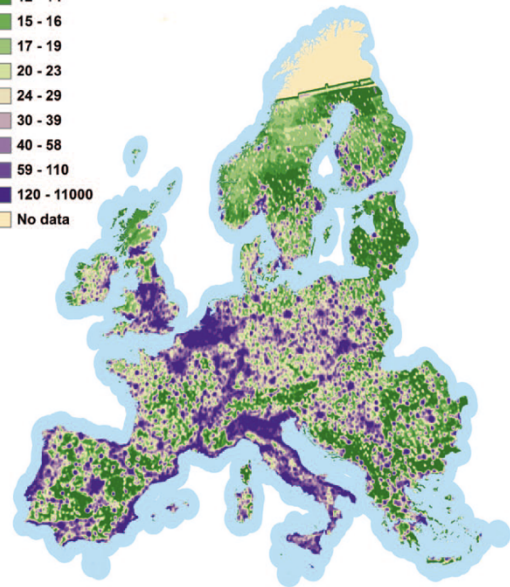
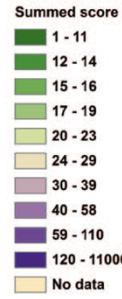
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<sup>25</sup> Sophie Mallez, Chantal Castagnone, Margarida Espada, Paulo Vieira, Jonathan D. Eisenback, et al.. Worldwide invasion routes of the pinewood nematode: What can we infer from population genetics analyses?. *Biological Invasions*, Springer Verlag, 2015, 17 (4), pp.1199 - 1213.

**Human access from roads and settlements**



**Impact of artificial night light**



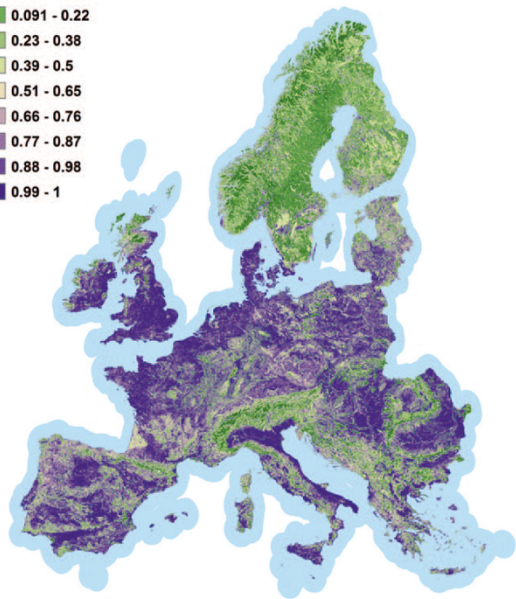
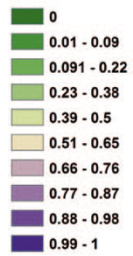
**a**

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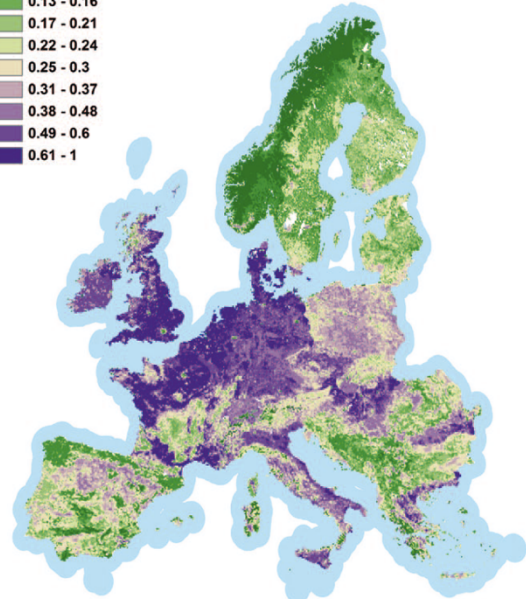
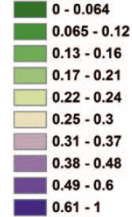
**b**

0 500 1,000 Km

**Deviation from potential natural vegetation**



**Proportion of harvested primary productivity**



**c**

0 500 1,000 Km

**d**

0 500 1,000 Km

### 3. *Environmental awareness, the turning point at the end of the 20th century*

The International Union for the Conservation of Nature is the first world international organisation for the environment created after the World Wars in 1948. Yet the IUCN began to be really active much later in the 1970s, leading the ratification of key international convention such as The Ramsar Convention on Wetlands (1971), the World Heritage Convention (1972), the Convention on International Trade in Endangered Species (1974) and the Convention on Biological Diversity (1992)<sup>26</sup>. In 1964 was established the IUCN Red List of Threatened Species which then became a major instrument to estimate global extinction risk of species. Starting from the 1970', the number of publications and the creation of various NGOs prove the growing concerns over environment and biodiversity loss. Earlier, the World Wildlife Fund (WWF) was created in 1961 to protect species and habitat threatened by human activities raising funds for conservation. The association *Greenpeace* and *Friends of the Earth* were set up in the 1970' with main objectives to protect the environment in financial and ideological independence. In 1992 the United Nation Conference on Environment and Development better known as the 'Earth summit' was held in Brazil leading to the Rio declaration on environment and development and the creation of the Commission on sustainable Development.<sup>27</sup> Despite the non-binding nature of such declaration and its participatory-based ruling enforcement, it opened the first world-wide cooperation for the protection of environment.

Environment conservation according to the Rewilding approach action takes many shapes. There are firstly the active stakeholders, associations, and private foundations among others Pro Natura in Switzerland, ASPAS in France (1980). To resolve the problem of the lack of lands in west Europe that can be dedicated to rewilding, ASPAS's method is ingenious, it involves land ownership and free evolution of nature. ASPAS proceed by buying lands to convert them into wild reserves under the strictest protection. It allows the free evolution of wilderness and the ban of all kinds of potentially harmful human activities. The NGOs use property rights as an efficient instrument to preserve nature and create a network of wild reserves. The exclusive right to exploit nature is used here on the contrary to protect it. The association also works to rehabilitate species considered harmful like the fox, the polecat, or

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<sup>26</sup> <https://www.iucn.org/about/iucn-a-brief-history>

<sup>27</sup> <https://www.un.org/en/conferences/environment/rio1992>

the magpie. In addition, these associations contribute to the enforcement and evolution of environmental laws by getting involved in legal procedure.

Rewilding conservation approach in Europe tries to connect natural lands to create wider spaces dedicated to wildlife. A major influence is the striking example of the Yellowstone to Yukon conservation initiative (Y2Y) in 1993 in North America. The connection of the two national parks of Yellowstone and Yukon permitted the creation of an area large of 3200 km free from any human activities or active management. The Y2Y conservation programme relies on two axes, the connexion of landscapes and their strict protection and the release of functional species like the wolf. Paul Jepson of the School of geography and the environment at University of Oxford defines “The term rewilding has been associated with conservation initiatives that explicitly seek to restore missing or dysfunctional ecosystem processes, often through the reintroduction of functional species”<sup>28</sup>. Based on this model, two environmental organisations were recently created in Europe and became preeminent in the promotion of Rewilding approach, The Foundation Conservation Carpathia (FCC) 2005) directly supported by EU’s Natura2000 and LIFE funding programme in the Carpathian, and Rewilding Europe initiated in the Netherland (2011) whose scope of action includes several sites in Portugal, Poland and Romania. The main objective of these associations is also to connect natural areas to permit the reintroduction of large mammals in a suitable environment, wide enough to ensure a stable population density and its dispersal.

There are also international organizations that covers large cross-boundaries areas like the International Commission for the protection of the Rhine (1950) or the International commission for the protection of the Danube River (1998) whose main goals are to ensure the conservation of surface water and groundwater, control hazards and reduce water pollution.<sup>29</sup> Finally, each nation state has a more or less developed environmental policy to protect the natural landscape. For example, the *Conservatoire du Littoral* (1975) in France and the National Trust in the UK ensure the protection of over a thousand kilometres of coast.

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<sup>28</sup>Jepson P, Schepers F, Helmer W. Governing with nature: a European perspective on putting rewilding principles into practice. 2018

<sup>29</sup> cf. Danube River Protection Convention

## B. Rewilding as a passive management approach of the environment

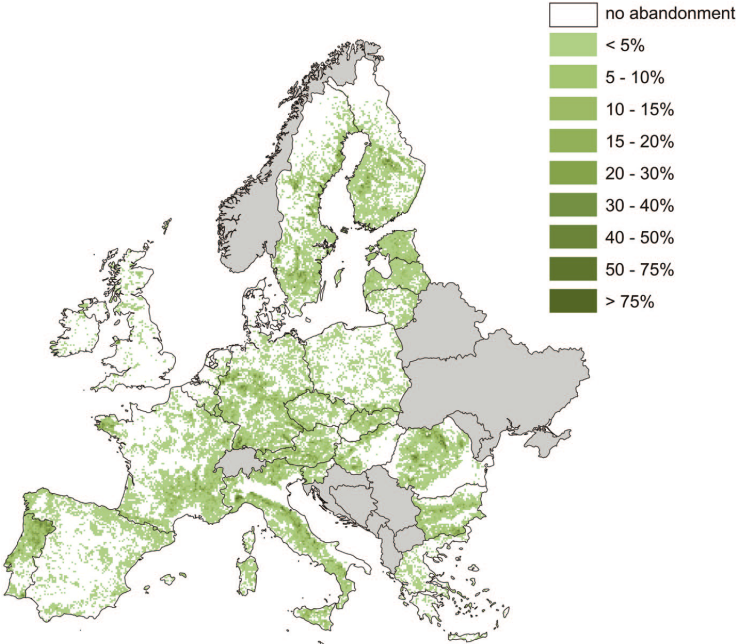
### *1. Rewilding a North American concept, toward a more optimistic ecology*

The very specificity of Rewilding in a European context is to apply this conservation strategy in territory which were initially not thought for such a purpose. Rewilding in Europe has new opportunities due to a global socio-economic trend, farmland abandonment. The less productive regions notably in mountainous areas where intensive agriculture cannot be applied, are uncompetitive and no longer profitable. The lack of services and job offers compared to urban areas accelerate the drain of population from rural to urban areas. The improvement in agricultural productivity and its mechanization has also greatly reduced the need of labour in the agricultural sector. Finally, in a larger historical scale the global switch from agricultural to industrial sectors and then to services as the main driver of national economies have contributed to rural migration, since industrial and services-related activities are mainly in urban areas. Therefore, the European Rewilding differs greatly from the original North American concept whose main goals were to connect already existing wild spaces and to reintroduce keystone species like the wolf. In Europe, we want to use the opportunity of farmland abandonment as a lever for implementing rewilding strategies in former agricultural lands.

