

REW/LDING In argentina

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INTRODUCTION

Mariua and her cubs Karai and Porã, the first free jaguars in Iberá after more than 70 years of the species' extinction in the province of Corrientes. PHOTO: MAGALÍ LONGO.

"Are you ready to do your part? Everyone is capable of taking up their position to use their energy, political influence, financial or other resources and talents of all kinds to be part of a global movement for ecological and cultural health. All will be useful. There is important and meaningful work to be done. To change everything, everyone is needed. All are welcome."

Douglas Tompkins

Fundación Rewilding Argentina and their strategic partner Tompkins Conservation work to reverse the species extinction crisis, one of the ongoing environmental tragedies that besieges the planet. Species extinction is known to be closely linked with climate change and the emergence of pandemics, but it has a distinctive attribute: It is irreversible. Thus, once a species disappears there is no possibility of recovering it. With the loss of species, biodiversity is eroded, destabilizing the ecosystems that sustain our existence, diminishing beauty, culture, development opportunities as well as quality of life.

Historically we mention the dodo (a flightless bird) as the first species whose disappearance in 1662, is attributed to human beings. It is believed since that date we have driven some six hundred species on the planet to extinction, although this number is surely higher as many would have disappeared without us ever knowing of their existence. In fact, extinctions resulting from human activity began thousands of years prior to 1662, and for none of these extinct species is there any way of going back, because current technology does not allow us to recover them. Extinction is forever.

In 2019 the United Nations' Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) noted that one million species are in imminent danger of going extinct. Unlike for species that have already disappeared, there is still hope for threatened species, owing to the fact that we either possess or can develop knowledge and technologies to save them. This is the driving force behind Fundación Rewilding Argentina and Tompkins Conservation.

Traditionally, the approach to preventing a species' disappearance includes designating large territories as protected areas so that both species and habitats can thrive. This was the original idea that inspired Doug and Kris Tompkins to settle first in Chile and later in Argentina: to contribute to the creation and expansion of national parks in both countries. In Argentina, the work was carried out under Fundación Rewilding Argentina, together with other partners, and involved the creation and expansion of eight terrestrial natural parks totalling one million hectares in extension.



nature itself.

Of these, 407 thousand hectares were acquired and donated to the state, while the remainder were public lands designated as parks. With respect to the ocean, Fundación Rewilding Argentina contributed to the creation of the first marine national parks in the country, encompassing ten million hectares. And the work goes on.

From the outset, Doug and Kris were aware that the creation of parks would not be enough, because these territories were defaunated (missing many native species) and impoverished and it is here where rewilding comes center stage. Doug and Kris had been very involved with this conservation movement since its inception in 1991 in the United States, participating in long hours of brainstorming with a large group of visionaries in a venture named the Wildlands Project. Figures in conservation were also present, including the renowned Dave Foreman, who coined the term "rewilding," as well as Michael Soulé and Reed Noss, who imbued the concept with content. The need to conserve extensive wild areas and bring back the top predators such as the wolf was at the heart of the discussions. This group understood that neither traditional conservation groups nor government agencies dedicated to wildlife conservation would take on the initiative of rewilding. Therefore, they decided to put theory into practice themselves. Doug and Kris supported the project in many ways, including in 1992, donating the funds to print 75 thousand copies of a special edition of the magazine Wild Earth, which is the publication of the Wildlands Project. In this publication, the group established the theoretical underpinnings of rewilding, bringing their ideas to a broader audience, including decision makers.

In 1998, and motivated by the concept of rewilding, Doug and Kris landed their small plane in San Alonso, in the heart of Iberá, Corrientes, Argentina. Top of mind for Doug was not only the creation of a large national park, but also the reintroduction of the top predator, the jaguar. Just like how in 1995 in the United States, the wolf had been returned to Yellowstone National Park, two years later the project to reintroduce the great cat of the Americas was begun.

Land acquisition to create Iberá National Park began in 1998 whereas the first project aimed to reintroduce locally extinct fauna started in 2007. But prior to planning and proposing the return of a species such as the jaguar, which was technically, socially and politically complex, we first had to lay the groundwork by reintroducing other species that were extinct in Iberá. We began with the giant anteater, then the pampas deer, the collared peccary, the tapir, the red-and-green macaw, the bare-faced curassow and the giant otter. Thus, Iberá became the most ambitious multispecies rewilding project in the Americas, and steadily recovered its wildlife and ecological functionality and at the same time developed a new economy, restorative in nature that thrived together with

> The extinction of species or loss of biodiversity is closely linked to other environmental crises such as climate change and the emergence of pandemics. Fundación Rewilding Argentina's projects attempt, for the first time in our country, to recover the functionality of ecosystems to face these crises. PHOTO: A RED-AND-GREEN MACAW, A SPECIES THAT HAD BECOME EXTINCT IN ARGENTINA, FLIES OVER THE FORESTS OF CAMBYRETÁ, NORTH OF IBERÁ, MATÍAS REBAK.



In Argentina, as with the purchase of land to create national parks, rewilding was not immune to questioning and controversy. In the case of the land purchases, the most vehement opposition came from the traditional productive sector which, on some level was to be expected, because the project was trying to fold land into a new model that we at Fundación Rewilding Argentina refer to as the "economy of nature" (see Chapter 5).

With regard to species reintroduction it was conservation organizations, both governmental and private who questioned our plan. This was not unexpected, because we were proposing a new way of engaging in conservation, seated in the territory we are protecting and with a fundamental active management component, which is rewilding.

As Doug pointed out, the best way to respond to this type of questioning was to show the results of our continuous work. And that is the objective of this book: to present the experience acquired over 15 years of rewilding work. It is not a new treatise on rewilding, of which several good ones already exist. Rather, we intend to communicate how we went about setting goals, taking risks, and learning from our successes and failures. In the following pages we explain how we acquired new knowledge, used new technologies, built new and enthusiastic work teams, reached new social agreements and helped to develop new economies.

Perhaps now, as never before in human history, we have begun to reconceptualize our relationship with the natural world, a relationship that should begin with the recognition of the intrinsic value of all forms of life on earth and which should change the patterns of nutrition, consumption, energy use and the distribution of wealth. A relationship that must preserve that which still remains of the natural world, and most especially, recover what has been lost.

The United Nations has designated the period between 2021 and 2030 as the Decade on Ecosystem Restoration, to encourage activities aimed at recovering natural ecosystems and wildlife. Argentina possesses unique conditions to make it a worldwide leader in rewilding, and that is also what this book is about, laying the foundations to scale up the pioneering work carried out in Iberá. Governments, civil society and citizens are called upon to become protagonists of this great change.

Doug and Kris Tompkins were active participants in the movement that gave rise to rewilding in the 1990s. This movement set out to provoke and elicit reactions in the conservation community so it would adopt new, more ambitious and proactive agendas. Working together with Doug and Kris were leading conservationists, activists and communicators, such as environmentalist Dave Foreman, who coined the term rewilding, and ecologists Michael Soulé and Reed Noss, who gave it conceptual content. PHOTO: KRIS TOMPKINS TOGETHER WITH OTHER MEMBERS OF THE WILDLANDS PROJECT, WHICH COINED AND DEFINED THE TERM REWILDING, TOMPKINS CONSERVATION ARCHIVES.

Doug and Kris bought their first property in Argentina in 1998: Estancia San Alonso in the Iberá Marshlands. They began to implement the idea of creating a large national park in Corrientes and bringing back the jaguar. Doug and Kris knew that preserving what was still standing was not enough. What was lost had to be recovered as well. PHOTO: TOMPKINS CONSERVATION ARCHIVES.



REWILDING: WHAT, WHY AND HOW



CHAPTER 1

REWILDING, REVOLUTION IN NATURE CONSERVATION

Rewilding is a novel conservation strategy that seeks to restore natural ecosystems so they are once again complete and functional. For an ecosystem to be complete, the keystone species that inhabited it in historical times must be present, and for it to be functional, these species must fulfill their ecological roles. Species reintroduction projects in Iberá are making this ecosystem complete and functional again. ILLUSTRATION: MARCELO CANEVARI.

"Rewilding restores the natural world, it brings well-being to local communities and above all, it brings joy to our souls."

Richard Preston

REWILDING

At Fundación Rewilding Argentina we work to revert the ongoing crisis of species extinction that besieges our planet. We do this through rewilding.

Rewilding is a biological and ecological restoration strategy that seeks to restore the integrity of natural ecosystems, which today are largely degraded and defaunated. The goal of rewilding is to transform them into complete, functional, self-sustaining ecosystems. That is, they should remain functional with minimal human intervention.

COMPLETE ECOSYSTEMS AND KEYSTONE SPECIES

What is a complete ecosystem? It is an ecosystem that contains all of the species that evolved there. That is, it contains populations of all of the species that have inhabited it since historical times. However, recovering all of the forms of wildlife that belonged to an ecosystem, but have been eradicated by humans is a Herculean task, and often impossible which is why it is necessary to prioritize some species over others.

We know that all of the species of an ecosystem are important, but science indicates that there are some that are more important than others to ensure a complete and functional ecosystem. We refer to these as "keystone species." A keystone species is one which has a disproportionate impact on the ecosystem that it inhabits, because through different mechanisms it determines the distribution and abundance of other species. One of these mechanisms is known as a trophic cascade. In a trophic cascade, the keystone species has a top-down effect on the food chain. For example, top predators such as pumas affect lower levels, including herbivore animals such as the guanaco and therefore also the vegetation. The puma feeds on guanacos and therefore determines the guanaco's distribution and how it feeds on vegetation. In a trophic cascade the mechanisms trickle down from the higher end of the food chain to the lower end.



In order for an ecosystem to be functional, the individuals of the keystone species must be present in sufficient numbers for them to fulfill their ecological role. Qaramta is one of the last jaguars in the Argentine Chaco and the only one whose presence has been confirmed in El Impenetrable National Park. Although the jaguar is present in the Argentine Chaco, they are so few in number that they can no longer fulfill their ecological role and therefore the ecosystem is not functional. PHOTO: CAMERA TRAP / FUNDACIÓN REWILDING ARGENTINA. Scientific evidence demonstrates that if a predator from a higher trophic level is lost, a series of events happen in chain reaction that cause change in lower levels of the food chain that the predator belongs to. These reactions can generate an imbalance in the ecosystem, affecting its structure and how it works, resulting in an impoverished, less diverse system. Most troublingly, these impoverished ecosystems are less resilient and therefore more vulnerable to undesired changes, which are often caused by human beings.

