

# Boundary Work in Ecological Restoration

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*Two protracted debates about the moral status of animals in ecological restoration projects are discussed that both testify to the troubling aspects of our inclination to think in terms of dualisms and dichotomies. These cases are more or less complementary: the first one is about the (re)introduction of species that were once pushed out of their native environment; the other one concerns the elimination or eradication of “exotic” and “alien” species that have invaded and degraded ecosystems. Both cases show the detrimental impact of dualistic thinking on ecological restoration projects. In the first case, communication and cooperation between stakeholders is frustrated by the opposition of zoocentrism and ecocentrism; in the second case the opposition of nativism and cosmopolitanism appears to be a major stumbling block for consensus building and conflict management. I will argue that “gradualization”—thinking in terms of degrees instead of boundaries—can offer a way out of this black-and-white thinking and can open up space for negotiation and deliberation among different and sometimes diverging perspectives.*

## **Introduction**

Climate change, air pollution, deforestation, loss of biodiversity, stratospheric ozone depletion, land and freshwater degradation—all these environmental problems have effects that transcend national boundaries; they cannot be solved by the unilateral decisions of individual states but require international cooperation. Moreover, these problems are interconnected and cannot be solved in isolation but require an integrated approach. However, such an approach is frustrated by the existing multiplicity of communities with diverse and sometimes diverging ethical visions and moral vocabularies. Hence, there is a strong tension between the diversity of actors that have a stake in sustainable development and the need for close cooperation between these various stakeholders.

If we want to deal with this tension between sustainability and diversity, we need to invest in “boundary work,” that is, in constructive efforts to facilitate and further communication, conflict management, and consensus building

across the fences that separate communities and their different social worlds (Keulartz 2005).

One major obstacle to successful boundary work is dualistic thinking. We are constantly confronted with a whole host of dualisms such as theory and practice, fact and value, body and mind, nature and culture, instrumental and intrinsic value. Dualistic thinking is deeply rooted in Western philosophy, judging by the importance of the principle of the excluded middle that was already formulated by Aristotle. This principle asserts that every judgment is either true or false (not true), there is no third possibility: *tertium non datur!* This “law of the excluded third” has a paralyzing effect on many scientific and societal debates. It encourages black-and-white thinking, which brings controversies to a head and leads debate to reach a total deadlock.

An obvious example of a dualism that frustrates productive debate over issues of natural resources management is the nature/culture dichotomy. Most people, including the majority of ecologists and environmentalists, tend to draw a hard line between nature and culture. As a result, people more than once exhaust themselves in unproductive boundary disputes. Such an impasse can be broken by what I would like to call “gradualization,” i.e. thinking in terms of degrees instead of boundaries. We should replace the notion of a clear-cut borderline between nature and culture with the idea of a broad continuum, a hybrid middle ground, in which it is no longer a question of “either-or” but of “less or more.”

This idea of a continuum, scale, or spectrum is, in fact, far from new. Roderick Nash for example put it forward already in his 1973 book, *Wilderness and the American Mind*. In the introduction to this book, Nash struggles with the problem of how to define wilderness. As a possible solution to this problem he mentions

the conception of a spectrum of conditions or environments ranging from the purely wild on the one end to the purely civilised on the other—from the primeval to the paved. This idea of a scale between two poles is useful because it implies the notion of shading or blending. Wilderness and civilization become antipodal influences which combine in varying proportions to determine the character of an area. In the middle portions of the spectrum is the rural or pastoral environment (the ploughed) that represents a balance of the forces of nature and man. As one moves toward the wilderness pole from this midpoint, the human influence appears less frequently. In this part of the scale civilization exists as an outpost in the wilderness, as on a frontier. On the other side of the rural range, the degree to which man affects nature increases. Finally, close to the pole of civilization, the natural setting that the wild and rural conditions share gives way to the purely synthetic condition that exists in a metropolis. (Nash 1973, 6)

In this paper, I will present two protracted debates over the moral status of animals in ecological restoration projects. Both debates testify to the troubling and counterproductive aspects of our inclination to think in terms of dualisms

and dichotomies. These cases are more or less complementary: the first one is about the (re)introduction of indigenous species that were once pushed out of their native environment; the other one is about the elimination or eradication of exotic and alien species that have invaded and degraded ecosystems.

### **Case 1: Born to be Wild**

The first case concerns a recent Dutch policy of introducing domesticated and semi-wild large herbivores in newly developed nature areas. I will first sketch the policy context, i.e., the emergence of a new paradigm in Dutch nature conservation and management. Next, I will zoom in on the Oostvaardersplassen, an area where the new paradigm was implemented with great enthusiasm. Then I will outline the still ongoing controversy over the moral status of the introduced large herbivores. Finally, I will sketch a way out of this controversy.

#### *The emergence of a new paradigm in nature conservation*

In 1990 Dutch parliament adopted an ambitious Nature Policy Plan. This plan was epoch-making in more than one respect—first and foremost because it marked the switch from a defensive to an offensive strategy. Rather than clinging to the protection and conservation of existing nature reserves, the overriding purpose was to create and develop “new nature.” The “nature developers” (as they were to be called later) dismissed the “old nature” of the traditional conservationists as no more than a weak cultural extract (i.e. the cultural-historical landscape of around 1850). Real nature, according to them, had to be primeval nature.