### *Agricultural tradition, cultural patrimony or wilderness?*

Lands which were used for traditional and extensive farming whose environmental negative impact is less significant in comparison with intensive agriculture seems particularly suitable for this switch to rewilding. An extensive exploitation compared to an intensive model is characterized by smaller yield, less capital involved, and less labour employed. These exploitations are mostly located in mountainous areas where traditional models of agriculture are still in use like agro-pastoralism or terrace earthworks. This kind of exploitation is more respectful to the surrounding natural environment and also favours biodiversity affiliated to open areas and grasslands maintained by agricultural activities. Furthermore, the aesthetic and cultural value of such exploitation is stressed by UNESCO world heritage sites as “cultural landscapes” because of “traditional or symbolic agricultural practices.” The European Habitats directives list landscapes of environmental value and among them high Nature value farmland which correspond to extensive agricultural models and semi-natural grassland maintained by

human activity. The European Common Agriculture Policy try to preserve these traditional agricultures and prevent farmland abandonment with a specific funds for Less Favoured Areas which totalled € 12.6 billion in the period 2007-2013.<sup>30</sup> However this financial effort, consequent at the European level but quite modest at the individual level, is not likely to stop farmland abandonment. Indeed, It is estimated that between 2000 and 2030, between 10 and 29 million ha of land will be released from agriculture.<sup>31</sup>



For decades the main priority of environmental policies in Europe was to save species from extinction. Therefore, many conservation strategies resulted in the management of land to make it optimal for a targeted species to thrive. A good example might be the Otmoor reserve in the UK. Former agricultural fields have been dug to form ponds and create an optimal environment for the reproduction of specific endangered species of birds. The landscape is managed and supervised to ensure that it does not lose its assets due to vegetation encroachment. Conservation here goes hand in hand with active management of the land in the core of Oxfordshire countryside. The wetland of Otmoor does not substantially differ in appearance from the surrounding agricultural fields except for the fact that management here is driven by environmental issues rather than yield. This environmental approach seems very far

<sup>30</sup> NAVARRO [20015] *Rewilding European landscapes*  
<sup>31</sup> *ibid.*

from North America's huge wild areas where human presence and impact is reduced to the minimum.

Rewilding is about restoring the favourable condition in order to reach optimal and self-sustainable biodiversity. A Milestone was reached in this conservation approach in 1991 with the Wildlands Projects in North America aiming at connecting large wild areas, and reintroducing keystone species. The Wildlands Projects later re-baptized Wild Lands Networks is the first example of conservation thought at continent-scale. This project was born from the collaboration of the biologist Michael Soulé and the environmental activist David Foreman. Their conservation strategy is based on the so-called 3Cs approach: "core areas, corridors and carnivores". Quoting Jamie Lorimer, professor of environmental geography in Oxford "In this North American version, rewilding focuses on securing large and well-connected core areas and releasing keystone species—most notably wolves". In fact, Yellowstone Park has been connected to Yukon Park in Canada to ensure a wide and diverse area for wilderness. The reintroduction of wolves in Yellowstone Park triggered a chain reaction of biodiversity enrichment. Yellowstone was declared a National Park in 1872 although human activities and intervention never has been totally banned. It covers around 898,000 hectares of natural areas, forest, mountain, and grasslands. The reintroduction of the wolf took place in 1995-1996 because of a growing concern with the unregulated increasing of the elk population. The nature reserve was hitherto asphyxiated because of the pressure of herbivores on vegetation. Timbers would not grow along the streams, leading to the rarefaction of beavers who appreciated them, and whose dams, creating ponds, benefited to many fish, amphibians and insects which can better reproduce. The return of the wolf changed the Cervidae behaviour and thus permitted great improvement in the overall biodiversity of the site.<sup>32</sup>

The American concept of Rewilding where great areas still exist relatively free from human marks, could not be applied as such to Europe where the situation is very different. There are no spaces dedicated to wildlife comparable to Yellowstone in terms of size in Europe. However, there are a plurality of ecological niches like Bialowieza in Poland, the last European old-growth Forest, the Danube Delta, Europe's largest wetland area or the Swedish Lapland vast uninhabited mountain range and unbroken taiga forest. The idea of creating international cross-boundaries areas of high natural values connecting natural land together is also taking

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<sup>32</sup> PERAZION [2018]



place in Europe with the fusion of national parks notably in the Alps between French Swiss and Italian national parks and in the Carpathians. Some naturalists suggest the creation of a natural belt running from the Iberia peninsula to the Carpathian and the Ural Mountains, where large mammals could move freely and enrich their genetic diversity.

*2. A new scientific paradigm, restoration of natural process through the reintroduction of key-species.*

Scientifics and naturalists took learnings from the pre-Holocene state of nature. The notion of ecological memory puts the stress on the idea that the current ecosystem's composition is determined by past ecological evolution. Before the onset of agriculture, large herbivores shaped the landscapes we somehow inherit today. There is a complementarity of the wild ungulates (Aurochs, Tarpan horses, wild goats etc.) which does not graze the same kind of vegetation and then impacts differently their environment and creates the diversity of landscapes.

Rewilding projects aim at restoring the extinguished megafauna in order to recreate the auto regulation of natural landscapes and ensure their enrichments.

In wild areas, much more than in managed natural or semi-natural sites, we observe the acceleration of natural processes of regeneration. As a megafauna-rich environment greatly accelerates nitrogen, phosphorus, and nutrient cycles<sup>33</sup>, the presence of megafauna increases the dynamics of the whole ecosystem. Wilderness does not mean to abandon landscapes to vegetation encroachment, making them turn into forest type of habitat. The European large mammals played this specific role in maintaining open landscapes before they have been replaced by domesticated animals. This passive management allows forest natural regrowth punctuated by the disturbance of the Mega-fauna which maintain clearings.

Rewilding puts the stress on the necessity of “self-sustaining ecosystems protecting native biodiversity and natural ecological processes and providing a range of ecosystem services”.<sup>34</sup> Even though this conservation model is inspired from past ecosystems, it often implies the introduction of reintroduction of species to fulfil this function.

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<sup>33</sup> *Ibid.*

<sup>34</sup> Rewilding Europe

### *3. Rewilding to provide ecosystem services*

Wilderness can provide a wide range of ecosystem services, that is to say all the services that nature can provide to mankind and affect its well-being. The Commission list these natural services in three categories, “provisioning (e.g. the supply of food, clean air and water and materials), regulating (e.g. water and climate regulation, nutrient cycling, pollination, or the formation of fertile soils), cultural (e.g. recreation opportunities).”

The Commission actually takes the Common International Classification of Ecosystem Services (CICES) which classifies ecosystem goods and services in function of how they contribute directly or indirectly to human well-being. Provisioning services are all products that can be obtained from ecosystems. The two others regulating and maintenance services, and cultural services are non-material benefits, and therefore harder to value. Regulating and maintenance services ensure the sustainability and resilience of the ecosystem processes providing basic needs like breathable air, fresh water, protection against disease and natural cataclysm, regulation of climate and soil nutrients. For instance, pollination is one of these regulating services on which many agricultural yields rely.

Ecosystems also provided multiple cultural services. A Natural landscape, a specific fauna or flora can have a spiritual, religious or aesthetic value, it is the notion of cultural landscape. Other types of cultural services provided by ecosystems are tourism and recreation.

The specificities of ecosystem services are that many of them are not traded in conventional markets, their economic value is imperceptible and consequently there are no brakes to depletion or overexploitation. Ecosystem services are more and more seen as an argument in favour of conservation and a way to fight social inequality because it directly affects people’s well-being and economy. This notion has been therefore fully integrated in the recent EU Biodiversity Strategy for 2030 whose main objectives is to limit biodiversity loss and the deprivation of these precious ecosystem services.

Indeed, ecosystems provide essential services integrated in conservation strategy. The value of these natural services that still need to be fully recognised in economic terms, taken into account the possible trade-off situation with other services. The EU Biodiversity Strategy includes the protection of wilderness, in particular old growth forest. Wilderness offers very particular and essential ecosystem services like air quality, freshwater provision, pollination but also recreation. Rewilding abandoned areas could improve the supply of these services. In that purpose, the association “Rewilding Europe” has fulfilled its goal to rewild 1 million ha of land

in Europe in 2020 spreading to several countries, notably in Portugal, Estonia, Croatia, Romania, Sweden.