One of the best known examples is that of the sea otters on the Pacific coast of North America. Intense hunting eradicated otters from a large part of their natural distribution, which caused an increase in population of their main food source, the sea urchin. It turns out the sea urchins feed on algae, and soon devoured kelp forests, which sustained an important biodiversity of fish and marine invertebrates. But the damage of this chain reaction does not stop there. It is estimated that the degradation of kelp forests lowered carbon sequestration from 43 to 13 billion kilos per year. Carbon that is not captured remains in the atmosphere where it bonds with oxygen and forms carbon dioxide, one of the primary greenhouse gasses that causes climate change.

The reintroduction of keystone species whose role allows for the reestablishment of important food relationships is a type of rewilding referred to as trophic rewilding, and this is the main type of work we focus on.

Although it is at times difficult to establish, it is generally considered that carnivores, herbivores and frugivores with large body mass are very likely to behave as keystone species, and this is why Fundación Rewilding Argentina focuses its efforts on reestablishing populations of these species. in Iberá (Corrientes) we work to reintroduce large carnivores and insectivores such as the jaguar, the giant otter, the giant anteater, as well as large herbivores that consume grasses, such as the pampas deer, birds that consume fruits and seeds such as the red-and-green macaw and the barefaced curassow, and animals that consume both fruits and grasses such as the collared peccary.

Beyond the importance that these species have in the food chain and therefore in the balance of the ecosystems that they inhabit, they possess another very important attribute: they are charismatic, generating admiration and respect, which makes them an important factor for obtaining support to implement conservation actions.

Just as these large-sized species have been heavily impacted by human activity, they have also been the first to disappear from natural environments. Many of them are considered threatened, and by implementing rewilding activities to recover the ecosystems we also contribute to improving their conservation status.

In some cases, we also strive to recover species that are absent in the ecosystems where we work, even though they are not considered threatened at either a national or global level. For example, the collared peccary has healthy populations in different ecosystems of the Americas, but was absent in Iberá, which caused the consequent loss of its ecological role in the area. We therefore implemented a project of reintroduction to reestablish this species.



Keystone species often exert their main ecological roles through interactions in the food chain. A top predator such as the puma, which is at a higher trophic level (at the top) of the food chain, will determine the distribution and abundance of its prey (the guanaco) and indirectly influence vegetation conditions by regulating grazing intensity. It therefore also influences the diversity of life that lives in the grasslands, the condition of the soil and the rate of carbon sequestration through photosynthesis. The puma also positively affects populations of scavengers such as the Andean condor that feed on the remains of the puma's prey and, finally, by predation or competition the puma regulates the number and behavior of medium-sized carnivores such as the gray fox, thus also indirectly influencing the abundance of their prey. These mechanisms of regulation through interactions in the food chain are called trophic cascades. In the illustration, the solid arrows represent direct influences and the dotted arrows represent indirect influences.



ly (See Chapter 4).

aforementioned trophic rewilding.

Ecosystems, in addition to being complete, must be functional. It is not enough for the keystone species to be present; they must also be there in sufficient numbers to fulfill their ecological roles. When within a region, the number of individuals of a species decreases, we say we are facing a functional or ecological extinction, which is a step before numerical or total extinction, when all these individuals completely disappear.

It is clear then, that despite their importance, the Red Lists (developed by the International Union for Conservation of Nature (IUCN)) of threatened species have a limited reach when it comes to recovering the functionality of ecosystems because restoring them can require working both with species in danger of extinction on a global level and those which are only extinct local-

In addition to ecosystem attributes and in connection with what we have previously stated vis a vis charismatic wildlife, keystone species often also have huge socio-cultural importance given that their large size, attractive coloration or fierceness are some of the characteristics that have appeal to humans. So when keystone species are lost, it is not only biological diversity which is eroded, but also the cultural diversity of the region they inhabited. We not only lose the animals but also the meanings of stories, legends, paintings, engravings and place names from the past, and artists also lose sources of inspiration. Therefore, rewilding also plays an important role in recovering the culture and identities of these peoples.

Specifically in the Americas, the goal of rewilding is to repopulate ecosystems with keystone species that were present 500 years ago (see Chapter 3), which is approximately when Europeans arrived on the continent in 1492. Although some environmental conditions may have changed in the intervening years, we believe that in many cases, these changes are reversible and do not seriously impede us from implementing activities related to rewilding. Another school of thought proposes pushing the benchmark point for rewilding back to the arrival of modern humans to the Americas, some 15,000 years ago (see Chapter 2). The idea of restoring species that were extinct thousands of years ago is known as Pleistocene rewilding and would be an extreme version of the

FUNCTIONAL ECOSYSTEMS AND KEYSTONE SPECIES

Keystone species are those which exercise ecological roles that the structure and functionality of the ecosystem that they inhabit depend on. When these species are missing, ecosystems are degraded and can even collapse. Keystone species tend to be large herbivores, frugivores or carnivores, such as the giant otter. PHOTO: ALONDRA FEEDING. SHE IS ONE OF THE INDIVIDUALS THAT WILL BE RELEASED IN IBERÁ SO THAT HER SPECIES CAN ONCE AGAIN INHABIT ARGENTINA, MATÍAS REBAK

Species reintroduced to recover ecological roles in one ecosystem may not exhibit conservation problems in others. The collared peccary was reintroduced in Iberá to recover interactions lost in this environment although it is still commonly found in several regions of South America and is not threatened at a global level. Rewilding seeks to recover ecological processes regardless of whether or not the species involved are globally threatened. PHOTO: MATÍAS REBAK.

The presence of a small number of individuals of a species in an area does not ensure that the species is fulfilling its function in the ecosystem, which includes interactions between different species. For example, in the Chaco region of Argentina, it is speculated that fewer than 20 jaguars remain, and only one, named Qaramta is confirmed within the territory of El Impenetrable National Park. So while the species is not considered to be numerically extinct because a few individuals still remain, their function as top predators has been lost so we can say that in the Argentine Chaco, the jaguar is functionally or ecologically extinct.

Rewilding is not only concerned with restoring a keystone species that is absent in a natural ecosystem (this process is called reintroduction), but also with increasing the numbers of species whose populations are diminished, through a process called supplementation. In both cases, we proceed only if the absence or reduction are the result of human activity.

It is important to mention that, as a process of ecological restoration, rewilding is complex and brings with it a certain amount of uncertainty in terms of the final results. Rewilding is focused on the restoration of processes that do not necessarily include recovering pristine, original states. So it is possible that once the work is finalized, some characteristics of the original ecosystem will not be restored, and that we will observe new characteristics that were originally not found in this ecosystem.

COMPLETE, FUNCTIONAL, NATURAL ECOSYSTEMS AND THE WELL-BEING OF PEOPLE

A complete, fully functional ecosystem harboring abundant populations of keystone species that interact with each other as well as with other components of the system will deliver efficient and effective ecosystem services.

These ecosystem services are those which allow life on the planet to thrive, including humans in rural and urban areas. We all depend on natural environments to supply us with water, good quality air, to sequester carbon and other factors that affect greenhouse gasses which cause the greenhouse effect, and thus mitigate the effects of climate change and prevent or mitigate the spread of pathogens that affect our health. Our very existence depends on the proper functioning of natural ecosystems.

Complete, functional natural ecosystems also provide additional benefits such as local development opportunities. Specifically, rewilding gives rise to local economies that function in synergy with natural ecosystems because they prosper to the extent that these very same ecosystems are better preserved. A key activity in these economies is nature tourism based on wildlife observation that capitalizes on the charisma of keystone species to attract tourists. Finally, complete and functional ecosystems reconnect visitors and locals with nature, thus providing opportunities to learn and be inspired, bringing natural beauty closer to our senses.

BRITISH

CANADA U.S.

THE ORIGIN OF THE WORD REWILDING





Pluie, the she-wolf's four-and-a-half-year journey inspired the emergence of the concept of rewilding in the 1990s, as knowledge grew about the vast habitat needs of top predators such as wolves and the intense effects they have on the environments they inhabit

PHOTO: GARY KRAMER / US FISH & WILDLIFE SERVICE.

The world rewilding was used for the first time in 1992 by the American environmentalist and writer Dave Foreman in his column Around the Campfire, published in the magazine Wild Earth, an informational publication of The Wildlands Project. This column was dedicated to "educate, provoke and make conservationists react." In 1992, Foreman wrote "it is time to do rewilding in North America. It is time to reweave the fabric of life on our continent." But although Boreman coined the term rewilding, he stopped short of defining it.

The first attempts to define the term rewilding appeared in a special edition of Wild Earth, also in 1992. In it they proposed a "strategy to recover wild North America." Thanks to the financial support of Doug and Kris Tompkins, 75,000 copies were printed of that edition in order to disseminate the idea. In 1998, Micheal Soulé and Reed Noss, two renowned career ecologists presented a new definition for the word in the magazine, defining the concept as a conservation strategy with strong roots in scientific knowledge.

The meaning of the word rewilding was largely inspired by the exploits of animals such as the she-wolf Pluie, captured and fitted with a satellite collar in Alberta, Canada in June of 1991. She was killed four and a half years later, in British Columbia, Canada by a hunting party. During the tracking period, Pluie moved in an area of ten million hectares between Canada and the United States, demonstrating that in order to conserve these large carnivores, large, largely untouched core zones were needed, surrounded by buffer zones and corridors that connected them. The definition of rewilding by Michael Soulé and Reed Noss made reference to this network of conserved territory which should guarantee the permanence of top predators.

The term rewilding did not arise in academic circles, but rather among conservation activists, who observed with concern that the large non-governmental conservation organizations and the United States government itself were not open to this new, untested strategy, which seemed onerous to implement. Even Soulé and Noss, in a more technical article mentioned that "the largest impediment to rewilding is the lack of willingness to imagine it."

The term rewilding was quickly popularized and a number of definitions have arisen since then. All of these definitions bear two important elements stated by Soulé and Noss which are 1. achieve self-sustaining ecosystems with the least possible human intervention 2. the need to focus on species that fulfill key ecological roles such as top predators.

KEYSTONE SPECIES AND THEIR ROLE IN THE FUNCTION OF ECOSYSTEMS The example of top predators, trophic cascades and environmental crises

An important body of empirical knowledge shows that top predators perform critical functions in the ecosystems they inhabit.