The nature developers offered the so-called *ecological reference* as their benchmark: a scientific reconstruction of what living nature under given physical conditions would have looked like in the absence of human influences. As nature developers claimed: “The ecological reference is an objective model which leaves any subjective judgement of nature out of account. Considerations of cultural history do not enter; nature is not a matter of taste,” (Veen and Lardinois 1991, 79).

In order to give nature development a chance, the Nature Policy Plan claimed a considerable amount of space in the form of the *National Ecological Network*. This network is composed of core areas, nature development areas, and ecological corridors. The entire network is to cover an area of 744,500 ha (compared to 3,500,000 ha of the entire Dutch territory).

This new nature policy is supported by a detailed scientific classification of all areas in the Netherlands with a natural potential into no less than 132 different *nature target types*. This systematic approach makes it possible, in the words of a former Minister of Agriculture, Nature Management and Fisheries, “to determine in main outline how much of what kind of nature we want to conserve, restore and develop in the Netherlands.” This elicited the following comment from Henk van den Belt (2004): “A country that can have the nature it wants in exactly the desired quantity must surely be a happy country!”

Two processes play a key role in the new approach to nature development: abiotic dynamics through free play of wind and water on the one hand, and biotic dynamics through releasing certain species of large herbivores on the other. The grazing styles of various animals, i.e., what they eat and how they graze, have a major impact on the development of particular areas. In order to regain a relatively open riparian or delta area, the presence of horses and cattle is indispensable beyond the already present wild ungulates such as the Roe deer, the Red deer, and Wild boar.

*The Oostvaardersplassen: past and present*

The Oostvaardersplassen is an important test case for the new nature policy and management approach. The Oostvaardersplassen is a landscape with a remarkable history. When the last of the polders that had been created in the former Zuyderzee was drained, a marshy landscape began to evolve in the lowest area, earmarked for industry. Before the planned industrial park could be built, planners were faced with something unexpected: nature. The area soon developed into a perfect habitat for plant and bird species associated with a more natural landscape.

The Oostvaardersplassen consists of 5,600 ha of open waters, marshland, (wet and dry) open grasslands, and forb communities with trees and shrubs. In this area, bird species that had become very rare in the Netherlands, such as the Spoonbill, the Great bittern, the Marsh harrier, and the Bearded tit, established themselves as breeding birds in numbers that were high in comparison to other nature reserves. The area also attracted species that had disappeared as breeding species from the Netherlands, such as the Great white egret and—most spectacularly—the White tailed eagle (also known as the Sea eagle).

These birds are reed marshland inhabitants. Among nature conservationists and managers, the question was raised: how were they to be preserved? In the Oostvaardersplassen, the conventional answer—reed cutting—was not an option. The area was too large to cut in the traditional way, by hand. It was also impossible to use large, modern reed mowing machines, because the soil's load bearing capacity was insufficient. These obstacles proved to be an advantage for nature in the reserve. No one entered the marshland to manage it, and so Greylag geese from all over Europe chose the site to moult during May and June. Because they are very vulnerable during this time, they seek out inaccessible areas to retreat to, such as the marshy area of the Oostvaardersplassen. Up to 60,000 Greylag geese retreat to the marshland to moult.

The Greylag geese grazed the marshland vegetation to such an extent that closed reed beds turned into open waters, something which up until then only human management had been assumed to be capable of. The Greylag geese created a mosaic of open waters and marsh vegetation that benefited countless wild animal and plant species. Greylag geese grazing enabled other wild plant and animal species to establish themselves and survive in the area. This would be impossible without the geese grazing. The Greylag goose proved to

be a so-called keystone species in the functioning of the marshy part of the ecosystem.

However, Greylag goose only spends a short period in the marshland. Mostly they graze on dry grassland. Without that grassland, the natural process of grazing the marshland would not take place. The marshland ecosystem then collapses and, after the Greylag geese have gone, a cascade of events would result in many plant and animal species disappearing. That is why grassland had to be created adjacent to the marshland. The question was, how? The traditional answer was seasonal farmland grazing, but this would lead to a continuous battle between farmers and geese. In order to prevent this conflict, a complete ecosystem, consisting of grassland and marshland, would have to be developed.

Concerning the development of grassland, it was argued that if domestic cattle could create grassland, then their wild ancestor, the Aurochs, should also have been able to do so. This also applied to the other indigenous specialized grass-eater the Tarpan, the wild ancestor of the domestic horse. However, the Aurochs and the Tarpan are extinct. Suitable replacements were therefore sought among the descendents of these species. In the end, Heck Cattle and the Konik Horse were chosen. They have undergone very little selective breeding and therefore might still have many of the same natural characteristics that their wild ancestors had. These natural characteristics could then be redeveloped by allowing the animals to live in the wild and become feral. Both breeds were selected in order to develop grassland through the natural process of year-round grazing. Year-round grazing provides a much greater variety of animal and plant species than can be found on short grassland that is characteristic of seasonal farmland grazing.

In 1983 and 1984, 34 Heck cattle and 20 Konik horses were introduced in the Oostvaardersplassen. In 1992, 56 Red deer were added. In the meantime they have reproduced considerably. The area now has 450 Heck cattle, 800 Konik horses and 1700 Red deer. Moreover, 50 Roe deer have settled spontaneously in the Oostvaardersplassen. At this moment, the introduction of Elks, Wisents, and Wild boar is being considered. The Heck population is the largest herd of cattle living in the wild in Europe; the Konik population is one of the largest "unmanaged" feral horse populations in Europe.