Wild areas can supply higher quality services than other semi-natural lands. Scientifics have noticed the higher carbon storage capacity of undisturbed forest and wetland. Wilderness also supplies cultural, social and economic services, generating income. For instance, The Oulanka National Park in Finland employs 183 persons representing 14 million euros injected into the local economy.<sup>35</sup> The reintroduction of charismatic species such as bison and bears in addition to supporting wildlife enhance the touristic attractiveness of a region. Wild areas are in addition, more and more considered for health and educational benefits. A German scientific study in the review “Landscape and Urban Planning” has shown a strong correlation between the presence of natural fauna and vegetation and better mental health. The more surprising being that it is less the abundance of nature but rather its diversity and species richness which has a positive influence on mental health.<sup>36</sup> Furthermore, wild areas are integrated in many programmes for youth development and rehabilitation.

According to the EEA, “Around 70 % of the EU-27 territory is covered by ecosystems providing medium and important service areas, i.e. one or two of the three key services (pollination, flood control and recreation) to people in the same area. However, there are more areas providing no services than those providing three services simultaneously”. Increasing the number of wild areas could enhance the provision of ecosystem services in Europe.

## C. The specificity of Europe

### 1. *Wilderness in Europe needs to be based on cohabitation*

With three openings to the seas and the ocean, its eastern wooden regions, its many long cross-borders rivers, three peninsulas (Iberian Liguria, Balkan), active volcanism and various mountainous regions, Europe provides for a great diversity of ecosystems and endemic species. Nevertheless, the wild areas in Europe are rare and remote among them the North Scandinavia, Iberian Peninsula, high altitudes in Pyrenees and Alps, Carpathians and Balkans mountains.

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<sup>35</sup> NAVARRO [2015]

<sup>36</sup> Joel Methorsta, Aletta Bonn, Melissa Marselleb, Katrin Böhning-Gaese, Katrin Rehdanz *Species richness is positively related to mental health – A study for Germany*, Landscape and urban planning, 2021

The specificity of Rewilding in Europe is that it is applied to areas which were not predisposed to conservation. It is not much about preserving or restoring past nature than creating a new kind of relationship between wildlife and humanity. The Rewilding project intends to fully include social and economic perspectives. Therefore, the rewilding approach gives a crucial importance to restore trust and cohabitation with wilderness. Communication, information meetings and educational programmes to give people a good knowledge of wildlife, how to behave into the wild, and keys to understand wild species behaviours are fully integrated in rewilding projects. Some animal species are victims of their bad reputation in popular culture and hostility toward them often comes from a lack of knowledge of their behaviours. Yet cohabitation first goes with restoring habitats which belong to wildlife and where human presence is tolerated and not the contrary. Indeed, Rewilding's principal objective is to create self-sustaining ecosystems by connecting natural sites together in wider areas providing better capacity of adaptation to external pressure for species and habitats. It is about restoring natural processes in order to make natural areas more autonomous and creating natural assets involving enterprise, and other actors of socio-economic interest. One way to enhance the conservation of wilderness is by making it profitable. An important argument in favour of Rewilding is that it offers a cost-efficient solution to challenges that EU environmental policy undertakes. It proposes to create job opportunities and restore natural value to territory to give incentive to people to contribute to nature conservation. Rewilding conservation project is one solution that combines private and public investment and interest and could contribute to meet 2030 biodiversity strategy. Indeed, the various NGOs supporting Rewilding action like *Rewilding Europe* insist on the compatibility of the Rewilding approach with EU environmental legislation. Rewilding conservation programme fully agrees on the European nature directives and presents itself as a viable option for its better implementation. The European directives were designed to protect specific habitat and species. One could think it is incompatible with Rewilding approach focusing on processes and dynamics of ecosystems rather than 'static' conservation measures.<sup>37</sup> Yet rewilding shares directives' main objective which are to restore favourable condition for habitats and species and creation of a wide range of ecosystem services within Natura2000 which inevitably leads to the restoration ecological processes and dynamics. The EU environment can actually evolve in many cases, and especially in south-eastern Europe where there are quite wide undisturbed natural areas, towards rewilding passive management.

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<sup>37</sup> JEPSON, *Making Space for Rewilding: Creating an enabling policy environment*, 2016

The question of the coexistence between local communities and wildlife seems all the more crucial when rewilding implies the reintroduction of free-living large and imposing animals such as the Bison or the bear. In the Southern Carpathians the reintroduction of bison was accompanied with several measures to ensure peaceful coexistence. Rewilding Europe supported the deployment of bison rangers to supervise the species' evolution. Regular meetings were set up to address people's concerns and educational programmes in schools to inform about the animal. The development of Nature-based tourism is promoted by Rewilding in order to stimulate the local economy. Jobs opportunities are created around the reintroduction of the bison like local guides with the creation of a bison tracking safaris and visitor centres.<sup>38</sup> Aside from the potential socio-economic benefits of rewilding, the main targets are obviously ecological which directly contribute to human well-being. Rewilding approach intends to provide highly valuable nature regulative services and to a greater extent than any other conservation schemes. For example, studies show that undisturbed old growth forests have a greater carbon sequestration capacity compared to agroforestry or plantation, over three times as much and they store it for longer.<sup>39</sup> Furthermore untouched forest have a better capacity of adaptation to climate change. The following case studies show a rewilding approach in practise and its efficiency to enhance nature resilience and ecological values while progressively setting aside human management.

### *Oostvaardersplassen in Nederland*

Oostvaardersplassen is a 5600-hectare polder in the Netherlands, a landscape whose wildlife density could recall the most luxuriant park like the Serengeti Park in Tanzania. There, it is in fact possible to observe immense herds of cows, elks and horses running free. This polder is in fact the illustration of a radically new response to the question of conservation of the landscape. The main actor of this transformation is Frans Vera who conducted a long study from 1996 to 2012 to study the influence of herbivores on vegetation. The natural area was created in 1968 in the very heart of the Netherlands, the most densely populated country in Europe. However due to the rapid encroachment of vegetation like reeds, the polder was doomed to impoverishment. Indeed, what makes damp land like polder so rich in biodiversity is the presence of open spaces suitable for numerous species of birds notably.

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<sup>38</sup> VAN DE VLASAKKER, *Bison Rewilding Plan 2014-2024*, Rewilding Europe, 2014

<sup>39</sup> <https://www.reuters.com/article/us-australia-forests-idUSSP25595420080804>

Frans Vera noticed that geese, by eating reeds, were maintaining open spaces. This simple observation is at the start of a real paradigm shift. The traditional conception is in fact that herbivores always follow the plant succession. It follows the logic that any space where trees can grow will evolve to a climax point which is a closed forest, therefore prehistoric Europe must have been covered in forest. Herbivores were supposed to be unable to shape the landscape but only adapt to it. The observation of wild goose led Frans Vera to consider the opposite and introduce several species of large herbivores in the polder without any extra food “All the scientists thought it was impossible, that before in Europe there were auroch tarpans, elk deer, bison, but that the whole of Europe was covered by dense forest.”<sup>40</sup>

Thus, the polder became a real laboratory in open space. Since the auroch and tarpan do no longer exist, Vera chose to introduce species the closest to their wild ancestors as substitutes, 20 Konik horses, 32 Heck cattle and 40 deer. These animals are complementary, the horses eat a shorter grass than the cattle but the cattle graze more and venture in areas that do not interest the horses.

From a hundred animals at the beginning, the herbivore population has now reached around 5000 heads. Hitherto, herds this size seemed impossible in Europe. The number of herbivores is regulated naturally by the food availability and rough winters. In fact, the number of herbivores can decrease by 30 to 60% depending on the harshness of the winter. Thus, the dynamic in the population of these ungulates influence the whole environment from plants to insects and birds. Depending on the number of herbivores, some species colonise the area, others disappear locally only to reappear a few years later. The study led by Frans Vera has shown that large herbivores shaped the vegetation. Without them, reeds, tall grasses, and shrubs would have invaded the space. The herbivores have influenced and maintained the grassland and drive the new and autonomous dynamic of the territory. These observations made in Oostvaardersplasen had a crucial influence on the possible implementation of rewilding elsewhere in Europe.

*The Iberian Peninsula Faia Brava reserve, an attempt to recreate the auroch and its function on the environment*

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<sup>40</sup> PERAZION (2018)

Auroch still exists in the genetics of its domestic cousin. The release in nature of semi-domestic Heck cattle in Portugal is an attempt to breed back its wild ancestor. The auroch, with its size and social organisation in vast herds, has been one of the main architects of the European landscape for thousands of years. Therefore, scientists and ecologists use their descendants, the domesticated cow, as a substitute. An attempt to revive the auroch is being made in Portugal, crossbreeding cows which have kept the physical pattern of their ancestors. The “Tauros programme” consists in the introduction in Faiai Brava reserve of a robust crossbred cattle in order to “de-domesticate” it. The primitive character of the auroch is still present in many breeds of cattle that did not have been too much changed by domesticity. Since the wild ancestor has become extinct, the programme aims at recreating the auroch, which was probably present all over Europe, in very large herds. The auroch still exists today in the genetics of its 1.2 billion predecessors, the main idea being that an animal that has the physical attribute of the auroch would have greater chances of survival. The specificities of the auroch were its great size, great height on legs allowing it to cover long distances, and great horn length useful to defend itself against wolves.

While domestic cattle are used to be provided with water and food, the ‘tauros’ have to take over their environment themselves, hide when they are in danger and find food. The most striking thing is that the change in behaviour occurs in only a few years. With the aim to make Europe a wilder place, scientists try to create a category of animal between the domestic and the wild, thus breaking the binary vision that traditionally split wild from domestic. This idea to bring the domestic and the wild closer together is at the heart of the Rewilding project.