Top predators help to maintain the abundance and diversity of mammals, birds, reptiles and invertebrates, and in some cases regulate the population of herbivores which would otherwise overconsume vegetation, thereby leaving the landscape less diverse. Grazing intensity can be controlled by decreasing the number of herbivores by predation (through trophic cascades). It also modifies the behavior of herbivores and makes it so that they avoid grazing in environments where they can more easily be preyed upon. These trophic cascades are referred to as "behavior mediated." For example in the mountains of San Juan, Argentina, vicuñas avoid certain sectors where the risk of being hunted by pumas is very high. In these sectors, the vegetation thrives and the grasses produce more biomass and seeds and this well-preserved vegetation provides shelter and food for organisms such as small mammals, birds and insects.

Top predators also regulate the populations of medium-sized predators. Therefore, when top predators disappear, a phenomenon called the release of mesopredators occurs. Medium-sized predators such as foxes, bobcats, raccoons and coatis proliferate in the absence of large carnivores such as pumas and jaguars, which sharply raises the rate of prey depredation, and some smaller prey could even disappear. For example, it has been suggested that in Iberá the absence of the jaguar caused an increase in the number of foxes who then prey on clutches and broods of threatened grassland birds such as the saffron cowled blackbird.

In addition, top predators subsidize other species with food, as occurs with carrion-eaters. In parts of the Andes Mountains which have little human activity, condors feed in large part on the carcasses of vicuñas and guanacos left by pumas. Without the availability of carrion the condor would not be able to subsist, or their numbers would be significantly lower.

Likewise, top predators are involved in limiting the proliferation of pathogens such as viruses and bacteria, and thus the diseases they cause. In the eastern part of the United States, the disappearance of the top predators such as pumas and wolves has led to the abundance of coyotes and therefore the reduction of the number of prey animals, including foxes. At the same time, the low number of foxes has caused a proliferation of small mammals which are important hosts to the ticks that carry the bacteria that causes Lyme disease in humans, which can be fatal.

Another way in which top predators mitigate climate change is through trophic cascades which increases carbon storage in soil and vegetation. By preying on moose in the boreal forests of North America, wolves slow vegetation consumption. Trees can fix more carbon through photosynthesis and dead leaves fall to the ground where microbial activity is minimal due to low temperatures. Thus, organic material decomposes more slowly, and the carbon is stored in the soil rather than returning to the atmosphere. It is estimated that healthy populations of wolves in these forests can increase the annual carbon sequestration rate by 32%, which is equivalent to the annual carbon dioxide emissions of all of Canada from the use of fossil fuels.

It is clear that recovering ecologically effective densities of top predators is fundamental to maintain the structure and function of ecosystems and to face the three large climate crises that threaten the Earth, which are: the loss of biodiversity; the appearance of pandemics; and global climate change. This information inspires us to make all necessary efforts to restore and maintain populations of top predators in their respective habitats.

Predators such as the puma modify the abundance and behavior of their prey as these avoid places where they are more likely to be hunted. In these areas, grazing intensity is lower and vegetation thrives, increasing the heterogeneity of natural environments and, consequently, the diversity of their biological communities. Likewise, by reducing grazing pressure in some sectors, the rate of carbon sequestration increases and global climate change is mitigated. Finally, predators generally eliminate the weakest and sickest individuals, which prevents the proliferation of pathogens. PHOTO: INGO ARNDT.





CHAPTER 2

PREHISTORIC DEFAUNATION IN SOUTH AMERICA AND ARGENTINA

The megafauna that inhabited the different continents and islands disappeared as modern humans colonized those spaces. It is now known that the cause of these extinctions was the hunting pressure on these animals and not climate change, as was held in the past. ILLUSTRATIONS: LEANDRO VÁZQUEZ.

"I will change my mind as many times and as often as I acquire new knowledge. The day that I realize that my brain is no longer suitable for these changes, I will stop working."

Florentino Ameghino

The original definition of extinction refers to the disappearance of all of the individuals of a species and occurs when the last specimen dies. This type of extinction is called numerical extinction and it can affect populations in one sector (local or regional extinction) or in the whole range of the distribution of a species (global extinction). As we have previously stated, when the numerical extinction is global, the species irreversibly and forever disappears. In contrast, when the numerical extinction is regional, the species can recover through reintroduction, translocating individuals from other regions or facilitating the arrival of individuals from nearby areas.

Functional or ecological extinction precedes numerical extinction and occurs when the number of members of a species is so small that they cannot fulfill their ecological role. In this case, species recovery can be achieved in one of two ways: reducing the threats that caused their numbers to decline and allowing recovery to occur without direct intervention; or instead incorporating new individuals in a process called "supplementation."

It is part of nature that species go extinct. Those extinctions sometimes take place en masse over a relatively short period of time on the geologic scale (some thousands of years) and globally, many of these have taken place. Traditionally five extinctions are recognized, including the mass extinction at the end of the Permian period, when 80% of the marine species that lived on planet earth went extinct, and the better-known extinction that took place at the end of the Cretaceous period, when the dinosaurs disappeared. In current times we are witnessing the sixth great extinction, which is also referred to as the first mass extermination to call out the unequivocal role that humans are playing in this extinction.

The number of species that inhabit the current territory of Argentina has shrunk radically in the last 13,000 years, a relatively short period considering that our planet formed 4.6 billion years ago. The fossil record shows a diverse fauna of giant mammals that inhabited Argentina: large armadillos of the genus Glyptodon (2000 kilos); giant sloths of the genus Megatherium (4000 kilos), wild horses of the genus Hippidion (500 kilos), elephants of the genus Stegomastodon (4700 kilos) and other herbivores related to tapirs but that resembled sturdy antelopes, like the Macrauchenia (1000 kilos). These species were, among many others, part of the landscape. This group was known as South American megafauna and it coexisted with species that are more familiar to us today, such as the guanaco, jaguar, huemul, anteater, tapir, giant anteater, marsh deer, pampas deer, collared and white-lipped peccary, maned wolf and giant otter.

This megafauna disappeared from South America about 13,000 years ago and similar events of extinction of large species have occurred throughout most of the planet over the course of the last 50,000 years. Paleontologists have generally associated these extinctions with changes in the climate, however except for the north of Eurasia where the evidence does, in fact point to climate change, recent studies have pointed to human beings (Homo sapiens) as the main cause of these extinctions.

This process of extinction of megafauna is very well documented on different continents and islands. For example, Australia's megafauna became extinct between 40 and 50 thousand years ago. These included herbivore marsupials the size of a hippopotamus like Diprotodon, kangaroos that weighed 500 kilos and the marsupial "lion" Thylacoleo, which weighed up to 130 kilos. In southern Europe the extinction of megafauna occurred between 26 and 30 thousand years ago and in northern Europe 10 to 15 thousand years ago when the mammoth, the wooly rhinoceros, the cave lion and other species disappeared. In North America the megafauna was extinguished two to three thousand years ago, when large elephants and the saber-toothed tiger disappeared.

This pattern of extinction also took place on islands such as Madagascar between 500 and 2000 years ago, affecting Archaeoindris, a gorilla-sized lemur and the flightless elephant bird, which weighed 500 kilos. In New Zealand the loss of megafauna happened only in the past 500 years, when various species of moas, a type of roadrunner that reached up to three meters in height, and Harpagornis-the largest eagle ever to live on Earth-disappeared.

In all of the cases mentioned, the collapse is associated with the arrival of modern humans to each one of these continents or islands. The exceptions are Africa and to a lesser extent, Southeast Asia where megafauna continue to exist. Here the modern human was not the first hominid to appear and the megafauna, including elephants, rhinoceroses, large cats such as tigers and lions, large primates such as gorillas and orangutans had time to coexist and adapt to the presence of these hominids.

At the archeological site Arroyo Seco 2, in the province of Buenos Aires there is evidence of consumption and exploitation of the giant sloth Megatherium and of the Hippidion and Equus horses. Arroyo Seco was a campsite and a meeting place where food was consumed, and remains of the meatiest portions of giant sloths and horses (the front and hindquarters) were found here. These skeletal remains abound in this archeological site, as opposed to other parts of the animal that contain less meat or that are more difficult to transport. In addition, some bones of these animals show fracture marks and cuts made by stone tools used to dismember the animal.



EVIDENCE OF PREDATION AND CONSUMPTION OF MEGAFAUNA BY THE FIRST HUMAN INHABITANTS OF THE ARGENTINE TERRITORY

The interaction between humans and megafauna is not only supported by the overlap between the arrival of Homo sapiens and the extinction of these species. In many parts of the world, including Argentina, evidence has also been found that humans lived with, hunted and consumed these animals.

At the archeological site La Moderna, in the same province, there is evidence of the coexistence of hunter gatherers from the pampas with the giant armadillo Doedicurus clavicaudatus. In contrast to Arroyo Seco, La Moderna is a site where the hunter-gatherers hunted and butchered the animals, but they did not consume them on site. The coexistence is substantiated by the presence of lithic artifacts and pieces of the skeleton of Doedicurus in the same archaeological layer. The absence of bones pertaining to the meatiest parts of the animal suggests that the meat was consumed elsewhere.

Until about 13 thousand years ago, Argentina's wildlife was dominated by enormous mammals and birds, called megafauna. The arrival of modern humans to South America introduced hunting pressure that caused the extinction of 70% of the species weighing more than ten kilos and the disappearance of the ecological roles they played. The illustration shows some representatives of the megafauna such as giant sloths and armadillos, the macrauchenia and the mastodon, which coexisted with species that exist today such as the pampas deer, the guanaco, the puma and the jaguar. ILLUSTRATION: DIEGO BARLETTA

The loss of megafauna in the area currently called Argentina, as in the rest of South America, coincided with the arrival of hunter gatherer groups to the southern cone of the South American continent, coming from North America through Central America and probably from Polynesia by crossing the Pacific Ocean. These groups, both in North and South America, developed a lithic technology consisting of fluted projectiles (arrowheads and spears), which are believed to have been developed to hunt megafauna. The appearance of this technology some 13,000 years ago coincides with the rapid decline of South American megafauna which culminated with the extinction of 70% of the species weighing more than ten kilos.

In the province of Buenos Aires, Argentina, there are archeological sites that demonstrate that humans consumed and processed megafauna such as the giant sloth (Megatherium), the Hippidion horse and Doedicurus, the giant armadillo. These first inhabitants also consumed or processed other species such as other giant sloths (Glossotherium and Mylodon) and the mastodons Notiomastadon and Cuvieronius in different regions of South America.