*Political controversy: The Oostvaardersplassen a concentration camp?*

One of the greatest challenges to address in the near future will be the population development of the herbivores in relation to availability of vegetation (both qualitatively and quantitatively), in addition to the habitat required for (migratory) birds. Due to the constant increase in grazing intensity, there is always a risk of food shortage. The number of "small grazers" (especially geese) is still very high, while the herds of horses, cattle and deer have grown considerably in recent years. It seems that the capacity of the area has reached its limits: the condition of the animals, and especially of the Heck cattle, declines

in the winter and the early spring, which results in growing numbers of starving animals. The Dutch State Forest Service, which manages the Oostvaardersplassen, does intervene for the sake of animal welfare based on the so-called “predator model.” If an animal’s behavior reveals its death is impending, it is shot. Repeatedly, the number of animals dying of starvation in harsh winters provokes fierce protests stretching from local people to national parliament. Public and political commotion escalated in the winter of 2004/2005. In that period, 14 percent of the Konik horses died, as did 22 percent of the Red deer, and 34 percent of the Heck cattle. The Minister for Agriculture, Nature and Fisheries asked two national councils for advice, namely the Council for the Rural Area, and the Council for Animal Affairs.

The Council for the Rural Area advised the minister to accept periodical reductions in animal welfare as a consequence of ecological management. This kind of management should be optimized by improving the predator model and by expanding the area available for the animals. The Council also advised the minister to improve public communication regarding this kind of ecological management. The Council for Animal Affairs fiercely opposed these conclusions. It was of the opinion that the carrying capacity of the area has been substantially exceeded and that management has failed. The Council’s chairman even compared the situation to that of a concentration camp. According to the Council, this kind of “animal experiment” should be abandoned. The total population should be reduced to 1500 animals by shooting animals in small numbers all year round and selling the meat for consumption. It would possibly be best to remove the cattle and horses and only use deer to graze the area. In addition, anti-conception should be considered.

Given this discord, the minister asked a panel of international experts for advice. In June 2006 the International Committee on the Management of large herbivores in the Oostvaardersplassen (ICMO) published its report “Reconciling Nature and Human Interest.”

### *Zoocentrism versus ecocentrism*

In order to understand the ongoing controversy over introduced large herbivores in the Oostvaardersplassen, we have to recognize that people look at animals from at least two different perspectives. Most animal ethicists and animal protectionists adhere to a zoocentric perspective, in which animals primarily count as individuals. Most nature conservationists and ecologists, on the other hand, adopt an ecocentric perspective, in which animals are considered as part of a complex whole such as a population, ecosystem, or biotope. From a zoocentric point of view, the emphasis is on the welfare, health, and integrity of the individual animal. Ecocentrists, on the other hand, emphasise values such as naturalness, diversity, and freedom, and favour a hands-off policy with respect to animals. While animal-welfare ethicists and activists are preoccupied with domesticated and captive animals such as laboratory animals, production

animals, and pets, ecocentrists are preoccupied with wild animals such as Red deer, Roe deer, and Wild boar.

The problem with the Heck cattle and Konik horses in the Oostvaardersplassen is that they do not seem to fit in with either perspective. The herbivores released are domesticated species derived from hoofed animals that were once wild, such as cattle, horses, sheep, and goats. Konik horses and Heck cattle represent a special subcategory within this group, since they are meant to “function” as semi-wild surrogates for extinct species. Originally from Poland, Konik horses were domesticated relatively superficially and are therefore good replacements for the extinct European wild horse, the Tarpan. Heck cattle are the result of attempts in the 1920s by the German Heck brothers to recreate the extinct Aurochs by back-breeding from diverse European cattle species.

Most Konik horses and Heck cattle come from farms, zoos, or small parks, in other words, from quite domesticated backgrounds. When introduced into relatively “wild” areas, they are subject to a process of what is sometimes called “de-domestication,” that is, they have to learn to fend for themselves. The management policies of de-domestication, which entail minimizing supplementary feeding and veterinary assistance, have been most controversial.

Most controversies revolve around the “domestication status” of the animals: should they be seen as (still) domesticated or as (already) wild? While the majority of animal protectionists, farmers, and visitors view the released horses and cattle as domesticated animals to be cared for as individuals, most park rangers, herd managers, and ecologists prefer to treat them—ethologically and ethically—as wild animals. This division can also be found with regard to the recommendations from the Council for the Rural Area and the Council for Animal Affairs. While one council proposed to accept temporary reduction in animal welfare as a consequence of ecological management, the other council rejected this type of management because it considered the animals not as wild animals but as kept animals.

In short, people consider the animals either as kept and domesticated or as wild—there is no third possibility: *tertium non datur!* Because of this black-and-white thinking, people exhaust themselves in unproductive boundary disputes in which both sides claim an exclusive “moral jurisdiction” over large herbivores.

### *Respect for potential wildness*

Ten years ago, in 1998, my colleagues from Wageningen and I released a report in which we tried to overcome the deadlock in the debate between the advocates and opponents of the Dutch State Forest Service’s policy in the Oostvaardersplassen (Klaver, Keulartz et al. 2002). We were convinced that this impasse could be broken if we replaced the notion of a clear-cut borderline between nature and culture with the idea of a broad continuum, a hybrid middle ground, in which it is no longer a question of “either-or” but of “less or more.” Herbivores introduced in nature areas do not simply cross a distinct dividing

line between culture and nature; they do not walk from domestication into the wild, that is, from a moral domain of individual care to one of concern for the ecological whole. They gradually move from a thoroughly cultural context to one that is increasingly natural.