### *Țarcu Mountains in Romania, reintroduction of the Bison*

The reintroduction of the bison answers a double perspective of protecting an endangered species and restoring its predominant role for the whole ecosystem. A major actor of Rewilding in Europe is Frans Sheppers, co-founders of the non-for-profit foundation Rewilding Europe registered in the Netherlands. He conducts a vast project of reintroduction of bison in the South Carpathians in Romania. It is the most important reintroduction programme of an animal that has become very symbolic of the rewilding project.

There are currently about 5000 individuals in Europe even though only a few dense herds represent a viable population. The increasing number of individuals in herds is primordial

to recover the ecological function of the bison. Indeed, as the population increases, herds search for new grazing areas and in winter for other types of food. They therefore have a much greater impact on vegetation and consequently on their environment. Due to its great size and weight the bison creates a real opening in the wood, breaking low branches and eating shrubs leaves and branches at more than 2m height. After its passage, clearings in the woodland allow the light to penetrate, permitting a new diversity of plants and animals to flourish. However, this function in the ecosystem has been lost almost everywhere in Europe when the last bison were killed in the 18th century. Nowadays there are about 5000 bison in Europe which is as few as the black rhinoceros in Africa, one of the most endangered species in the world. In Europe, we get used to empty landscapes, the landscape is cultivated and exploited with a deep-rooted belief that without management it could not work. In fact, as Paul Jepson (researcher at Oxford University School of Geography and the Environment) says Europe is the only continent in the world where we associate even conservation with controlled landscapes.

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## II. Rewilding and the European conservation policies

### A. The social and economic potentiality of the Rewilding project

#### 1. *The opportunity of Farmland abandonment*

In marginal agricultural regions, low productivity and the aging of the population are driving the farmland abandonment despite of state subsidies. The areas most affected by rural depopulation are extensive and traditional farming characterized by heavy workload for a comparatively low level of yields. These areas are therefore under the pressure of both a vulnerable economy and depopulation. It is a vicious circle, low population density will negatively affect the creation or the maintenance of business, limiting access to jobs and triggering depopulation, causing in return low population density. These regions are real “poverty traps”, as L.M Navaro puts it “households suffer from scarcity of resources, low return on investment, lack of opportunities, and reduced social services”<sup>41</sup>. These models of farming allow undoubtedly a greater diversity of species than intensive farming systems. Besides the historic and cultural value of traditional rural landscapes like the alpine grasslands is often used as an argument to maintain them as such. These “low-intensity agricultural management” are classified in the European habitats directives as “high nature value farmland”. According to the European Environment Agency around 15-25% of the European countryside are considered as high nature value farmland. However only one third of these landscapes benefit from a real conservation status under the Natura 2000. Even still the concrete measures of protection remain largely undefined. Extensive and marginal agriculture benefits mostly from the financial support of the Common agriculture policy to less favoured areas. Yet the subsidies which are substantial at the European level would not to be enough at the individual level to stop depopulation.

This trend is not new and can be observed at least from the second part of the 20<sup>th</sup> century. Between 1960 and 2010 the rural population has decreased by 70%. It has huge consequences on the territory and especially in mountainous regions where the land is no longer

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<sup>41</sup> NAVARRO [2015] *Rewilding European Landscapes*

the realm of agriculture. In these areas where cultivated lands offer a small income, it is projected that between 5 to 15% of land could be released that is 30 million ha, 300 thousand Km<sup>2</sup> more or less the size of Italy. The biggest challenge of Rewilding in Europe will probably be the fact that it won't be like managing natural parks or protected areas, but whole territories, keeping a close attention on the people who live there.

Rewilding projects aim at revitalizing these marginal areas by providing a huge range of ecosystem services linked to protected natural areas and flora and fauna abundance, touristic attraction with the presence of wildlife, a passive management of the territory and protection of the biodiversity by renewing natural processes. Rich biodiversity is 'productive', ecosystem services and goods evolves in cascade, from provisioning materials: energy, food and fresh water, natural fertilizer, genetic resources, biochemical and pharmaceuticals such as medicine or food additive, or ornamental resources, to less visible *regulating and maintenance services*: regulation of climate, of the water cycle and purification of water, of disease, decomposing of waste, prevent erosion, protection against storms of flood, pollinating plants, maintaining oxygen production through photosynthesis<sup>42</sup>. The main difficulty is that this second range of services, although crucial for human well-being, are more easily overlooked since they don't provide immediate and visible benefits in contrast with exploitation of primary resources like, for instance, timber, fishery, or agricultural production. Overexploitation of natural resources leads to biodiversity loss and habitat degradation and consequently the loss of these related regulating and maintenance services. The competing demands often created between availability of resources and regulating services is distorted by the invisibility of the latter. Timber or fishery is directly enjoyable goods whereas carbon sequestration or protection against storms provided by forest habitat for instance are not visible. For instance, mangrove forest is of crucial help to protect communities against coastal erosion and violent storms, but it also offers important timber stock and fish habitat whose exploitation endangers these fragile ecosystems. It is unfortunately only from the absence of these regulating services, caused by biodiversity and habitat depletion that we come to feel their worth. The ever-increasing global demand for provisioning services, food, timber, fibre, and fresh water has shown a symmetric decline of the other cultural and regulating categories of services provided by nature. In Europe the 'green revolution' initiated in the 1950' with agriculture intensification, mechanisation and systematic use of pesticides and industrial fertilizers has boosted in tremendous amount

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<sup>42</sup> DASGUPTA [2021]

Europe's provision of food but had had a disastrous impact on biodiversity and the other categories of services it provides. Global climate change accelerated by the massive use of fossil fuel has put a light on this issue and notably on the major role that natural landscape plays in regulating climate. "over the year, economic development has come to mean growth in the products we enjoy from provisioning services and cultural services, but that the pursuit of economic growth has led to a decline in the ability of the biosphere to supply regulating and maintenance services."<sup>43</sup>

Rewilding would contribute to restore natural functions of species and protect natural processes from human disturbance to enhance nature resilience and autonomy. In fact, ecosystem productivity relies on its resilience, that is its ability to regenerate, recover and maintain itself through shocks and disturbance.

## *2. The opportunity of natural assets to revitalize non profitable regions.*

It is possible to value natural assets involving real economic activities with no or few harm to natural ecosystems toward a more sustainable economy. Among these activities are sustainable agriculture, low-carbon energy production, green infrastructure and eco-tourism which can attract private investment. Most of these activities are incompatible with a strict conservation programme like in rewilding zones since they allow a minimal intervention on resources provision. Nevertheless, they can be alternative measures in parallel in regions where rewilding is not implementable or to compensate for loss of earnings of other strictly protected areas. Sustainable agriculture, agroforestry and ecotourism can more easily benefit from private investment since they are lucrative activities which can generate profit. The independent fund manager 'Ecoentreprises Fund', partners of the European investment bank, is a good example of how to support natural assets by channelling financial flows. Mostly focused on Latin America, the Fund has mobilised \$140 million for sustainable economic activities such as those quoted before. To balance the fact that investment on natural assets is risky in terms of financial returns, the Fund relies on blended finances, that is to say the mix of public and private

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<sup>43</sup> Ibid.

investment reducing the risk taken by private investors. The fund is also based on a diversified portfolio to guarantee more stable financial returns to investors.<sup>44</sup>

Activities using nature without extracting resources such as nature tourism, wildlife watching and trekking, can in a context of rural depopulation generate benefit to local economies. “Overall, tourism is the largest global economic sector accounting for \$ 3.6 trillion in economic activity and eco-tourism has constantly increased 20-30% per year since the early 1990’s”<sup>45</sup> Eco-tourism can help revitalizing marginal areas where there are few alternative livelihoods and at the same time promote biodiversity conservation and rewilding project. A better connectivity of natural landscapes aimed by associations like Rewilding Europe would facilitate the expansion of large iconic mammals. The presence of charismatic species like wolf, bison or bears can appeal to tourism and thus contribute to the economy. In Scotland, eco-tourism contributes 1.6 billion € annually to the country’s economy making it its most important economic sector. Recreation opportunities from wildlife generate 65 million € and support 39,000 full time jobs<sup>46</sup>. The reintroduction of large carnivores and grazers in the Majella National Park in Italy and the Retezat National Park in Romania is thought to have contributed to the local economy. The International Ecotourism Society defines Ecotourism as “responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education”<sup>47</sup> The principles of ecotourism are notably to minimize impacts off all kind, physical but also social and psychological, to promote environmental and cultural awareness, provide direct financial benefits for conservation programmes, and also for local people and private investors.<sup>48</sup>

The potential economic benefits of a passive restoration of landscapes together with lower cost of management should help to boost the economy of regions where such a strict conservation programme can be implemented. In Region where Rewilding cannot be considered because for example of the presence of too many settlements, or a limited potentiality in terms of natural areas of high value, economic practises based on a sustainable use of ecosystem provision services can appear to be a more viable option.

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<sup>44</sup> DASGUPTA [2021]

<sup>45</sup> Bishop, J Building biodiversity business (164 pp). London: Shell International Limited and the International Union for Conservation of Nature. 2018

<sup>46</sup> Brown, C., McMorran, R., & Price, M. F. (2011). Rewilding—A new paradigm for nature conservation in Scotland? *Scottish Geographical Journal*, 127(4), 288–314.