We can say that the megafauna disappeared from the planet in recent times, and together with it the ecological roles that these species performed. Evidence of these ecological roles can be seen today, for example in the presence of the so-called megafauna fruits. Many species of plants continue to produce oversized fruit and seeds that no current herbivore could consume and disperse. For example, in North America remains of Joshua Tree (a species of tree that still exists in the Mojave Desert) have been found in fossilized fecal matter of giant sloths. The Joshua Tree invests a lot of energy in this desert environment to produce enormous fruits which today almost no species eat or disperse; the giant sloths and other megafauna were the consumers and dispersers of these seeds. It is believed that the extinction of the megafauna and subsequent loss of its ecological role prevents this tree from colonizing new areas, which will ultimately lead to its disappearance in the face of environmental changes such as global climate change. Another example of megafauna fruit is the well-known avocado, a plant originally from Central America which produces a large fruit and seed to be consumed and dispersed by giant sloths and mastodons. In each continent with the exception of Antarctica, there are examples of these oversized fruits.

Mass extinctions of species of large animals are associated with the migratory movements of modern humans during the Pleistocene age. Currently, technological development does not allow us to bring back these large animals, however it might be possible to replace their ecological roles with the introduction of similar species that do still exist. This type of rewilding represents an extreme trophic rewilding, called Pleistocene rewilding. There are limited examples of fenced territories where this is being attempted, and one of these is at Pleistocene Park, located in Russia.

According to the proponents of the Pleistocene Park, the return of herbivory has caused an increase in the proportion of grasses among the vegetation, which has caused an increase in the sequestering of carbon, revitalization of the nutrient cycle and in particular, recovery of the permafrost layer (a layer of soil that has remained frozen for thousands of years), which, in the presence of these grasses is shown to be less affected by global warming.



PLEISTOCENE PARK IN RUSSIA

Pleistocene Park in Russia is one of the few Pleistocene rewilding initiatives. It consists of two thousand fenced hectares of arctic tundra where various species of herbivores have been introduced or reintroduced with the aim of recovering the process of herbivory (grazing) carried out by extinct species such as mammoths, wooly rhinos, bison and huge deer, among others. These animals became extinct during the Pleistocene era and, to a lesser extent, in historical times.

The species selected to recover herbivory and which are already within the perimeter fence are moose, European bison, camels, musk oxen, yaks, Kalmykia horses, and cows and sheep from the Baikal region.

Although there is overwhelming evidence showing that the megafauna extinction was brought about by modern humans and that many ecological roles which have been lost could ideally be recovered, Pleistocene rewilding continues to be controversial, particularly due to the very real possibility of replacing the ecological roles performed by now-extinct species with the introduction of existing non-native species.



There is no way to recover species that became extinct a few thousand years ago due to human activity, but animals' ecological roles could be replaced by using similar species called ecological equivalents. Pleistocene Park in Russia is one of the few initiatives developed with this in mind: the introduction of species such as the camel has made it possible to restore the grasslands of the Siberian steppe and, therefore to rebuild the permafrost (a permanently frozen topsoil) that is a key component of these ecosystems. PHOTO: PLEISTOCENE PARK



CHAPTER 3

HISTORIC DEFAUNATION

The disappearance of many species over vast territories of Argentina occurred very early in history. There are records of the maned wolf in the southern pampas region and northern Patagonian regions from the 18th century by the first military and religious explorers who entered these territories. Naturalists, who arrived in the 19th century did not record it in this region. PHOTO: RAFAEL ABUÍN AIDO.

IN SOUTH AMERICA AND ARGENTINA

"Rewilding is an audacious intent to scramble our way back to October 1492 to find a different path, a path overgrown with weeds and already nearly forgotten. We are not looking for the highway that leads to gold, the empire and death. Columbus and the strong men who followed him have already found that yellow brick road. What we seek is a path leading to beauty, abundance, wholeness and wildness. We see the great outdoors rather than empire, we chase wolf tracks instead of gold, we yearn for life instead of death."

In the territory now known as Argentina, the process of defaunation did not end with the extinction of the Pleistocene megafauna that the first settlers to the Americas caused 13 thousand years ago. In truth, this process intensified 500 years ago with European colonization fueled in part by their technological advances such as firearms, hunting dogs, large-scale cattle farming and using horses as a means of transport. The European colonizers decimated the descendants of the first inhabitants of the Americas and caused catastrophic reductions in the numbers of large vertebrates including herbivores, carnivores and frugivores that had survived the first defaunation and were still plentiful in the region when the settlers arrived.

From 1860 to 1870, 2.13 million deer hides were exported from Argentina, though the number of individuals killed was likely higher. The population collapse of the most numerous herbivore in north-central Argentina, of which only about 2000 individuals survive today, occurred before the start of the 20th century. PHOTO: A COLLECTION OF JAGUAR AND POSSIBLY PAMPAS DEER HIDES IN CHACO IN 1914, ARCHIVO GENERAL DE LA NACIÓN.

CURRENT AND HISTORICAL DISTRIBUTION IN ARGENTINA





JAGUAR -Panthera onca-Current distribution (Paviolo et al. 2019)

> Historical distribution (Di Bitetti et al. 2016)

MANED WOLF —Chrysocyon brachyurus—

Current distribution (Cirignoli et al. 2019)

Historical distribution (adaptated from Chebez, 2008)



PAMPAS DEER —Ozotoceros bezoarticus—

Current distribution (Merino et al. 2019)

Historical distribution (Chebez, 2008)



GUANACO —Lama guanicoe—

Current distribution (Carmanchahi et al. 2019)

Historical distribution (adaptated from Roig, 1988)

> The reduction in range of many species of large mammals in Argentina, such as the jaguar, the maned wolf, the pampas deer and the guanaco has been notorious. Recognizing these territorial retractions is the first step in proposing actions to reverse them.

The historical distribution (the geographical location) of the species that suffered the impact of the colonizers are inferred in part from remains found at archeological sites and from some chronicles of religious and military writers who were early explorers outside of the fledgling settlements that would later become Argentina. The naturalists, who were better educated and more meticulous came later, mainly during the 19th century when population reductions and even regional extinctions had already occurred. By way of example, here are some lines from Felix de Azara's journal, written on January, 20th, 1784 when he was exploring the south east of the province of Corrientes:

"From the Bajada of Santa Fe to here we wandered through many forests, or not far from them, all of them carob and espinilla (*Vachellia caven*) trees. From their disposition and from the twisted stumps we can strongly infer that all of these lands have been, not long ago, a continuous forest that the burns have destroyed and will soon destroy what remains [...]. Where man lives neither trees nor plants nor animals remain."

Although throughout history no large vertebrates have become extinct (with the exception of the Malvinas fox and probably the glaucous macaw), the colonizers considerably reduced the populations of a number of species, which were widely distributed until about 100 years ago when compared to the territories that they currently occupy.

For example, the guanaco was found among the grasslands and hills of Chaco, the jaguar was found until at the very least the north of Patagonia, the tapir and the white-lipped peccary roamed to the delta of the Paraná river, the huemul was found in some sectors of coastal Argentina, the maned wolf inhabited the Atuel marshes in the pampa, the giant armadillo and the giant anteater were observed in Córdoba, the collared peccary reached the banks of the Río Negro, the river otter reached the Atlantic in the Viedma region and the pampas deer inhabited all of the northern and central parts of Argentina to the east of Chubut. But not only the native fauna suffered due to the colonizers' presence. Several species of trees, including red quebracho, *Fitzroya cupressoides* (false larch) and rosewood experienced severe reduction in abundance and geographic distribution.

Thus, the European colonizers greatly exacerbated the defaunation initiated by the first inhabitants of South America several thousand years ago during the Pleistocene period. At the start of the 20th century the natural ecosystem of the Southern Cone was already exhibiting serious structural and functional problems as a result of the disappearance of many of its large vertebrate species which play key roles in those ecosystems.

Most of Argentina's ecosystems are defaunated, even those protected in national parks. The lush jungles of Iguazú National Park in Misiones are no longer home to the giant otter, bare-faced cassowary, red-and-green macaw, harpy eagle or Brazilian merganser. PHOTO: FLORIAN VON DER FECHT.

The incredible forests and grasslands along the Bermejo River in El Impenetrable National Park in Chaco have lost the giant river otter, marsh deer, pampas deer and guanaco. PHOTO: HERNÁN POVEDANO.

In the rugged mountain chains of the Lihué Calel National Park, La Pampa, the jaguar and the pampas deer are now just a memory. PHOTO: FLORIAN VON DER FECHT.

The forests, steppes and lakes backed by the looming Lanín volcano in this national park in Neuquén no longer protect the huemul, while the guanaco and southern river otters have almost disappeared. PHOTO: FLORIAN VON DER FECHT.









Currently Argentina along with Uruguay is one of the countries with the greatest loss of animal species in South America. Perhaps Argentina's mostly flat topography or the prevalence of open natural areas such as pampas and steppes are contributing factors. Even places such as the national parks which we consider to be well-preserved are largely defaunated. In the mountain forests of El Rey National Park the jaguar is missing; in the rivers and streams of Iguazú National Park the giant otter is absent. In the grasslands of El Impenetrable National Park the guanaco is no longer present. In the forests and steppes of Lanín National park the huemul is not found. The list goes on and includes many key species in virtually each and every one of our national or provincial parks. It would be unlikely to find an example that conserves its original cast of large mammals, birds or reptiles. These environments, often considered pristine, are actually impoverished and even partially devoid of fauna due to historical extinction processes that continue on to today.

Unfortunately the process of degradation did not stop with the loss of the key species in natural environments in Argentina, but instead, sped up after the industrial revolution, which strongly impacted already impoverished ecosystems of our country, particularly from the second half of the 20th century and beyond. In fact, cattle ranching and intensive agriculture, the mining and hydrocarbon industries and the construction of large hydroelectric dams, among other factors significantly reduced the extension of natural environments, fragmenting them and isolating the populations of species that continued to live within them. Regions of Argentina, such as the Misiones jungle, the Yungas jungle, the Chaco and Espinal forests, which were defaunated but still standing in many areas, began to be devastated. This latest crisis of biodiversity loss, comparable to mass extinction events that occurred millions of years ago, gave rise, as in other parts of the world, to the Anthropocene.

The term Anthropocene is used to define a new geologic epoch in which the climatic, hydrologic, geologic and biological processes of the earth are altered by human activity. There is a consensus that the Anthropocene began in 1950 when a notable acceleration of the human impact on Earth took place, and although the term has not been recognized by the International Union of Geological Sciences, it is frequently used in current scientific literature.