In order to do justice to the gradual character of de-domestication, my colleagues and I introduced a new ethical notion with regard to the treatment of large herbivores in newly developed nature areas: the principle of “respect for potential wildness.” This principle does justice to de-domestication as a dynamic learning process. “Born to be wild” after a long period of domestication in which they were dependent on humans for their food and well-being, they have to learn to live up to their potential and develop the capacity to fend for themselves. The eco-ethicists’ aim of letting nature take its course must not mean a completely “hands-off” policy in which the newly introduced horses and cattle are delivered to whatever fate “nature” may have in store for them. To judge the introduced herbivores to be fully-fledged components of natural systems, and therefore conclude that there is no moral responsibility for these animals, is to deny the learning aspect. Similarly, animal protectionists who assume—according to the slogan “once domesticated, always domesticated”—that “running wild” can only lead to severe neglect, are denying the learning capacity.

Emphasizing the potential aspect of wildness concedes a capacity for wildness, while at the same time it acknowledges that de-domestication is a dynamic process with an uncertain and unpredictable outcome. In such a process, both animal-welfare ethicists and eco-ethicists will be indispensable. We have launched this new ethical concept with the pragmatic intention of overcoming the deadlock in the debate between the advocates and opponents of the Dutch herbivore introduction program.

In order to arrive at a workable solution, both sides have to develop what Donald Schön and Martin Rein have called “double vision,” namely “the ability to act from a frame while cultivating awareness of alternative frames” (Schön and Rein 1994, 207). They should learn to “squin” so to speak in order to see things from different angles simultaneously. Only then will it be possible to find a balance between caring for the health and welfare of individual animals and respecting their (potential) wildness, freedom, and autonomy—a balance that will shift as the animals learn to fend for themselves.

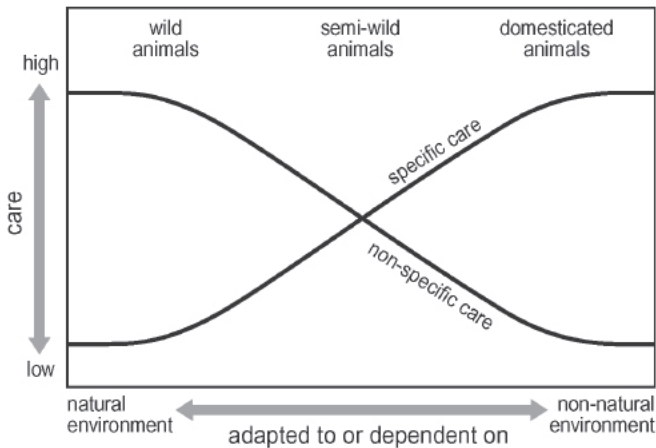
### *A mirror image*

As Christine Reed (2008) has argued recently, the role of Konik horses in Dutch conservation policy is a mirror image of the situation in the U.S. In both countries, policies are geared towards restoring self-sustaining ecosystems, but whereas Dutch conservation policy favors releasing domestic breeds into Dutch nature reserves as ecological surrogates for extinct wild horses, policies for protecting wild horses in the U.S. favor removing them from public rangelands, because they are not considered an indigenous species. In Dutch nature

reserves, animals are in transition from domesticity to wildness, whereas wild horses in the U.S. have to make a transition from wildness to domesticity—they are being removed from public rangelands and kept in holding facilities awaiting adoption.

Here again, we see a struggle between animal-protection groups and environmental groups, although their positions are reversed. Environmental groups emphasize the vulnerability of wildlife habitats and call for the total elimination of feral horses from these habitats, while animal-rights activists emphasize the vulnerability of the individual horses and lobby against their removal.

Reed also argues for what we have called “gradualization” to overcome the fierce opposition between those who favor the integrity of self-sustaining ecosystems versus those who promote the welfare of individual animals. Wild horses are becoming increasingly dependent on transitional or mixed-category environments that are neither wild nor domestic, such as the Dutch nature reserves and the U.S. holding facilities for wild horses. Wildness and domesticity should be considered as endpoints on a continuum, and the obligations of care should vary according to the direction of the transition along this wildness-domesticity continuum.



Caring for wild animals means that we have to make efforts to maintain their living conditions, their habitat. Jacques Swart (2005) calls this type of care “non-specific care” because it is not directed at the individual wild animal and its specific individual needs, as is the case in caring for domestic animals. For the latter he suggests the term “specific care.”

The U.S. policy towards feral horses brings us to our second case: the elimination of exotic and alien species that have invaded and degraded ecosystems. It is a point of severe contention, however, whether feral horses in North America should be considered an invasive or an indigenous species. Currently, most

management agencies suffer from what Donlan and Martin (2003) have called a “post-Columbian bias.” They typically turn to Columbus and the year 1492 for a restoration baseline. If, however, we accept as a benchmark for restoration measures the arrival of people from the Clovis Culture, by at least 13,000 years ago, we should manage horses as native species.