<sup>47</sup> <https://ecotourism.org/what-is-ecotourism/>

<sup>48</sup> *ibid*

The European Natura2000 network shows that protecting natural areas and generating benefits are not incompatible. Indeed, according to the Institute for European Environmental Policy (IEEP) the annual overall economic benefits of the Natura2000 network range between €200 and €300 billion, representing 2 to 3% of EU's GDP.<sup>49</sup> The recognition of the economic value of the Natura2000 network can attract new funding, facilitate eventual land-use change and contribute to the integration of the protected areas in local and regional development policies. According to IEEP's estimation, Natura2000 would receive annually between 1.2 and 2.2 billion visitor days with a total visitor expenditure ranging between 50 and 90 billion euros in 2016. These expenditures linked to the cultural and recreational services provided by natural areas contribute to help employment and generate additional incomes in the region. Around 30% of the overall benefits of Natura2000 correspond to these additional incomes which represent between 50 and 90 billion euros.<sup>50</sup> It is estimated that during the period 2006-2008, activities related to Natura2000 have helped the creation of about 12 million full-time-equivalent jobs per year, thus representing 6% of total employment in the EU, including jobs in recreation, agriculture, fishing, and forestry sectors.

The economic benefits of Rewilding areas are essentially of two types, regulating and cultural. Forest regrowth would provide an increase in carbon sequestration as wild forest within the Natura2000 network has generated the highest carbon value estimated at 610.1 billion euros almost doubling commercial forest.<sup>51</sup> old-growth forest's carbon offset in the Carpathian is expected to generate 26 million euros. Wetlands are another important ecosystem notably for water regulation, their restoration through rewilding practise could reduce cost due to flood damage around 6.4 billion euros per annum.

### *3. The rupture between western and eastern Europe*

Most of the landscapes of high natural value are located in eastern Europe. Rewilding approach appears to be more suitable to these eastern regions where natural values are under less pressure. The European legislation offers more scope for innovative environmental conservation programmes in East Europe. Indeed, in the western part of Europe, most of natural

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<sup>49</sup> EU COM, Estimating the Overall Economic Value of the Benefits provided by the Natura 2000 Network. Final Synthesis Report to the European Commission, DG Environment on Contract ENV.B.2/SER/2008/0038. Institute for European Environmental Policy / GHK / Ecologic, Brussels 2011

<sup>50</sup> *Ibid.*

<sup>51</sup> NAVARRO [2015]

values are related to extensive farming practises and pre-industrial land-use under severe pressure of natural habitat degradation which justifies very strict law. In this context, the main objective is to preserve target species and habitats making it clear what kind of intervention is allowed or not to meet favourable conditions. On the contrary, in other regions in Europe mostly located in the East, natural values are under less pressure which gives room for interpretation of the directives and its possible implementation. The European nature directives are the main instrument to create new protected natural areas taking into account socio-economic requirements. Rewilding programmes in Romania and Poland have demonstrated the capacity of the rewilding approach to combine ecological and socio-economic interest proving to be a viable and serious option for European environmental policy.

The natural areas in Eastern Europe often represent vulnerable economies and can be seen as a weight for nation states. For example, the integrity of Bialowieska natural site in Poland is threatened despite the fact it is protected by National law, by UNESCO since 1979, and under Natura2000 European directives. In 2016 the Polish minister of environment Jan Szyszko took the decision to triple the rate of deforestation, in total contradiction with European directives. The Polish government argued to remove only dead and sick trees. This operation was also justified by the Polish authorities as a sanitary measure to avoid the spreading of a pest devastating pine trees. On the 20 of July 2017, the Commission said the Polish authorities did not take the necessary precaution to guarantee this action will have no impact on the integrity of the protected area following the “Habitat” directive. The Commission therefore referred the case to the European court of Justice which stated in 2018 that in fact the felling operation led to the destruction of a part of the site. What makes the Bialowieska forest so particular is precisely the presence of old trees and dead wood which play a crucial role in the forest ecosystem. Standing dead wood can also serve the forest as protection against wind and disease, contributing to the forest resilience. The classification of Natura 2000 site usually follows the presence of species listed in the bird and the habitat directives whose protection is considered as priority. The European court stated that Poland failed to fulfil its obligation regarding these directives. This decision proves the binding nature of the directives which impose obligation to member states to preserve the natural sites. Furthermore, The European Court showed that whereas the European spruce bark beetle (*ips typographus*) — the insect in cause in the disease of pines trees — was not representing a substantial threat for the Natura 2000 site Puszcza Bialowieska, the felling of century-old spruce trees led to the destruction of a part of the site and therefore was a threat for the natural site’s integrity. Besides, experience has shown that felling of sick trees to avoid contamination can even be counterproductive because it weakens

the forest natural defence. Two National parks in Germany and in Czech Republic were invaded by destructive insect, the Czech authorities decided to have recourse to massive felling whereas in Germany they decided to rely on the forest natural defence without proceeding to felling. As a result, the loss happened to be much more important and costly in the Czech exploitation than in the German one.<sup>52</sup>

It is of a crucial importance not to omit the socio-economic significance of a natural sites, in Bialowieska, timber extraction represents 6 million euros per year and alternative like tourism might not be enough to sustain this economically remote area. Therefore, to prove its viability, Rewilding must generate diversified benefits and opportunities for local economies. In the sector of conservation, the national park with 110 employees is one the largest employers in the regions. The Natura2000 designation gave a strong conservation status that can influence local management and land-use and attract other European funding like the Life programme. Yet Natura2000 network still struggle to be fully accepted in Poland where it is often perceived negatively as barriers and limitation to economic development. The various socio-economic benefit of the natural site still needs to be better informed. The multiple ecosystem services provided by the forest like climate regulation, water purification, air quality regulation, natural barrier against natural hazard, seed dispersal, maintenance of species diversity, need to be underlined because they are invisible on the market, they do not produce direct and tangible income and are hardly quantifiable. However, biodiversity's values are vital for human existence, biodiversity loss can be the cause of pollution in water, landslides, vulnerability of settlement to natural hazards killing people. It also can affect human health, some suggested that pandemics are due to natural habitat disappearance, which lead to the direct contact in human settlement with potentially pathogenic species deprived of their natural environment. Besides, pharmaceutical products are in large extent derived from biodiversity. Many studies have shown, furthermore, the negative impact of the absence of green space over mental health.<sup>53</sup> Biodiversity provide a wide range of services we fully rely on non-exhaustively listed before. Economists also begin to consider the *existent* or *intrinsic value* of biodiversity, without even direct experience with wilderness, one can have the sense that it should be preserved. Biodiversity has again a recreational value proven by the ever-increasing share of ecotourism in economies benefiting from extraordinary natural capital goods.

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<sup>52</sup> COCHET [2020]

<sup>53</sup> DASGUPTA [2021]

In Poland's Bialowieza forest, The ONG Rewilding Europe in association with Life programme and Natura2000, has set up the reintroduction of bison, attracting European funding and thus maximising the socio-economic benefits of the sites. The promotion of existence values species such as the bison encourage partnership with landowners and communities and increase the number of investment and visitors.<sup>54</sup> Thanks to this effort, the Bialowieza forest now hosts the world's largest population of wild bison. Aside from the ecological benefits of saving endangered species, Rewilding Europe commits itself to invest in business development to link bison conservation and local economy benefits together.<sup>55</sup>

In Romania, the Oas-Gutâi plateau in the Northwest Carpathian host rare habitats and species and notably large carnivores and herbivores. This Natura2000 site gathered 66% of globally threatened plant species on the IUCN red list. It is also a site where people live and find income from natural resources. The EU accession of Romania has contributed to make traditional extensive farming unviable and economic development pushed landowners to intensify agriculture practice with harmful consequences for the environment. It is precisely the centuries old farming practises together with wooden craftwork that give the cultural value of the plateau recognised as a UNESCO heritage site. The low intensity farming practises allows a coexistence with rich biodiversity. The management of the high natural value site is mostly financed by national agro-environmental measures, but these payments are not enough to sustainably support the wide range of ecosystem services provided by the plateau<sup>56</sup>.

The EU agricultural policy has created changes in landscapes since low-intensity farming is undermined by international competition or industrial producers and farmers.

Therefore, according to the EEIP report, it appears necessary to provide more payment to support sustainable forest management, to develop local markets, subsidize extensive grazing and farming to avoid farmland abandonment and preserve or restore the cultural value of the site. Rewilding the grazing land could be another potential solution to farmland abandonment together with the cultural value of the site which contribute to the attractiveness of the region.

## B. Rewilding and the European Union biodiversity strategies

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<sup>54</sup> KAZAKOVA [2009]

<sup>55</sup> VAN DE VLASAKKER, Rewilding Europe, *Rewilding Europe Bison Rewilding Plan 2014-2024*, *Rewilding Europe's contribution to the comeback of the European bison*, 2014

<sup>56</sup> Ibid.



## 1. Current state of EU environment legislation

The European Union is considered as the major international actor in environmental policy. In 1972 the Paris declaration was the starting point of seven action programmes for the environment. The beginning of the involvement of the EU in the environment in 1972 corresponds to the UN conference in Stockholm of the same year. However, the EU commitment to the environment was firstly mostly motivated by economic concerns. The EU action on the environment was purely linked to the common market and fair competition. The EU tried to harmonise the different national environmental regulations to avoid distortion of competition. During the first decades of EU environment policy the normative and binding aspect was therefore minimal.