The prospect is discouraging, but at the same time, in Argentina we have an enormous potential to restore our ecosystems through rewilding. We are fortunate to have a relatively well-consolidated national parks system with room for expansion as well as the knowledge and technology to bring back lost species. All that remains is to decide to scale up rewilding processes such as the one carried out in Iberá in order to once again coexist with nature in all of its complete, functional, vibrant beauty, with economies based on well-conserved, natural ecosystems.

Argentina's defaunated ecosystems suffered another blow in the second half of the 20th century. Activities such as intensive agriculture and cattle ranching, the construction of large dams and mining and hydrocarbon exploitation seem to mark the beginning of a new geological era: "the Anthropocene," an era characterized by the acceleration of the destruction of nature, and in which the Earth's climatic, hydrological, geological and biological processes are profoundly altered by human activity. PHOTOS: FLORIAN VON DER FECHT, MATÍAS REBAK, FLORIAN VON DER FECHT.









CHAPTER 4

STRATEGY IN ARGENTINA

In the 1980s there was a pioneering initiative on Victoria Island in Nahuel Huapi National Park to carry out semi-captive breeding of pudú with the goal of reintroducing them in parts of national parks where they had disappeared. Unfortunately, the project was discontinued, and the pudús were released on that island and not in the previously identified sites. PHOTO: MARTÍN CÁRDENAS.

REWILDING AS A CONSERVATION

"Rewilding is conservation on the offensive. Rewilding projects are therefore likely to attract more attention than those that fit within the widely accepted, defensive, model of conservation that has dominated since the nineteenth century. Rewilding is a provocation –often deliberate." **Richard Corlett**

The beginnings of the conservation movement as we know it today are hard to pinpoint, but some think its first manifestation was in an English botany book from 1664, which warned of increasing deforestation. Beyond this specific case, modern conservation arose just before the Industrial Revolution, at the end of the 18th century, due to the over-exploitation of European forests used to build war and transport ships.

These actions and those that followed sought to stop the damage that humans were inflicting on nature. The defensive reaction as a response to the destruction has defined conservation strategies to this day. Try to save that which is left, resisting in the "trenches" so that the "enemy" doesn't advance on unconquered territory. From this point of view, conservation is mostly aimed at not touching, which is to say, protection.

Under this paradigm, in 1872 the United States established Yellowstone National Park, the first of its kind. Beginning at that time, national parks and protected areas became one of the main conservation tools developed worldwide. Argentina was one of the first countries to follow the example of the United States, and in November of 1903, the visionary Francisco Moreno penned the document through which he donated the territory that in 1922 would give rise to the Parque Nacional del Sud, (Southern National Park, later Nahuel Huapi), and to the entire Argentine national parks system.

In the decree that creates the above-mentioned park, signed by then president Hipólito Yrigoyen, the prevailing concept is evident, establishing it as "essential to avoid the destructive exploitation" of "lakes, hillsides, mountains, rivers and virgin forests." The law that created the Administración de Parques Nacionales (National Parks Administration) in 1934 follows in this same vein, mentioning that "the regulation tends to preserve intact the characteristics of the landscape and to beautify it without altering its original conditions."

This approach of conserving by protecting what still stands is appropriate but it is not enough. Why is this? Because when national parks are created, contrary to what is commonly held, they do not protect complete and functional ecosystems. The majority of them have already lost their largest tree specimens (in the case where they contain forest and jungle ecosystems) or large animal species. In fact, it is likely that in Argentina there exists not one single park with an intact list of wildlife because most of them were already more or less defaunated when they were created. The same is true of remaining protected areas or natural environments without formal protection. Furthermore, many of these parks continued to lose their wildlife after they were established, which calls into question the legitimacy of the hands-off paradigm as a strategy.

Here are a few examples. Lanín National Park was created with huemul deer within the territory, though they do not currently live in the park. The same has happened with the jaguar in the Copo and El Rey National Parks, and the giant otter and the Brazilian merganser (a type of duck) in Iguazú. Meanwhile in other national parks, species have dwindled to such a great extent as in the case of the guanaco and river otter in Lanín that they can be considered ecologically extinct. And between 2014 and 2017 San Guillermo National Park lost more than 90% of its guanaco and vicuña population due to an outbreak of mange, likely spread to them by domestic livestock and which the authorities let go unchecked.

These species which are missing or very rare in national parks and other natural environments in Argentina are generally keystone species, from which we can conclude that the majority of natural environments in Argentina–including those protected within national parks and other protected areas–are not complete, and have lost some of their functionality.

Talampaya National Park was created in the province of La Rioja in 1997 when the largest predator of the region, the jaguar, was already extinct. A conservation strategy based primarily on non-intervention will never succeed in restoring a complete and functional ecosystem in this park. PHOTO: FLORIAN VON DER FECHT.

Copo National Park was created in the province of Santiago del Estero in the year 2000 when the jaguar still inhabited this region. The conservation strategy adopted-based mainly on non-intervention-did not prevent the extinction of the apex predator in this park. PHOTO: FLORIAN VON DER FECHT.

Management of El Palmar National Park in the province of Entre Ríos is evaluated as "moderately satisfactory" based on the types of uses (permitted or prohibited) that occur there, as in the rest of the protected areas. But if the effectiveness were measured on the basis of the integrity of the ecosystems it protects, the classification would be "deficient" as this park has been significantly defaunated. Looking only at mammals, the jaguar, the giant river otter, the giant anteater, the black howler monkey, the pampas deer, the collared peccary and the coati have become extinct. The evaluation system for management of protected areas obscures the need to restore natural ecosystems. PHOTO: ANIBAL PARERA.





manage their protected areas.

The IUCN was also responsible for developing the Red List, in 1964. This list compiles a list of threatened species, which is another conservation tool adopted at a global level (including Argentina) which greatly contributes to the continued existence of certain species on the planet. However, red lists focus on the number of remaining individuals of a species (and their current population trends) in the area of their original distribution, and many times this number is considered sufficient to guarantee their permanence at the global or national level despite the fact that this species (and therefore its ecological role) has disappeared from vast territories.

Given the proliferation of protected areas around the world, the IUCN created the National Parks Committee in 1948. In 1960 it became known as the World Commission on Protected Areas (WCPA). This commission's main objective is to help governments and other organizations to

One of WCPA's greatest contributions was to standardize the management categories of these territories into six different models. For example, a Strict Nature Reserve (Category I) prohibits any use other than research whereas a Park (Category II) allows low-impact public use and the Multiple Use Reserve (Category VI) allows certain extractive activities such as forestry or livestock. It is expected that the most restrictive management categories (I and II) will be well-preserved and therefore no interventions are necessary to continue protecting them. However, as we have seen, this is not generally true, and adopting non-intervention strategies in degraded ecosystems that should be restored only allows the non-functionality of the ecosystem to persist.

This model of management categories that is based on the type of permitted use rather than the level of integrity of the ecosystem (adopted by all Argentine entities, national and provincial) contributed to perpetuating the paradigm that protecting what still remains is sufficient. This model evaluates the effectiveness of the management of protected areas based on the uses that are developed within them and is not based on preserving well-conserved ecosystems, which is to say ecosystems that are complete and functional. In practice, those responsible for the management of a protected area ensure that only permitted uses are carried out within their jurisdiction, and if they detect a prohibited use, they act accordingly. But only on rare occasions do they take action due to the absence of a species or the disappearance of a species during their oversight. In fact, there is no record of administrators being taken to task for not intervening against the extinction of a species in a national park in Argentina.

> Rewilding aims to restore the ecological roles of species that have become extinct or are vanishingly rare, regardless of whether they are considered threatened globally or nationally. Therefore, the red lists of threatened species that largely guide conservation decision-making have limited applicability when it comes to rewilding. For example, the guanaco does not present major conservation problems at the national level, but nevertheless, we are investing resources to reintroduce it in El Impenetrable as we seek to recover the ecological role of this large herbivore in the dry Chaco. PHOTO: HERNÁN POVEDANO.

For example, although the collared peccary and the jaguar are classified as Least Concern or Near Threatened respectively on a global level, that does provide information on their ecological role in the Iberá Wetlands, where both species are extinct. Red lists should not only focus on the number of surviving individuals but also the loss of their ecological roles where species have already disappeared. Failure to do so emphasizes the urgency of protecting what still remains over the need to recover what has been lost. We consider the approach based on the degree of threat to species to be useful but insufficient, and believe that instead we should focus on the integrity of the ecological roles that species play in a specific region. Compiling red lists at the national or provincial level could be of substantial help to recover the integrity of natural ecosystems, as it would clearly indicate which species are lost or which exist only in very small numbers in that conservation unit, and this might encourage taking measures to recover them (see Chapter 20).

Beginning in 1970, with the appearance of new knowledge and technology, another strategy was formally incorporated into the universe of conservation: restoration. Although there are many instances of restoration prior to this date, it is only at the end of the 1970s when a conceptual framework was developed. For the first time an active conservation strategy was proposed, aimed at recovering what was lost, representing a better alternative to the traditional strategy of defending what still remains.

In Argentina, as in other parts of the world, restoration was especially focused on recovering plant species, including tree species where they had been lost, likely for a variety of reasons. First, when restoration arose as a discipline, there was little knowledge about top-down regulation involving key species, and instead, more attention was paid to bottom-up regulation, that is, from lower trophic levels (producers) to higher trophic levels (consumers) and therefore restoration was focused on plant life. Second, animal species restoration projects are generally more expensive, more technically complex, more time-consuming and require building broad political and social support to proceed, and all of this makes them less common. Finally, restoration tasks in Argentina have mainly been run by forestry engineers and to a lesser extent by agronomists, professions linked to natural resources (especially plants) and with a strong productive component. Therefore they have focused on plant communities and more specifically on forest and jungle environments. There are several forest restoration initiatives in different territories of Argentina including in national parks and at the same time the state manages a large number of native species plant nurseries.

Environmental restoration in Argentina has been focused on recovering plant species. This strategy places more attention on regulations from the bottom up, which is to say from lower (producers) to higher (consumers) trophic levels of the food chain. PHOTO: REFORESTARG VOLUNTEERS MOVE COIHUES THROUGH THE SNOW TO THE PLANTING SITE IN CHOLILA (CHUBUT PROVINCE) WHERE A FIRE DEVASTATED 40 THOUSAND HECTARES OF NATIVE FOREST, PHOTO: GUSTAVO CALFIN.