### **Case 2: The Attack of the Aliens**

Although invasive species create complex and costly problems, eliminating them can often prove equally problematic. Eradication programs for invasive species are often highly controversial. This is true for mechanical, and chemical as well as biological methods. Mechanical treatment is very labor-intensive and often must be repeated several times to be effective. Chemical methods that make use of pesticides can be very effective but also counterproductive due to possible contamination of land and water resources and to the unintended but unavoidable killing of native species. Biological control programs involving the release of natural enemies to eliminate invasive species are considered as the most efficient and least damaging to the environment, but they can also have disastrous effects if the released species do not prey upon the invasive species but instead cause havoc to native species and ecosystems.

#### *Conflicts over words*

Eradication programs for invasive species are often counterproductive and can give rise to severe conflicts with local residents about human and animal welfare issues. These conflicts are often contentious and difficult to solve due to the language used to frame the problem of invasive species. Terms such as “alien,” “exotic,” and “non-native” have a racist or xenophobic ring for many people. Those who want to eradicate non-native species often attribute to them the same infamous qualities that xenophobes have attributed to immigrant groups, such as sexual robustness, uncontrolled fecundity, low parental involvement with the young, aggressiveness, and predatory behavior (Sagoff 1999).

People not only take offence at metaphors with a racist and xenophobic resonance, they also feel annoyed at the frequent use of militaristic and combative metaphors. Comparing plant and animal species to “natural enemies” and declaring war on these species can also have a boomerang effect and lead to the alienation of the very local communities that the nature conservation and restoration movement needs most.

This boomerang effect occurred when the U.S. Fish and Wildlife Service launched a recovery plan for the San Francisco lessingia that included the removal of some of the Australian eucalyptus. The San Francisco Chronicle bemoaned the plan for “killing trees in the name of some sort of ecological purity” and took offence at the way the trees were described. A typical comment from a city official: “How many of us are ‘invasive exotics’ who have taken root in the San Francisco soil, have thrived and flourished here, and now

contribute to the wonderful mix that constitutes present-day San Francisco?" (Todd 2002)

To mention another example: in June 2007, a Dutch newspaper reported the advance of the wild Raccoon dog in eastern parts of the Netherlands. The animals were suspected to be responsible for a massacre of the stork population in a special reserve. The Raccoon dog is native to East Asia. Between 1929 and 1955, about 9,000 animals were released in the European part of the former Soviet Union as potential fur or game animals. Soon the animals began to colonize neighboring countries very successfully. The Raccoon dog has many features in common with other mammals that have quickly invaded new areas: it is rather small, omnivorous, and capable of living near human settlements and of utilizing human-made food resources. It has a very high rate of reproduction and is generally very adaptable. Moreover, the Raccoon dog sleeps through the winter, which is a great advantage in areas where winters are harsh and food availability low. Opinions concerning its environmental impact vary from no impact to severe impact. Apart from being a vector of rabies, it could predate on endangered amphibians, reptiles, and game birds, and it could oust badgers and red foxes by competition.

The press release led to a discussion in the Dutch parliament. Member of Parliament Mariane Thieme from the Party for the Animals raised a fierce protest against the cruel abuse that newcomers from the animal kingdom are allowed to be shot and killed by anyone with a hunting license. "If animal species that come from abroad to settle in our country will automatically be labeled as 'unwanted aliens' with an unprotected status," she asked the Minister for Agriculture, Nature and Food Quality, "could you explain to us on what grounds such a 'our own animals first!' attitude is based?"

### *Nativism versus cosmopolitanism*

Once again, this example shows the impact of words that invoke xenophobic, racist, and belligerent images and impressions on the debate and consequently on the management of invasive species. Some people concluded that, by using these words and expressions, one was simply telling the wrong story to gain acceptance and support from local communities. To reframe this story in a less counterproductive and more constructive manner they simply reversed it: bio-invasion should not be compared to immigration, i.e., the arrival of aggressive and sexually prolific intruders who threaten to degrade and destroy once stable native communities, but should be compared to cultural "imperialism." Exotic species should not be controlled and combated as unwanted aliens, but should be opposed and resisted in order to protect local diversity from the homogenizing forces of globalization.

William Jordan already put forward this inverse storyline in his 1994 article, "The Nazi connection." According to Jordan, preference for native species should not be compared to Nazism, but instead should be seen as a positive act

designed to “protect the oppressed and threatened group from extinction,” an example of which would be the creation of modern Israel (Jordan 1994, 113).

More recently, this storyline was further developed by Ned Hettinger. Hettinger has accepted the claim made by some critics of racist and xenophobic anti-exotics rhetoric that invasions can add to the richness of species diversity. However, this increase in biodiversity within local assemblages inevitably goes hand-in-hand with a decrease in biodiversity between the planet’s ecological assemblages. If we shift the focus from intra-assemblage biodiversity to inter-assemblage biodiversity, it will become clear, Hettinger contends, that, on a global scale, bioinvasion will ultimately create “biosimilarity” instead of biodiversity. “In addition to this tragic loss in biodiversity, the spread of exotics also helps to undermine an important feature of human community. Globalization of flora and fauna contributes to the loss of a human sense of place” (Hettinger 2001, 217).

However, the reframing of bioinvasion from a reactionary rejection of disruptive immigration towards an argument for protecting local communities from cultural imperialism has also met with criticism. Critics fear that this new framework will only reproduce many of the more troubling aspects of the reactionary framework. By simply turning the anti-immigration story upside down, the anti-imperialism approach corroborates rather than contradicts the rigid dichotomy between the purity of local “authentic” cultures and the corrupting and contaminating influence of outside forces. However, the idea that globalization is equivalent to homogenization has been challenged by postcolonial and cultural studies that emphasize that globalization processes do not necessarily produce homogenization but also create opportunities for hybridization, i.e., the mixing and blending of cultural identities that leads to new forms of diversity.