The first legal basis of EU environmental policy in the European treaties came only in 1986 with the Single European Act (Title VII “Environment”). The notion of environmental European policy was integrated in the Maastricht treaty in 1992. Qualified majority voting is henceforth used in an extended number of cases involving environmental issues facilitating decision-making at the European level. In 1993 the European Environment Agency was set up with a mission of public information and the post of European Commissioner for environment and its directorate generals was created. In 1997 Amsterdam treaty place for the first-time sustainable development as one of the objectives of the European Union.<sup>57</sup> 1992 is a milestone in the European environment policy with the *directive on the conservation of Natural and of Wild Fauna and Flora* whose together with the *Birds Directive* (2009) guarantee the conservation of over 2000 species and habitats. To support the implementation of the directive, LIFE (L’Instrument Financier pour l’Environment) funding program is set up, providing funding for environmental matters and to enhance research. For the period 2014-2020 LIFE programme had a budget of 3.4 billion euros injected in more than 3000 projects.<sup>58</sup> Following the directive is also created Natura2000, the network of protected areas all over Europe, giving a more collective and coordinated approach to environmental conservation beyond the frontiers. Species and habitat are protected in the long term through a coordinated network covering 20% of terrestrial land and 10% of marine waters<sup>59</sup>. As the following maps show, the spatial diversity of habitats and species covered by the directives is relatively homogeneous across the EU

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<sup>57</sup> JORDAN, Andrew, *Environmental Policy in the European Union* (Oxon: Routledge, 2013).

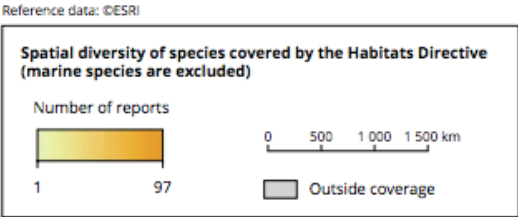
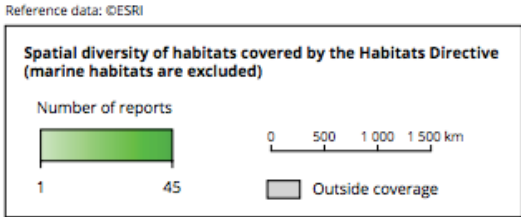
<sup>58</sup> Ibid.

<sup>59</sup> EEA Green Infrastructure Building a coherent trans-European nature network July 2020

territory and their implementation is therefore of a common concern. The habitat and species diversity reported under the nature directive appears nonetheless to be less important in the west of France and South England and habitats reported are overall more located in central Europe. These maps do not give information about the repartition of natural assets across the continent as it only gives a quantitative overview of species and habitat whose protection is undertaken under the nature directives.

**Map 3.2** Spatial diversity of habitats covered by the Habitats Directive (marine habitats are excluded)

**Map 3.3** Spatial diversity of species covered by the Habitats Directive (marine species are excluded)



**Source:** Prepared by ETC/BD based on the number of reported habitats/species per 10 km × 10 km grid cell; EEA; country boundaries. © OpenStreetMap based on Article 17 Member States' reports and assessments.

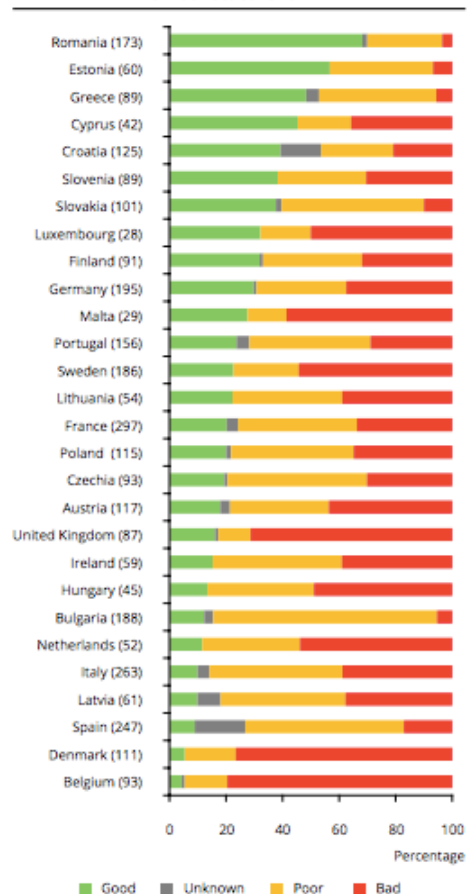
The EU member states have to give a report every 6 years on trends in the listed habitat and species living in their national territory. Yet the habitats directive list targeted species representing about only 5% of the European species referenced in the Red list of the International Union for the Conservation of Nature. As we said before, there is not an equal distribution of habitat and species over Europe. For example, the three peninsulas (Spain, Italy, Balkans) have a great richness of endemism and biodiversity compared to central regions in

Europe. To quantify the state of natural habitat and species over Europe, the European Environment agency has set up two useful instruments, the Conservation status of habitat and of species, ranging Europe and countries' natural conservation state in three categories good, poor, or bad. The mountainous areas and the Mediterranean regions and the Baltic countries tend to have the greatest diversity of habitat, low diversity being often correlated with intensive land use. Roughly, the diversity of species covered by the directives is generally more important in central southern Europe than in the north Atlantic. Overall, the conservation status of habitats under EU habitats directive at Europe level is declining and far from meeting 2030 targets with only 15% of habitats having a good conservation status and 81% having a poor or bad conservation status. At the Member states' level, the result varies greatly, south and eastern countries like Romania, Cyprus, Estonia and Greece report the best conservation status, while all the other member states report a good conservation status for less than 40% of their natural sites. The lowest shares of habitat good conservation status are located in western north Europe, in Belgium, Denmark and the UK reporting 70% of their habitat having a bad conservation status.

The conservation status of species at EU level is for the major part unfavourable too with more than 60% bad or poor for only 27% good. The relative similarity in numbers is not a surprise knowing that the destruction of habitat is the first reason for biodiversity loss. Here again the level of conservation is very different from one country to another. Maybe more surprisingly the worst conservation status is not terrestrial but marine, in the Mediterranean and in the Baltic Sea as a result of overfishing.

In the case of terrestrial land, agricultural practise is affecting the most biodiversity and habitat degradation. 40% of the total land area of the EU-28

**Figure 3.8 Conservation status of habitats at Member State level**



**Note:** Statistics are based on the number of habitat assessments at Member States' biogeographical/marine level. The number of assessments per Member State is indicated in parentheses. The total number of assessments is 3 246.

**Source:** Article 17 Member States' reports and assessments.

are dedicated to agriculture. The mechanisation and intensification of agriculture since 1950' contribute dramatically to the pressure on natural habitats and biodiversity loss.<sup>60</sup>

The agricultural pressure on the environment is multiple. Firstly, the abandonment of grassland management results in vegetation encroachment which lead to the impoverishment of lands, badly affecting pollination and bird population for instance. The use of chemicals to protect cultivated plants is undoubtedly harmful for the whole ecosystem. The negative effects of pesticide are notably well known over various species of mammals, amphibians, insects, and insect-eating birds. Other negative impacts of agriculture can be intensive grazing by livestock, pollution of groundwater, conversion of natural land into agricultural land or drainage for agriculture.

The EU Biodiversity strategy 2030 pledges to increase the percentage of protected areas all over Europe. Biodiversity loss and habitat degradation keeps on going as show the conservation status which continues to decline in Europe. The EU biodiversity strategy to 2030 has for main ambition to change these trends by reinforcing the connectivity among the natural areas. It plans to “build a truly coherent Trans-European Nature Network”. The Commission put the stress on the notion of ecosystem services and ‘green infrastructure’. The green infrastructure strategy is roughly a network of natural and semi-natural areas overlapping Natura 2000 better connecting the sites together and enhancing ecosystem services, that is to say all the benefits that nature can provide to people. The main priorities of the green infrastructure are to protect and restore natural habitat and ensure the better provision of ecosystem services. In order to do so the GI will create new connecting landscapes that will be designated as protected areas with targeted conservation measures.

In Brief by 2030, The EU pledges to commit itself to Nature protection by legally protecting at least 30% of land area and 30% of sea area in order to build the Trans European Nature Network. In addition, the EU wants to place at least a third of all the Europeans natural sites under strict protection measures. On these areas any extraction of resources would be forbidden.<sup>61</sup> However according to a report of the European Environment Agency published in 2020 on the State of Nature in the Europe, The 2000 biodiversity failed to meet its targets as biodiversity keeps on declining due to the pressure of urban sprawl, pollution and unsustainable

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<sup>60</sup> EEA Report, *State of nature in the EU, Results from reporting under the nature directives 2013-2018*

<sup>61</sup> EU Commission communication on 2030 biodiversity strategy, 2020

farming and forestry. The limited and badly targeted funding and the lack of human resources has been the main issues to conduct effective conservation measures. The report address the insufficiency of the Natura 2000 network with further deteriorating of the species and habitats protected under the Nature directives, 32% for habitats, 31% for non-bird species and 23% for bird species.<sup>62</sup>