On the other hand, wildlife restoration initiatives are rare, and examples of rewilding in Argentina are not numerous. There were some inroads with the pudú (a small deer) in the province of Neuquén (Nahuel Huapi National Park) and with the pampas deer in the province of Buenos Aires, both of which were later abandoned, and there are also some notable initiatives with guanacos and vizcachas in the province of Las Pampas (in the protected areas of Luro and Pichimahuida) and in the province of Córdoba (Quebrada del Condorito National Park). Fundación Bioandina–along with other institutions such as the Ecoparque de Buenos Aires–are conducting the Andean Condor Project which has managed to reintroduce this species in regions where it had disappeared, such as the Somuncurá plateau in Río Negro. Although there are few examples of this type of project, it is interesting to note that they have been carried out by the national government, provincial governments and NGOs. These pioneering projects are just starting to get some support through official documents and pronouncements but still lack concrete actions to accompany them (see Chapter 20).

In summary, at its inception and as a pioneer on the South American continent, Argentina began by adhering to the early paradigm of conservation where it is believed that the best way to conserve a natural environment or species is to not intervene. As we have mentioned, this continues to be the dominant paradigm vis a vis conservation in our country. However, it is not sufficient because 1) when Argentina adopted this approach the natural ecosystems were already degraded and defaunated, and many keystone species had already been largely eradicated from the territories that they inhabited and 2) under this paradigm the ecosystems continue to degrade and the species diminish in both number and distribution range. It is therefore fundamental to implement proactive approaches to conservation and begin restoration on a large scale, mainly recovering key species to regenerate complete and functional ecosystems. That is to say, to implement rewilding. The example of Iberá represents the opportunity to continue to break new ground in the field of conservation and to position Argentina as an innovative country that is a leader in restoration in South America. This requires rethinking traditional conservation approaches such as the management categories of protected areas and the creation of red lists, as well as developing new norms and regulations as discussed in Chapter 20. It does not require us to abandon the existing legal bodies of conservation, but rather to complement and reformulate them for the current situation, where we are in dire need of rewilding to reverse the environmental crises that are sweeping the planet.

Unlike the more classic restoration strategy, rewilding seeks to restore the upper levels (consumers) of the food chain as it pays special attention to top-down regulation, or trophic cascades. PHOTO: A GIANT ANTEATER RELEASED IN IBERÁ AS IT ROAMS THE GRASSLANDS IN SEARCH OF ITS MAIN PREY: ANTS AND TERMITES, PHOTO: RAFAEL ABUÍN AIDO.

The reintroduction of the Andean condor in the Sierra de Pailemán (Río Negro Province) carried out by Fundación Bioandina and Ecoparque de Buenos Aires is one of few examples of species reintroduction in Argentina. PHOTO: TOMÁS CUESTA.



CAHPTER 5

REWILDING

Ceramic jaguar crafted by an artisan in El Impenetrable, Chaco Province. In order to implement the rewilding strategy, we help to develop new economies through the economy of nature model. PHOTO: ESTRELLA HERRERA.

AND THE ECONOMY OF NATURE MODEL: THE DEVELOPMENT OF A NEW ECONOMY

"In a mostly urban world, the economy of nature is presented as a possible path to recover ecological integrity of our natural areas at the same time that these act as engines of an economic and social resurgence in disadvantaged rural regions."

Rewilding is a strategy used to regenerate complete, functional ecosystems that are self-sustaining or that require only minimal human intervention to thrive. To carry out rewilding, we must contemplate a model that considers the territory in which it will be undertaken, develops an economy based on wildlife observation—and thereby nature conservation—and encourages local communities to participate as the main beneficiaries of this new economy. These aspects together form what we refer to as the "economy of nature" model.

The economy of nature requires a territory where it can be implemented. To this end, Fundación Rewilding Argentina acquires private properties that are part of different productive models such as livestock, agriculture and forestry. In these properties, we work to replace the existing productive models with the economy of nature. During this process the lands cease to be private and become public through donation to the provincial or national government and are set aside for conservation and public use. Opening these lands to visitors begins before the donation is made and involves more than "unlocking the gates and swinging them open." Fundación Rewilding Argentina invests in quality infrastructure for public use to facilitate access, while prioritizing the visitor experience and minimizing the impact on the environment. Thus, lands that were formerly used for livestock agriculture or forest production are transformed into lands used for the economy of nature or parks, which will become an engine for local development and job creation.

While a livestock yard produces cows or sheep, an agricultural field produces wheat or rice and a forest produces pines or eucalyptus, a park managed by Fundación Rewilding Argentina and then donated to the state will produce wildlife. In particular, through rewilding, the Foundation's land will produce species such as the jaguar, puma, marsh deer, giant otter, red-and-green macaw, guanaco and huemul. Consequently, these species will restore important ecological processes to recover degraded ecosystems and thus in the medium and long term, wildlife will become more abundant, circulate freely without human harassment, and it will be easy to observe.

Livestock farming generates income through the sale of meat, leather or milk. Agriculture brings in foreign income from the sale of grain, fiber or flour, and forestry makes money through the sale of wood or resin. Similarly, the economy of nature generates income mainly through wildlife-based tourism. To implement this a territory's brand is developed, such as Iberá, El Impenetrable, Patagonia or Patagonia Azul where we help the local people to provide high quality services linked to wildlife. Thus, local people have the opportunity to join the economy of nature as entrepreneurs who run their own businesses such as wildlife observation excursions, local gastronomy tours, producing handicrafts and offering homestays. Above all, these offers must be heavily slanted towards experiences that only local people can convey. In this way it is the local communities that benefit from this productive model that stimulates entrepreneurship, which at the same time strengthens roots to the community, generates pride and leads to greater empowerment among the population (see Chapters 12 and 13).

In contrast to most of the typical productive activities that take place in our country, the economy of nature avoids non-sustainable extraction of natural resources and instead is based on providing services which depend on complete and functional ecosystems in order to prosper. This is the case with wildlife observation tourism in ecosystems in an optimal state of conservation which provide ideal visitor experiences, thus promoting local interest in maintaining healthy ecosystems. For this reason, the economy of nature model results in economies that contribute to restoring environments.

Human beings have played a central role in the development of livestock, agriculture and forestry on the basis of just a few species around the globe, homogenizing the productive matrix and the environments in which these activities take place. This is the case even in marginal sites (sites that due to environmental conditions are not ideal for farming or livestock) such as Iberá, El Impenetrable and some sectors of Patagonia. The advance of agriculture into marginal areas results in rapid soil depletion, decreases yields per hectare and lowers profit margins so that long-term success requires state subsidies.

In contrast, these marginal areas that yield poor results for traditional agricultural production are excellent places for the economy of nature as in Iberá, where producing wildlife is less costly than producing livestock. In addition, nature tourism that stems from wildlife observation generates more income than livestock while allowing a better distribution of that same income. It more fairly distributes income as it is no longer concentrated in the hands of a few firms that manage large swaths of land. On a provincial scale, the economy of nature does not replace traditional activities, rather, it diversifies the productive matrix by increasing foreign income.

The economy of nature model is not limited to lands that are in the process of becoming public, but can also be developed on private properties (see Chapter 15).

The rewilding projects that we undertake via the model of economy of nature are, by definition, economically viable and should be sustainable over time. This is achieved when four factors are met: the state assumes the management of the created park, guaranteeing its existence in perpetuity; the development of public works that enhance and expands the Foundation's investments are verified; the keystone species that are reintroduced or supplemented demonstrate sufficient populations that do not require intervention or require only minimal intervention and; local entrepreneurs have the capacity to make genuine investments that allow their businesses to grow. Once these objectives are met, Fundación Rewilding Argentina withdraws and the implementation of the model can be considered successful.

For some orthodox conservationists the concept of economy of nature implies "surrendering to capitalism" and "commodifying conservation." However, the economy of nature assigns value to the territory through restoration and conservation, ensuring that both communities and visitors can access and have a positive experience in an ecosystem in which native wildlife thrives.

The economy of nature model allows us to transmit our values and use a shared language with key actors that view wildlife conservation as a threat to development and well-being of people, as is the case with some politicians, businesspeople, traditional agricultural producers and people outside of the conservation sphere. Many of these actors influence or make necessary decisions to create parks, recover extinct or threatened species and generate restorative environmental economies. Thus, the economy of nature model also represents a valuable tool to gain social license and political support when carrying out rewilding strategies

REWILDING AND THE ECONOMY OF NATURE MODEL: THE DEVELOPMENT OF A NEW ECONOMY



The economy of nature model is based on four pillars: parks, wildlife, restorative economy and community well-being. PHOTO: EDWIN HARVEY. Parks: the territories where we carry out the economy of nature model are protected territories, categorized as parks, which must be transformed into nature tourism destinations. These parks, as far as possible in the public domain, are open to visitors and access is facilitated by building quality infrastructure. PHOTO:: LAGUNA IBERÁ PORTAL IN THIS NATIONAL PARK, MATÍAS REBAK.

Wildlife: under the economy of nature model we produce wildlife by reintroducing extinct species or supplementing dwindling populations. Thus, we manage to regenerate complete and functional ecosystems with abundant, observable wildlife. These natural spectacles generate a productive opportunity through nature tourism. PHOTO: TANIA THE JAGUAR WITH HER CUBS ARAMI AND MBARETE, BORN AT THE JAGUAR REINTRODUCTION CENTER LOCATED IN IBERÁ, CAMERA TRAP / FUNDACIÓN REWILDING ARGENTINA.

Restorative economy: in the economy of nature model, the restorative economy is linked with tourism based on wildlife observation guided by local people. In addition, a territorial brand can be developed to offer products made in the region which help to reduce threats to the park and its wildlife. PHOTO: MATÍAS REBAK.

Community well-being: beyond the economic benefits, the economy of nature model stimulates entrepreneurship, generates roots and values in the local communities, which leads to local empowerment. In addition to the employment opportunities offered by the nature destination, training in trades, access to basic services and connectivity are also increased. PHOTO: A LOCAL RESIDENT INSTALLS THE ROOF OF A TOURIST SHELTER USING THATCH, A TRADITIONAL CONSTRUCTION TECHNIQUE FROM IBERÁ, BETH WALD.