According to William O’Brien (2006), this shift of emphasis from homogenization to hybridization should also affect our view on the exotic species issue. Here he refers to Michael Soulé’s conception of a new area of ecological science—“mixoecology” or “recombinant ecology”—that rejects the premise that exotic species are a detriment. I will return to this conception.

### *The continuum from restoration to recombination*

Apparently, the debate on the exotic species issue has ended in stalemate with only two mutually exclusive positions: nativism, whether xenophobic or non-xenophobic, and cosmopolitanism. To break up this dichotomy and to open up space for renewed debate, I will explore the different frames that can be found within conservation biology. I will argue that nativism and cosmopolitanism should be considered as extremes of a broad continuum ranging from restoration and recreation to reparation and recombination. As we move along this continuum, the standard by which we value nature management gradually shifts from historic authenticity to functionality. I will start at the nativism pole, where invasive species are anathema, and gradually proceed from this

pole to the cosmopolitanism pole, where invasive and native species are believed to coexist peacefully and with some degree of harmony.

#### FROM RESTORATION TO RECREATION

Invasion biology is intimately connected to restoration ecology; a field of ecological inquiry that is close to the nativism pole. Invasion biology and restoration ecology emerged at about the same time and developed as “sister disciplines” during the latter 1980s. They developed an increasingly strong synergy, with the objectives of each reinforcing those of the other. “Restoration ecology’s emphasis on restoring environments with native species affirmed the importance of invasion ecology, and invasion ecology’s emphasis on the harm caused by introduced species provided important justification for restoration ecology’s preference for native species” (Davis 2006, 49).

From the outset, ecological restoration’s attempt to return degraded ecosystems to their original state has been interpreted in terms of the restoration of artworks. There have been heated debates among environmental philosophers whether ecological restoration was indeed comparable to art restoration or rather to art reproduction or even art forgery, as has been argued by Robert Eliot in his seminal 1982 paper, “Faking Nature.” A Van Meegeren will always be inferior to a real Vermeer!

However, if we shift the focus from the visual arts to performing arts such as theatre, dance, or music, the restoration metaphor acquires a different meaning. A ballet, symphony, or play is anything but static; it derives its very life from being recreated time and again. Performances typically involve repetition, but at the same time, a perfect reproduction of an earlier performance would not be a performance at all but a copy of one. Variation is as important to successful performances as repetition. Performances are at once iterative and creative.

Performances are public rituals; they cannot thrive without an audience. A good example of a restoration ritual is the Bagpipes and Bonfire festival, a spectacular celebration of the harvest season in Lake Forest, Illinois. The tradition began in 1928 when Mrs. Evelyn Shaw McCutcheon hired a bagpiper to make festive the autumn chore of burning the prairie brush and invited neighbors and friends to join the fun. Today this festival features hundreds of bagpipers on parade in the prairie, and also includes hot-air balloon rides, Highland games, hayrides, a petting zoo, a harvest picnic supper, and of course, the great Fall bonfire! The biggest victim of this festival is the buckthorn, a shrub or small tree that can grow to eight meters in height. Introduced into the United States as a garden shrub, this European species has become an invasive species that is a serious threat to the open character of the prairie. According to Jordan (2006), the people of Lake Forest have made the killing of the buckthorn the occasion for a festival that brings the community together and makes it more aware of its residence in and its troubling responsibility for a particular ecosystem.

Although the recreation metaphor shifts the emphasis from composition and pattern to performance and process, it still does refer to “authenticity” as the most important standard by which ecological restorations should be evaluated. An artistic performance should be true to the original score, script, or scenario. Although the players, the props, the scenery, and costumes constantly change, the performance has to remain *Swan Lake*.

#### REPARATION AND THE ISLAND THEORY

So far, I have focused on the dominant approach within invasion biology, the conservation approach advanced by Elton and strongly influenced by restoration ecology. This approach is a top-down, deductive approach, in which an effort is made to apply general ecological theory in order to better manage and control invasive species. The alternative path is the scientific approach, a bottom-up, inductive approach, in which individual invasions are examined in order to further develop general ecological theory. In recent decades, the first approach became dominant because a large number of ecologists are employed by conservation groups and governmental agencies where they work primarily on applied problems (Davis 2006).

There is a huge difference in language usage between the two approaches. The vocabulary of the conservation approach includes expressions such as “alien,” “exotic,” “invader,” “invasion,” and other explicit militaristic terms, whereas the other vocabulary has a more value-neutral character, preferring phrases such as “colonizer,” “introduced,” “new arrivals,” and “migration.” This language is typical for the dominant theory used to understand bioinvasion: island biogeography.