## *2. Harmonisation of national and European environmental legislation*

The EU environmental laws must be implemented by the Member states, in countries where the nature and the state of biodiversity can vary greatly. It is the role of the European Commission to check if Member States fully comply with the Birds and Habitats directives. The first step in the Commission control is the “compliance promotion”, that is to say informal discussion and support for the application of EU rules. If a Nation state fails to implement the EU laws, the Commission can have recourse to legal action with a letter of formal notice which can lead to a referral to the European Court of justice. In the case a member states would not abide to court ruling, fines can be ensued after a second referral to Court.<sup>63</sup> The good application of the EU laws permit the improvement of one common and strong conservation status, Natura 2000, which can be use as reference for national environmental actions at all levels, local, regional, and national. The benefits of the Natura 2000 network are estimated by the Commission at 1,2 billion € per site, per year. The EU law enforcement must help to reduce all projects of national governments that can have a negative impact on the protected areas. A Commission assessment of projects potentially harmful for the environment together with compensatory measures can be used to counterbalance the negative impact of a given project. The EU laws also impose to nation-states a more compelling and constraining hunting and species protection measures at national level. This translates into the enforcement of bans of hunting during breeding seasons or bans of unsustainable and damaging fishing and hunting practises like for example the ban on electric fishing damaging marine wildlife in 2021. Infringement procedures give a clear view or what action is allowed or not in protected areas helping to harmonize environmental standards across the EU. The eventually of being fined give nation states incentive to take earlier action to ensure better application of the environmental laws. This effort helps improving national environmental legislation and

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<sup>62</sup> EEA report State of nature in the EU. Results from reporting under the nature directives 2013-2018

<sup>63</sup> European Commission Publication *Enforcing EU Environmental law benefits and achievement* 2016

implementation mechanism. EU infringement action can lead National administration to undertake structural changes to better implement EU nature laws. In 1998 The building of a dam in Portugal was thought to have a negative impact on the population of Iberian Lynx. The infringement measure taken by the Commission impose the Portuguese authorities to take compensatory measure in order to offset the possible negative impact of the dam on the Natura2000 site. A conservation programme was launched to reintroduce the Lynx and ensure a stable population. Thanks to that programme the first Lynx born in the wild was observed in Portugal in 2015.<sup>64</sup> The Harmonisation provided by EU environmental legislation and enforcement goes even beyond the frontier of the 27 member states and influence neighbouring countries.

In the six eastern partnerships, the Bern Convention set up the Emerald network, the most important European network of protected areas after the EU's Natura 2000 <sup>65</sup>. As for Natura 2000 sites the emerald qualification is based on the presence of species and habitat types targeted to ensure their survival and protection. 561 Emerald sites covering 12.3% of the eastern Partnership countries' territories have been created with the support of the EU and the Council of Europe, the main goal being to harmonise the various existing types of protected area designation and set one clear legal level of protection for all the regions. Indeed, the Natura 2000 sites are still greatly impeded by fragmentation. It is most often lacking one of the main characteristics of wilderness: large areas. According to the EEA, 80% of the Natura 2000 sites are partially connected by unprotected natural or semi-natural areas. Green infrastructure ambition is to fully link these regions by overlapping the Natura 2000 network and including unprotected landscape as 'connectors' requiring little management intervention. However, the presence of highways crossing over 15% of the disconnecting natural sites and impeding the species movement, makes it impossible to fully carry out the green infrastructure network.<sup>66</sup> 20% of the Natura2000 sites are not connected at all, fragmented by fields and urban settlement. The dense road network notably in east of France and in the Benelux is the main cause of breaks in the GI network cutting Europe's natural landscapes in two.

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<sup>64</sup> *ibid.*

<sup>65</sup> EEA *Briefing Protected areas in the Eastern Partnership countries, 26 August 2020*

<sup>66</sup> EEA Green Infrastructure Building a coherent trans-European nature network July 2020

### *3. The outstanding richness of preserved protected natural area where nature is allowed to be itself*

The Alps national parks in Switzerland, France, Germany, Slovenia and Italy, the Abruzzo National Park in Italy, the Swiss national parks, the 25 national parks in Norway, give an idea of the abundance of natural environments free from human management. National parks show that when optimum density of species is reached it is auto regulated, without any need of human intervention. One of the fears of releasing lands from agricultural practises for instance in grasslands was that it leads to the land impoverishment with the loss of open clearing and related species like butterflies or flowers. On the contrary one can observe in the Swiss National Park that even though pastoralism was abandoned in 1914, the open grasslands still exist thanks to the presence of around 2000 deer grazing on the mountainside.

In the case of forest, the national park of Bialowieska shows the incomparable richness of undisturbed forest in terms of biomass, with centuries old oak trees and the important role that deadwood plays for biodiversity. Standing deadwood protects the forest against the wind and their slow decomposition allows the development of biodiversity notably fungi in symbiotic relation with plants making them more resistant to disease and micro-biotic stress. A good example is the case that we mention before: to limit the destruction of pines by pests, the National parks of the Bavarian Forest in Germany decided not to intervene and use the deadwood as a protection to the forest.

In the Canton of Genève in Switzerland, hunting has been forbidden since 1974, corresponding to 28 248 hectares where there are natural areas but also settlements and agricultural areas. This unique case where fauna densities now reach unprecedented levels proved the very positive effect of the release of hunting pressure over biodiversity with few collateral damages. As proof of the good acceptance of wildlife in a highly urbanised region, in 2009 the Grand Council of Geneva voted against an amendment to partially allow hunting by 70 votes against 6.<sup>67</sup>

Once again, Europe is very heterogeneous in the repartition of strict protection measures over its natural landscapes and resources. For example, in Italy the 25 existing national parks cover 1 604 600 hectares, which is 5% of the national territory. These figures have to be

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<sup>67</sup> COCHET [2018]

compared with the French case, where the 7 existing national parks only cover 407 000 hectares that is 0,74% of the French territory.<sup>68</sup>

In Norway, the national parks where “harmony of the nature comes first”<sup>69</sup> whom 15 has been created in the 2000’, are scattered all over the country allowing ungulates and *Cervidae* like the muskox, the elk and the stag, hitherto mostly located in the uninhabited north, to spread in all the national territory.

## C. The remaining challenges and potential solutions

### 1. *Connection of the areas of great environmental value across Europe,*

An ambitious attempt to reach trans-European natural network is the European C2C project (in response to the North American Y2Y) that would connect European landscapes over 4000 Km from west Cantabrian Mountains in Spain to east Carpathians and Caucasus relying mostly on National parks network well developed in mountainous regions. This project could permit to re-establishes migration routes of wild animals at the continent scale. When the fragmentation due to high-level roads is too important, reconnecting natural landscapes can also rely on innovative techniques. In 2007 a joint Austrian-Slovakian action plan was launched to restore natural corridors connecting the Alps mountains with the Carpathians. The presence of dense highways and other roads infrastructures and settlements between the two mountain ranges blocks traditional route for wildlife. The ecological connectivity of the two regions relies on a system of “green bridges” going across the various motorways and thus facilitating the passage of wildlife. This programme is mainly funded by the EU through the European Regional Development Fund.

The EU projects to reinforce the Natura2000 network by integrating it in a larger network called Trans-European network for green infrastructure, including unprotected natural and semi-natural landscapes. It connects the various protected areas under Natura2000. Infrastructure such as highways currently disconnect around 15% of the Natura2000 sites negatively impacting the provision of ecosystem services.

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<sup>68</sup> *Ibid.*

<sup>69</sup> <https://www.visitnorway.com/things-to-do/nature-attractions/national-parks/>



A better-connected wild area should provide more ecosystem services. According to EEA the green infrastructure network improves the provision of ecosystem services by 10% compared with areas not included in the network, unprotected, and disconnected.

The European Union biodiversity strategy to 2030 seeks to develop a Trans-European Nature Network with priorities to ensure good conservation status of species and habitat and deliver multiple ecosystem services. The EU pledges to protect 30% of its territory restoring habitat conditions and create new protected areas within the green infrastructure network. Green infrastructure network includes natural but also man-made green areas like parks, forests or hedgerows.

The EU action encompasses several steps: Mapping the green infrastructure (GI) to identify key ecological corridors to prioritize and potential new protected areas. Deploying GI in rural landscape and also in urban areas to mitigate the impact of Urban sprawling and agriculture intensification on species movement. It would also result in the potential allocation of land which can lead to trade-offs that need to be resolved<sup>70</sup>.

Each territory has to offer the best condition for settlement of species to ensure optimal diversity at each level. The introduction can be spontaneous like in the case of the wolf but can also result from reintroduction programmes. The reintroduction of large mammals, essential actors in the evolution of habitats, must be favoured and the population must be big enough to ensure dispersion. Yet such reintroduction, to be viable, must be completed with the free circulation of species on the whole European territory thanks to the restoration of natural corridors. On example are rivers and other watercourses and the plan to remove obsolete dams at the scale of the continent. The Water Framework directive and the biodiversity strategy for 2030 recognize the importance of river continuity allowing the free movement of water, sediment, fish and other organisms. The EU environmental policy aims to restore at least 25 000 km of free-flowing rivers by 2030. In order to do so the EU pledged to remove barriers like dams and restore floodplains and wetlands.<sup>71</sup> According to the EEA, there are very few free-flowing rivers in the European river network with over 1 million barriers, often small dams whose thousands of them are obsolete. These obstacles to free-flowing water are considered to be one of the main reasons why rivers fail to reach good ecological status. The EU objectives in the management of rivers should also concern removal of dikes and thus allow the recovery

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<sup>70</sup> *Ibid.*

<sup>71</sup> EEA Briefing no. 30/2020 Title: Tracking barriers and their impacts on European river ecosystems

of forest along the riverbanks. In all the plains in Europe rivers were in fact in close relation with forest for the benefit of biodiversity.

The EU Commission on 2030 biodiversity strategy insists on the necessity to set up ecological corridors to ensure species dispersal but also to avoid genetic isolation.