IBERÁ, THE ORIGIN OF THE ECONOMY OF NATURE MODEL

We developed the economy of nature model and implemented it for the first time in Iberá in conjunction with the province of Corrientes. Here, the model allowed us to create a plan together with the provincial government and various other municipal governments and effectively communicate our intentions to actors outside of conservation such as livestock and forest producers. The economy of nature territory in Iberá currently includes a national park of 158,000 hectares and a provincial park of 600,000 hectares which form the Gran Parque Iberá. From the start, the economy of nature was centered on increasing the populations of species that are still present in the territory such as the capybara, alligator, marsh deer and roe deer. This was done by eliminating threats that had led to the decrease in population and which impeded its recovery. We then began more intensive production reintroducing the giant anteater, pampas deer, collared peccary, red-and-green macaw, jaguar and giant otter. At the same time, we collaborated on the development of four public access portals: Laguna Iberá, San Nicolás, Carambola and Cambyretá. Entrepreneurs from four locales linked to these portals today lead different tourism-related activities. These locales are Colonia Pellegrini, San Miguel, Concepción del Yaguareté Corá and Ituzaingó and currently, wildlife observation tourism is the main economic activity in Colonia Pellegrini.



Boat outing for wildlife observation at Portal Carambola. PHOTO: MATÍAS REBAK.



 (\top)



Map of the territorial projects where we do rewilding. Fundación Rewilding Argentina is developing or has developed various projects in different regions of Argentina. The four broadest projects underway using the rewilding model are Iberá (Corrientes), El Impenetrable (Chaco), Patagonia (Santa Cruz) and Patagonia Azul (Chubut).



IMPLEMENTING REWILDING IN ARGENTINA



CHAPTER 6

IN IBERÁ

In 2007 the first individual of the first species introduction project was released: a female anteater named Yvoty Porã (Beautiful Flower in Guaraní). She had been raised in a house by a family in Jujuy Province, who adopted her when she was young, because some experts opined that it would be impossible for her to adapt to her new environment, let alone reproduce. Yvoty lived past the age of fifteen and had at least seven offspring, which demonstrates a highly successful project. PHOTO: CLT / FUNDACIÓN REWILDING ARGENTINA.

THE HISTORY OF REWILDING

"The creation of national parks is not the end of the story. Their survival and ability to thrive can only be guaranteed by those that defend them. We, the people who learned to know and love these lands and waters, must continue to be their guardians and protectors. Moreover, the parks will last as long as their biological communities remain healthy and whole. Extinct species must be reintroduced; ecosystems must function and evolve."

Kris Tompkins

DEVELOPING THE VISION

When Doug and Kris began the Iberá Project in Corrientes it was their vision to bring back keystone species to regenerate a healthy, complete and functioning ecosystem.

In 1997 the then-president of the National Parks Administration invited them to Argentina to visit the Yungas (mountain forests) of Salta and ask for their help to expand Baritú National Park. It was during that trip that an Argentine environmentalist invited them to later visit the Iberá Wetlands where there were also many properties for sale within the nature reserve.

As they were flying in their small plane over the vast expanse of the wetlands to see the landscape, wildlife and human activities, Doug saw the incredible opportunity to replicate here-but with the jaguar-the rewilding work carried out by the US National Parks Service in Yellowstone in the 1990s, when wolves were reintroduced.

Iberá had been defaunated several decades earlier by hunters seeking skins and feathers to supply European markets. In 1976, biologist George Schaller spent several days flying over Iberá because he had set out to study capybara ecology, but when it was impossible for him to observe wildlife, he changed the location of his study to the Brazilian Pantanal; although the habitat appeared to be intact, wildlife was absent. In Doug's first consultation with local conservationists, he learned that at a minimum, the jaguar, giant anteater, tapir, pampas deer, giant otter and the collared peccary were extinct in Iberá.

Doug was so enthusiastic about conducting his own rewilding experiment that the following year he acquired the San Alonso ranch in the middle of the wetlands, waiting for the right moment to begin restoration work. The strategy was to include reduction of threats that caused species extinction and the protection of Iberá over the long term, with the creation of a large national park.

To this end, between 1998 and 2002, Doug and Kris acquired a number of contiguous ranches covering a total of some 150,000 hectares. While they had all been cattle ranches, many of them no longer had animals due to the ravages caused by the great floods of 1998, when the effects of that year's El Niño was particularly strong in the Argentine Mesopotamia.

TEAM BUILDING AND GETTING TO WORK

In 2005 the lands Doug and Kris had acquired included environments of sufficient quality and quantity needed for the species to be introduced. Additionally, they completed work to repair houses, build lodging to accommodate the first visitors, reinforce perimeter fences and eliminate interior fences. It was time to take the next step in Doug's vision: rewilding. This phase of active wildlife management required a team of young Argentine professionals who lived in the territory and who would be primarily dedicated to enforcing environmental laws and leading the change in vision for the territory.

The first team that Doug and Kris put together oversaw land purchasing and the architectural remodeling of the ranch houses. For many years, this was the only team and it was composed mainly of ranchers from Corrientes who were familiar with the local ways and customs but who had strong opinions about what was good and bad about the prevailing traditions. Corrientes is historically a cattle-raising province, proud of its autonomy so its inhabitants, including Doug and Kris' collaborators and several local environmentalists were skeptical of ideas such as reintroducing the jaguar and to an even greater extent donating the acquired lands to the state.

To take the next step they needed young people who would enjoy new challenges and nature in its wildest state, who were not intimidated by the intolerant reactions of the old ranch bosses, and whose dreams included sharing the planet with all of its biodiversity. This new team was composed mainly of Argentines from government agencies with experience in creation and management of protected areas, veterinarians from wildlife rescue centers and environmental activists; it also included a group of Spaniards who shared techniques for wildlife recovery processes and conservation perspectives from other parts of the world. Like Doug and Kris, they all wanted to break with the local status quo, generating a proactive and innovative synergy, which was necessary to overcome the strong cultural resistance to ideas that came from outside of Argentina.

The change process involved many different types of work on different territorial scales, so they formed strategic programs to align with the different phases of the Iberá project, each with coordinators with different profiles and backgrounds. The Parks Program would address the legal protection of the territory, and its opening to public use, including infrastructure development.

Doug and Kris Tompkins landed for the first time in Iberá in 1997 and a year later acquired the first property in this wetland. They brought with them the vision of creating a large public park and reintroducing extinct wildlife species, including the apex predator of this environment: the jaguar. PHOTO: CLT/FUNDACIÓN REWILDING ARGENTINA.





The Conservation Program would be in charge of controlling invasive exotic species, fire management and the illegal entry of cattle from neighboring fields. The Species Program was to execute the reintroduction projects of extinct fauna. The Tourism Program would work with the shift of a production-based economy to a service-based one. The Community Program would deal with cultural re-valuation, environmental education, training in new trades and the well-being of rural populations. Outside the territory it would also be necessary to set up an administrative team to manage accounting, legal and financial matters and resolve a large and ongoing demand for complex procedures. Unbeknown to us, we were laying the foundations for the economy of nature model. The example of Doug and Kris living in the territory and sharing the activities with the team set a quick work pace and allowed them to change strategies on the ground based on local community reactions and the results obtained.

Thus, in early 2006, the long-awaited moment to plan the how and where of the reintroduction of the first extinct species in Iberá and Corrientes arrived. The first workshop to define the macrostrategies for the first ten years of work brought together the deputy director of the Iberá Nature Reserve and a few Argentine conservationists who were sympathetic to these ideas, a total of eight people. They defined the sequence in which the animals would be introduced, leaving the jaguar for last, when technical capacity, social and political support would be at their highest.

LEGITIMIZING REWILDING WITH THE PEOPLE OF CORRIENTES

The reintroduction of the giant anteater was the first project that had to break down cultural barriers in the ways of thinking about conservation in Argentina. The species was chosen due to its charisma, its relative abundance in the north of the country and because there were no strong research groups working with it at the time. To develop the project, the IUCN protocols, the recommendation of numerous manuals and publications about the reintroduction of species, the advice of convened experts as well as all of the administrative and legal steps were all taken into account. Even so, it took almost two years to obtain approval and celebrate the arrival of the first giant anteater to the Iberá: a female named Yvoty Porã (beautiful flower in Guaraní, a name chosen by the children of Colonia Pellegrini), who was raised by a family in Jujuy in the kitchen of their home. It was not, perhaps, the ideal beginning, but it was possible. Over the years more than 100 anteaters were rescued, the majority of them orphan pups whose mothers had been killed by hunters or dogs in other provinces in northern Argentina, and this is how the five population nuclei that today live in Corrientes were formed. Though complicated and time-consuming, using

Doug and Kris assembled technical and operational teams helping to create leaders that continue to the present day, implementing their legacy in Iberá and scaling conservation actions in other places in Argentina. PHOTO: CLT / FUNDACIÓN REWILDING ARGENTINA.

After the success of the reintroduction of giant anteaters it was time to work with the pampas deer, a species whose conservation status was much more compromised. Despite the denial by Argentina's National Ministry of the Environment the deer translocation was able to be carried out because the movement of the animals was within the province of Corrientes, whose government authorized the translocation. After several years of work, the pampas deer population reintroduced in Iberá is the largest in a national park in Argentina. PHOTO: CLT / FUNDACIÓN REWILDING ARGENTINA.

the specific stories of each orphaned or injured animal which was rescued and freed was the best way to gain the support of the community and authorities to continue with the rest of the planned reintroductions. Many researchers joined in the drafting and execution of the project whereas a group of naysayers mistakenly predicted the failure of this and other rewilding initiatives.

CONFLICT MANAGEMENT

It was not an easy task to synchronize all of the projected changes for Iberá. While the community of Corrientes supported CLT (this is how the Foundation was known at that time, for its former name, Conservation Land Trust) in relation to their work with wildlife, there was a lot of opposition to the "the outsider" figure: Douglas Tompkins. Doug's questioning of the traditional forms of production without soil conservation, and his denouncing the construction of the embankments and irrigation canals that marred the wetlands galvanized an opposition front made up of ranchers and rice companies.

Powerful businesses and the related media were busy putting together a story of conspiracy and building up the image of the foreigner who came to steal water for himself, to drive out rural settlers and to build US military bases in the wetlands. A large sector of the political class, both from the right and left repeated and re-repeated this story.

There were also tensions within the team, as local members wanted to protect relationships with their neighbors, family members and acquaintances, while the activists wanted to denounce the farmers and the government of Corrientes for non-compliance with environmental laws. The media played an important part in fanning the flames of the conflict and generating combative positions between the environmentalists and the more conservative producers in the rural sector. The conflict seemed to escalate over time due to the lack of trusted messengers to build trust between the two sides.