This theory goes back to the New Ecology, a new approach within the field of conservation biology that can be traced back to cybernetics, which flourished in the United States after World War II. Within this tradition, nature is repeatedly compared to a complex clockwork. This metaphor reinforces confidence in our ability to repair damaged ecosystems like we repair “the radio or the family car,” as famous ecologist Evelyn Hutchinson once put it (Kwa 1987, 427). The island theory deals with groups or communities, the “populations.” These are perceived as systems attempting to maintain a dynamic equilibrium under ever-changing conditions by means of feedback mechanisms. The theory predicts the number of species on a given island, using the size of the island and the distance to the mainland as its main parameters. Although the taxonomic composition on the island is subject to continuous change, the number of species, which is determined by the rates of extinction and colonization, remains constant. The island theory takes no interest in the question of whether components of the ecosystem are identical in a material sense, but only whether they perform the same function within the ecosystem, for example, that of producers, consumers, or decomposers (bacteria and fungi) (Keulartz 1998).

The island theory definitely puts invasive species in a different light than restoration ecology. Whether a species “belongs” in an environment is not de-

terminated by its origin but by its function. Species are entitled to a green card, so to speak, as long as they do their job.

#### REHABILITATION AND THE HEALTH METAPHOR

Yet another way to frame the exotic species issue is provided by the health metaphor that has had an amazing career within environmentalism and ecology since about 1990 (Keulartz 2007). Its domain of application has been extended from the level of the individual (clinical and veterinary medicine) and the population (epidemiology and public health) to the level of ecosystems. An interdisciplinary field of research has developed in which the relations between human activities, natural systems, and health are being systematically explored. At present, the notion of health is a focal point for the integration of three highly overlapping areas of research activity: geographical medicine, conservation medicine, and ecosystem medicine.

“Geographical medicine” or “geomedicine” studies the impact of the environment on the geographical distribution of health and illness. Recently there has been growing concern over the influence on the health of human populations by global economic, technological, and environmental changes, including climate change, ozone depletion, loss of biodiversity, land degradation, desertification, deforestation, world-wide urbanization, and mass migration due to war or natural disasters.

“Conservation medicine” combines techniques, facts and concepts from public health, veterinary medicine, conservation biology, and plant pathology. Conservation medicine evolved out of a crisis: unprecedented levels of disease in many species because of the worldwide transformations of the host-parasite relations by climate change, chemical pollution, animal trade, encroachment into wildlife areas, habitat fragmentation, and loss of biodiversity.

“Ecosystem medicine” is “a systemic approach to the preventive, diagnostic, and prognostic aspects of ecosystem management, and to the understanding of relationships between ecosystem health and human health” (Rapport et al. 1999, 84). Ecosystems are considered healthy as long as they have the capacity to maintain structure and function in the face of stress. The proponents of this approach talk about the “Ecosystem Distress Syndrome” (EDS). Indicators of this syndrome are changes in primary productivity and in nutrient cycling, loss of species diversity, return to early stages of succession, and so on.

The health metaphor is akin to the reparation metaphor. The cybernetic approach of ecological restoration can be compared to clinical medicine in a hospital setting where the professionals take on the role of physicians or surgeons. However, the concepts of health and healing are much broader and encompass other approaches such as “rehabilitation,” the treatment of severely diseased or disabled people with the purpose of re-socialization and re-integration into community life.

## THE OTHER END OF THE CONTINUUM: THE RECOMBINATION METAPHOR

The most radical reframing of the exotic species issue comes from Michael Soulé. In his presidential address on alien species at the third annual meeting of the Society for Conservation Biology in 1989, Soulé claimed that “the inexorable invasion of alien species from distant land masses and between heretofore isolated regions within continents may be the most revolutionary” among the many environmental challenges of the coming decades (Soulé 1990, 233). The flood of exotic species will homogenize and impoverish the world’s ecological communities, a process which Soulé refers to as “cosmopolitanization.” He is convinced that the flood of exotic species cannot be stopped and that we simply have to accept cosmopolitanization.

According to Soulé, the concept of natural versus artificial, already outdated due to the pervasive influence of humans, is further undermined by the universal and irresistible force of bioinvasion. It will therefore become nearly impossible to defend the ecological *status quo ante*. “A policy of blanket opposition to exotics will become more expensive, more irrational, and finally counterproductive as the trickle becomes a flood” (ibid., 235).

Although the psychological adaptation to biogeographically recombined communities will be tough, Soulé believes that shifts in scientific fashion will facilitate the transition “from the traditional view of biogeographic integrity to the postmodern acceptance of cosmopolitanization” (ibid., 234). The first shift is the decline in status of the “niche paradigm.” “Niche” is a key concept in biogeography that is based on a holistic view of biological communities as highly integrated by competitive interactions.<sup>1</sup> A niche is the role or function of an organism in a community of plants and animals. Each community, especially an island, has a limited number of niches, and therefore can hold only a limited number of species. In a certain area, no two species can occupy the same niche for long. The one that is better adapted for the niche will win the competition for food and habitat and will cause the other to leave or become extinct.

The second shift, which is perfectly in line with the first one, concerns the replacement of the holistic community concept by an individualistic community concept. The individualistic concept was developed as early as 1917 by Henry Allan Gleason, who opposed the organicist views of his fellow countryman Clements. According to Gleason, an association of plants or animals cannot possibly be likened to an organism. The development of associations cannot be explained or predicted with the help of a limited number of physical laws, but has a non-deterministic (stochastic) and distinctly historic character. Every association is the unique outcome of a combination of migration pat-

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1. MacArthur’s “dissertation work, a study of community structure and niche partitioning among different species of warbler, also yielded a paper for *Ecology*, which appeared in 1958 and became recognized as a minor classic” (Quammen 1996, 410).

terns and environmental factors. Between the different associations, there are only fluid transitions, not the fixed, clear-cut boundaries that would justify a comparison with organisms.