## *2. Maintaining open in the place of marginal agriculture area*

One critic of the Rewilding project is that it can cause the loss of traditional agricultural landscape. Are we ready to accept the free evolution of landscapes we have been used to managing for centuries? Abandoned farmlands are related to extensive farming practises and grasslands for livestock whose natural value is often acknowledged. According to H.M. Pereira “the fear has been that, without the maintenance of those systems, much biodiversity and ecosystem services will be lost. Therefore, measures such as agro-environmental subsidies and support to least favour areas have been implemented under the Common Agricultural Policy”<sup>72</sup>

These extensive farming systems are obviously richer in biodiversity than intensive farming systems. Furthermore, clearings maintained by farming practises often have locally higher species diversity than non-managed areas and forest. Indeed, a great number of species, of plants, birds and insects, relies on the existence of opening and are likely to decline in an environment encroached by vegetation. This is used as an argument to keep on the active management of extensive farmland. Therefore, The EU supports these traditional farming systems even though they are most affected by rural depopulation agricultural practises because they are thought to be more respectful to the environment and for their cultural value.

Nevertheless, this observation does not hold if we change of the scale, on a regional scale, where it appears to be clear that the return of forest is beneficial for overall biodiversity and increases the conservation status of habitats. The relative positive effect of extensive farming over the environment is only valid at a local scale and compared to a state of nature which is not optimal, that is without large mammals. The expansion of human activities has caused the disappearance of several species including the auroch, the tarpan and the bison. Besides, At the scale of the region, re-vegetation, if regulated by the presence of large

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<sup>72</sup> PEREIRA [2015]

mammals, and the connection of natural areas can lead to higher species diversity and better protection of habitats. Furthermore, deforestation conducted by agricultural practises is thought to be the cause of soil erosion. This issue is particularly important in mountainous regions where slitting rivers and flooding downstream cause huge damage every year. It notably led to afforestation programmes subsidized by states in Portugal (National Forest strategy) and Spain (Spanish forest plan 2002-2032). Rural exodus is an opportunity to bring back large mammals to ensure the development of a self-sustaining environment, providing ecosystem services and enhancing natural processes. 23 studies observed positive trends in species and habitat conservation with the decrease of human pressure following land abandonment, 60 species of birds, 24 species of mammals and 26 species of invertebrate would benefit from farmland abandonment<sup>73</sup>. Rewilding passive management approach would assist natural regeneration of forests in connexion with other habitats. In any case change of land use seems inevitable, in the past few decades (between 1990 and 2010) and despite European subsidies, livestock numbers in many of these marginal agriculture areas have declined by 25% whereas it is precisely the action of domestic grazers which maintained the clearings.

The passive management associated with rewilding can provide regulating and cultural service for a much lower cost than other management options and with a minimal level of investment.

The outcome of rewilding will undoubtedly not be the same according to the region's situation in rural depopulation and their potential in natural forest regrowth.

### *3. Conflict people/wildlife*

The level of tolerance of inhabitants to the wild fauna is directly linked to the time of their coexistence. The cohabitation appears to be easier in the Carpathians where the wolf and the bears never went extinct and with which farmers learned to live with, than in the Pyrenees where the return of the bear triggered high tension between farmers and the French authority. To create a new economy based on Rewilding appears difficult in Europe where the exploitation of the territory resources has been the driving force of its development. Dramatic illustration of it can be the Bear attacking livestock in the Pyrenees or the Bison destroying fields in Romania. There are nevertheless possible technical solutions like electric fences to protect crops and

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<sup>73</sup> NAVARRO [2015]

prevent damage from wild grazers. Large herbivores like deer, wild boars or bison can in fact damage crops, pastures, or forest. To avoid carnivores' damage, ancestral livestock protection techniques that proved over the time their efficiency can also be reused like the recourse of the Pyrenean Mountain dog to protect sheep from bears. The issue related to wild carnivores is also linked to scarcity of the megafauna: the return of wild ungulates in abundance may prevent the carnivores from attacking the domestic animals. Several countries have set up compensation for all damage caused by wildlife, with an average of 2 million € per year for bear and wolf damage in France, Italy or Spain and 2,5 million in preventive measures. This said, according to WWF bear attacks only represent less than 1% of livestock mortality over the French Pyrenees and predation over sheep is much more often due to dogs than wolves<sup>74</sup>. The fear of attack on people can triggered tension but better information to public should helped resolve it, "there is a correlation between the fear of an animal and a lack of knowledge of its behaviour"<sup>75</sup> The lack of tolerance in rural communities toward large carnivores is still widespread in Europe and illegal killings can threatened the existence of species whom population is small and therefore vulnerable. Another difficulty that reintroduction could bring is to create a disturbance in the ecosystems with species becoming invasive. The solution to that problem should be to release species as close as their wild ancestors to replace their ecological function.

Conflict with wildlife goes beyond the local scale and is now heard at the EU level. In 2014, the EU platform on coexistence between People and large Carnivores was launched to set a dialogue between stakeholders including hunters, foresters, livestock producers, landowners, rural people in order to reduce the level of conflict and promote their resolution. The first report of the Platforms notes several institutional issues that threatened large carnivores including poor public involvement and transparency, low degree of coordination between countries and the absence of population's monitoring systems. According to the author of the report, the Norwegian ecologist John Linnell, the resolution of conflicts surroundings large carnivores must start with a good understanding of the specifics conflicts to design the appropriate actions from prevention to mitigation and resolution.<sup>76</sup> The conflicts can be caused by depredation on domestic livestock which beyond the mere economic loss can be perceived as a social indifference to the farmer's job, but also destruction of property, competition with hunters over game, vehicle collision, land use restriction, fear of injury... The combination of

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<sup>74</sup> <https://www.wwf.fr/champs-d'action/vie-sauvage/conflits-homme-animal>

<sup>75</sup> PERAZION [2018]

<sup>76</sup> Linnell, John *From conflict to coexistence? Insights from multidisciplinary research into the relationships between people, large carnivores and institutions*. February 2013

preventive measures with compensation payment should reduce the level of conflict and enhance cohabitation with wildlife. The EU platform is confronted with the controversy about rewilding in Europe where each acre of land belongs to someone. These European territories have often a high social and cultural significance for the population living there and where hunting, pasturage, forestry has been practised for many generations. Rewilding challenges landscapes and practises that have shaped Europe for centuries and questions our will to accept the free evolution of some ecosystems. Are we ready to coexist with wildlife at the continent scale? Rewilding is still a recent approach that must find solutions and better understanding from its various empiric experiences all across the continent.

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# Conclusion

In October 2021 The countries parties of the UN Convention on Biological Diversity will meet in Kunming, China, to define the “post-2020 global biodiversity framework.” In fact, the world biodiversity has never been in such a critical state before. According to the IUCN “Despite an increase in policies and actions to support biodiversity, indicators show that the drivers of biodiversity loss have worsened and biodiversity further declined between 2011 and 2020. At the global level none of the 20 Aichi Biodiversity Targets agreed by Parties to the CBD in 2010 have been fully achieved.”<sup>77</sup> Nevertheless, in Europe, several decisions at national and federal level have been taken to reverse the situation, and progress has been made to limit habitat degradation and species extinction. The two Europe “Nature” directives are probably the most important setting a list of endangered species and habitat and legally binding the Nation states to ensure their protection. Rewilding appears as an innovative and effective conservation approach which can be applied in many cases within the European legislative framework to safeguard natural landscapes and wildlife. Rewilding is compatible with strict level protection for areas which are or can become a haven for biodiversity. This passive management of natural areas can therefore only go with effective political action to protect more areas under strict conservation status. The originality of such conservation approach is that it can also apply to areas which were not initially thought for nature conservation. The European Union already provides financial support to rewilding projects through the Life programme and the European Regional development fund<sup>78</sup>. Rewilding questions the land use

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<sup>77</sup> <https://www.iucn.org/resources/issues-briefs/post-2020-global-biodiversity-framework>

<sup>78</sup> see European Union-funded Interreg Europe “Wildlife Economy” project  
<https://rewildingeurope.com/news/policy-push-for-europes-wildlife-economy/>

and governance with the opportunity of an important change. It would lead to the substitution of unviable marginal farming lands with areas dedicated to wildlife. Rewilding also questions our relationship with nature and the cohabitation with wildlife. In addition to a mere strict conservation approach, rewilding aims at recreating optimal nature where it no longer exists. More than to protect and restore the existing natural capital, the rewilding approaches can help creating new rich and undisturbed natural areas based on biologist expertise. The rewilding approach consist in restoring natural processes in order to ensure ecosystems to manage and sustain themselves without any human intervention. Thus, former farming lands like the mountain sides of the Alps can become new nature sanctuaries. The reintroduction of key-species increase ecosystem functionality. Rewilding can be a solution to address farmland abandonment and develop a new rural economy beneficial for both society and environment. Apart from farmland abandonment, land availability for rewilding projects can also result from former timber production, decommissioned military areas or salt ponds. In some situations, active management might be preferred to rewilding, when for instance it is required to protect an endangered species. The potentiality of the rewilding approach must therefore be discussed in each case at local level to find out where this management option is the most achievable and sustainable. rewilding may not be applicable in every situation but it gives a serious and cost-effective land use alternative that must be fully taken into consideration by the European environmental policies. Rewilding land can furthermore be combined with other less strict conservation measures allowing in some areas a regulated extraction of resources. One ambition of conservationists would be to face the urgency of biodiversity loss by reversing the protection status of territories, making nature protection the rule and resource exploitation the exception. Instead of having exceptional delimited areas like national parks dedicated for wildlife, a strict protection of natural resources would be followed everywhere while some patches of land would be dedicated to natural resource's extraction to cover human needs.

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