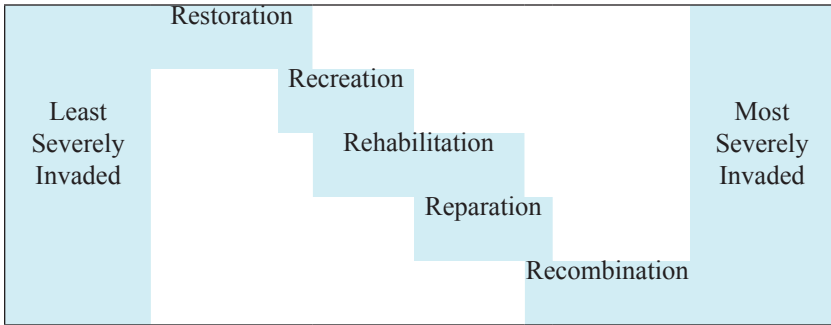
Among his colleagues, Gleason was seen, in his own words, as a “good man gone wrong” and his arguments were ignored or even “pulverised” (McIntosh 1991, 137; 265). This changed in the 1990s, when systems ecology (and the notion of “Nature in Balance”) increasingly had to compete with evolutionary ecology (“Nature in Flux”). Taking their cue from Gleason, the evolutionary ecologists gave up the “top-down” approach, in which the parts are viewed from the whole, and replaced it with a “bottom-up” approach, starting from the individual populations and ending up at the associations which they jointly form.

Soulé not only refers to Gleason but also to Hengeveld, who applied the individualistic community concept to the exotic species issue in his 1989 book, *Dynamics of Biological Invasions* (see also Hengeveld 1988). According to Hengeveld, species have no fixed roles in static communities, but they move about, responding individualistically to options and opportunities in a dynamic environment. Hengeveld considers niches as “ephemeral, non-specific opportunities potentially to be occupied by more than one single, predetermined species” (Hengeveld 1994, 350).

After his discussion of the shift to the individualistic community paradigm, Soulé suggested that a new ecological discipline will develop to deal with the interactions within new, biogeographically complex assemblages that result from deliberate or accidental species introductions. He suggested calling this ecological discipline “recombinant ecology” or “mixoecology.” This field can be defined as “the ecology of communities of plants and animals, the constituent members of which are drawn from a wide range of global biogeographic zones” (Barker 2000; Gilbert 2005). Although some might feel that Soulé’s suggestion was not meant seriously (Enserink 1999), the new field has slowly begun to be recognized with work in Eastern Europe, and more recently in the UK (Rotherham 2005, 53; see also Crifasi 2005).

### *Towards a multiple vision on invasive species*

I have shown in some detail that nativism and cosmopolitanism are but extreme positions within a broad continuum, ranging from restoration, recreation, and rehabilitation to reparation and recombination. In this way, we can bridge the gap between nativism and cosmopolitanism and open up space for a renewed debate that allows for a multiple vision on the exotic species issue. Taking my cue from environmental philosopher J. Baird Callicott and his colleagues Larry Crowder and Karen Mumford, I want to develop such a multiple vision by arranging the different frames on a scale from the least to the most severely invaded areas (Callicott et al. 1999; see also Keulartz 2007).



Callicott *cum suis* distinguish two contemporary schools of conservation philosophy: “compositionalism” and “functionalism.” The compositionalist emphasis is on the process of returning a biotic community to its original condition of biological diversity and integrity, whereas the functionalist emphasis is more on the process of returning an ecosystem to a state of health. Callicott and co-workers consider compositionalism and functionalism as two ends of a continuum: the compositionalist emphasis on the ecological restoration of biological integrity and diversity is appropriate for the management of the less severely degraded areas such as wilderness areas, national parks, and state parks. The functionalist emphasis on the ecological rehabilitation of ecosystem health is more suited for the much greater part of the world that is inhabited and economically exploited by humans.

Although our spectrum is somewhat broader than the compositionalism/functionalism spectrum of Callicott *cum suis*, their notion of a continuum between the least and the most severely degraded areas can certainly be helpful in the context of the invasive species issue. After all, ecological degradation is at once cause and effect of bioinvasion. Therefore, in general, the degree of degradation will correspond to the degree of invasion by exotic species.

This ordering has some prima-facie plausibility. The restoration and recreation metaphors seem more appropriate for the management of the least severely invaded areas such as wilderness areas, national parks, and state parks, whereas the reparation and recombination metaphors are more suited for the most severely invaded areas, including urban and industrial areas. It is significant in this respect that it was the Urban Forum that has taken the lead in setting up the first important workshop on recombinant ecology, took place on 13 July 2000, because, “although ‘recombinant’ communities are found in rural as well as in urban areas in the UK, the most obvious, striking and easiest to study are those of large urban areas” (Barker 2000).

## Conclusions

I have presented two (complementary) case studies, one about the (re)introduction of species that were once pushed out of their native environment, and the other concerning the issue of bioinvasion. Both case studies show the detrimental impact of dualistic thinking on ecological restoration projects. In the first case study, communication and cooperation between stakeholders is frustrated by the opposition of zoocentrism and ecocentrism. In the second case study, the opposition of nativism and cosmopolitanism appears to be a major obstacle. Gradualization can offer a way out of this black-and-white thinking and can open up space for negotiation and deliberation among different and sometimes diverging perspectives.

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