The municipality of Colonia Carlos Pellegrini, where some of the lodges had been built on the shores of the Iberá lagoon offered the opportunity to build strategic alliances to show that the proposal was aimed at benefiting local communities. We approached the mayor with an offer to improve the infrastructure which would help local people, and which made it possible to inaugurate the first free campsite in Iberá, the design of which was aesthetically pleasing. This gesture of donation and work with the neighbors strengthened Colonia Pellegrini as a tourism destination for wildlife observation. The mayor, encouraged by these first experiences with tourists, understood and embraced the new economic proposal. He was the first trusted messenger to communicate our story and add to it other mayors from nearby local communities. Thus, a working group

The municipality of Colonia Carlos Pellegrini was where we gained a foothold in Corrientes, building strategic alliances that allowed us to communicate our vision and objectives in Iberá to a large number of key players and references in the province. This is where nature tourism based on wildlife observation was first developed within the framework of the economy of nature model. PHOTO: THE CAREFULLY DESIGNED, AESTHETICALLY PLEASING PELLIGRINI MUNICIPAL CAMPGROUND. IT WAS DONATED BY DOUG AND KRIS TOMPKINS TO PROMOTE NATURE TOURISM AND WILDLIFE OBSERVATION, CLT / FUNDACIÓN REWILDING ARGENTINA.

San Alonso, Iberá was first acquired in December 1998, and 20 years later, in December 2018, the national park was created. The people of Corrientes went from opposing the project to being proud custodians of the largest natural park in the country (including the national park and the provincial park). PHOTO: CLT/FUNDACIÓN REWILDING ARGENTINA.





When powerful people from provincial governments have a shared vision, strategic decisions generate high-impact actions that can accelerate changes to land use. Sergio Flinta (left), a reference and supporter of the creation of Iberá National Park and the reintroduction of species was able to understand Doug (right) and Kris Tompkins' intentions and generate a public vision of the economy of nature on a provincial scale. FOTO: MARISI LÓPEZ.

consisting of the ten mayors from municipalities near the wetlands was formed to begin to develop the route that would become the Iberá tourist circuit. Over time, other parties were added, who, seeing the results obtained in Pellegrini helped the messages to flow among the most diverse sectors of the Corrientes community. Thus, understanding of the vision and the paradigm shift began to take hold in the territory.

INCREASING THE SCALE AND IMPACT OF REWILDING

Towards the end of 2009, it was time to move forward with the reintroduction of the pampas deer, a species that is more endangered than the anteater, as only some 2000 specimens survived in Argentina. In contrast to the anteaters, deer would be obtained through the translocation of wild individuals from the last remaining population in Corrientes, cornered in the scrublands of the Aguapey basin, surrounded by the advance of pine plantations.

At that time the Argentine minister of the environment was developing the Plan Estratégico del Monumento Natural Nacional Venado de las Pampas (Strategic Plan for the Pampas Deer National Natural Monument) to save the deer from extinction, and we participated in the workshops to seek technical support for our proposal. Unfortunately, the national experts ruled that it was dangerous to endorse a plan like the one we proposed, and the Ministry opposed the translocation.

As Argentina is a federal country, the Dirección de Recursos Naturales de Corrientes (Corrientes' Division of Natural Resources) has the authority to permit captures and relocations within its own jurisdiction and this allowed the reintroduction project to continue. With the assistance of a team of Brazilian veterinarians with extensive experience in trapping deer in the Pantanal we learned the basic techniques for their management in a first translocation of five individuals. In a short time, and having translocated and monitored dozens of deer, we became known on a national level for the management of the species.

Deer translocations required the endorsement of some farms in the Aguapey basin. This contact led us to be able to understand their apprehensiveness toward the foundation: the activist conflicts had significantly affected the rural sector. Only after intensive public relations work were we able to rebuild trust so that they would allow us to enter their land.

Now with ample experience in the management of anteaters and deer, we decided to continue with collared peccaries, a species for which the approach appeared simple. It was not threatened, its management appeared straightforward and it was abundant in zoos and wildlife rescue centers that would be a source for individuals. However, the approval of the project presented to the Corrientes' Division of Natural Resources which shared the vision and also approved of rewilding strategies took a very long time. The peccary's physical resemblance to the feral pigs in Iberá that caused a litany of problems for agribusiness could generate opposition in the rural sector and the government did not want to reactivate that conflict which had been largely overcome, but that was still bubbling just under the surface. The project was only approved when we agreed to keep a communications low profile for this project. Finding the best way to manage the peccaries was also complex: fights between released animals, the challenges for free peccaries to find food,

ulation nuclei in Iberá.

REWILDING AND BIRDS

The work with mammals was so attractive that it raised the attention of several ornithologist friends who, in 2014, questioned the lack of avian species on our priority list. To recover a complete and functional ecosystem, we should also rise to the challenge and bring back macaws and bare-faced curassows, the large winged fruit dispersers missing from Iberá.

The macaw brought new challenges as this species had become completely extinct in Argentina and we had to work with captive individuals who had spent their whole lives in small cages without flying, who were preyed upon even as adults, and once freed, could fly dozens of kilometers in a few hours, arriving to locations where we would probably never see them again (including across the border into Paraguay). In this sense social media and working with our neighbors was fundamental to finding lost birds. After six years of trial and error there are now more than 20 red-and-green macaws flying around the north of Iberá and several pairs are readying their nests, laying eggs and raising chicks.

At that time we had institutional support from the national and Corrientes governments to scale up the rewilding strategy starting with translocations of wild populations from protected areas. Due to the abundance of its populations, El Impenetrable National Park could donate tapirs that would quickly adapt to a similar environment. Similarly, the Iberá National Park could be a donor of marsh deer to recover populations in El Impenetrable which had become extinct decades ago. Both projects were approved by the National Parks Administration and preparations began without delay.

the high predation rate of the young of recently released individuals and the repeated entanglement of the peccaries' forelegs in the tracking collars were some of the difficulties. However, the experience we gained allowed us to overcome these obstacles and today the species has five pop-

Years later we started the bare-faced curassow project. Their instinctive behavior and shorter flight range favored their adaptation to living free and subsequent monitoring compared to the macaws. On the other hand, their terrestrial habits make them more vulnerable to predation. Currently we are establishing the first populations in the forests of northern Iberá.

THE TAPIR. AN UNFINISHED CHAPTER

The tapir, "the great beast" that still exists on the South American continent was also once present in Iberá and was therefore one of the keystone species that we set out to reintroduce. We started by adding animals from wildlife rescue centers, and after three years of work we managed to generate an initial nucleus where we verified the first young born.

However, in May of 2018 the tapir monitors alerted the veterinarians to the unexpected death of an adult male and also about a female that staggered when she walked and at times lost her balance. The dead animal was quickly necropsied and the sick tapir was anesthetized to take blood samples. The results showed that both of the animals were afflicted with Trypanosoma evansi which



The proposal for translocation from El Impenetrable National Park changed to become an ecological and sanitary monitoring project for tapirs in that protected area. At the same time, studies on the presence of the parasite in wild hosts and in horses in the Iberá basin and other parts of Corrientes to find areas that were free of the illness were conducted, but thus far they have been unsuccessful. (See Chapter 7.6, Fig. 2)

With Doug's sudden death in December of 2015, the search for legal protection of the territory accelerated. It was a priority for Kris to fulfill the promise of land donation to promote the creation of a national park. In Iberá we had begun the construction of enclosures for the reintroduction of jaguars and brought the first female in May of 2015, so when Doug died, we were just beginning the experimental management stage. As for the regional economic model, Iberá was already perceived as an emerging tourist destination and the government of Corrientes–led by a senator who loved the marshes—supported the vision of the economy of nature throughout the basin of the great wetland.

But there had been no advances regarding the law of ceding environmental jurisdiction from Corrientes to the national government, a necessary step for the national Congress to be able to sanction the law creating Iberá National Park. The idea that the management of the Corrientes territory would remain at the national level had been soundly rejected by most of our allies in the province, who considered it offensive, and a betrayal.

is caused by an exotic parasite brought to the Americas with cattle and whose main host is the capybara, and its vector the horsefly. It was possible to treat the animals to eliminate the virus, but the tapirs became infected again and if they were not treated, they would soon die. There was no vaccine to immunize them and the capybaras, which were abundant in Iberá due to the absence of predators, did not allow sufficient isolation to avoid contagion. These factors led us to capture all of the tapirs, and return them to captivity until we had more information about this parasite in the tapir, which was previously unknown.

DOUG'S DEATH. THE CREATION OF IBERÁ NATIONAL PARK AND THE RETURN OF THE JAGUAR

The year 2021 began, as did the UN's Decade on Ecosystem Restoration. After 15 years of work we were ready to release our first jaguars in the heart of Iberá. From the outset we knew that working with the largest feline in the Americas would mean much more than a biological and ecological challenge since the cause of its extinction had to do with the prevailing economic model. We knew that it was necessary to propose a change in the productive system, in addition to ensuring the presence of a huge, protected and well-managed territory.

> In 2012, construction began on the Jaguar Reintroduction Center in San Alonso, in the heart of Iberá, which encompasses some 40 hectares of corrals. Nine years later, on January 5th, 2021, the doors of the largest enclosure were opened for the first three individuals to live free again on Corrientes soil, more than 70 years after their total extinction in the province. UPPER PHOTO: THE JAGUAR REINTRODUCTION CENTER DURING CONSTRUCTION. LOWER PHOTO: DOUG OBSERVES TOBUNA, THE FIRST JAGUAR TO ARRIVE TO IBERÁ AS SHE LEAVES HER TRANSPORT CAGE AND ENTERS THE CENTER'S FACILITIES. PHOTOS: CLT FUNDACIÓN REWILDING ARGENTINA

However, the trauma of Doug's death weighed on everyone and there was no time for second thoughts. Two days after the accident, the new president of Argentina—who was politically aligned with the governor of Corrientes-took office. The authorities in Corrientes who had most strongly opposed the creation of the national park became its biggest supporters on the Foundation land while at the same time proposing to create a provincial park on the lands in the public domain of Corrientes. Soon after, the necessary agreements were reached between the provincial government, the National Parks Administration and the Foundation so that all of the protected territory would form part of a singular territorial vision within the framework of the economy of nature model, to continue and complete the restoration of the ecosystems species reintroduction.

Months before the tragedy that took Doug's life, the idea of a government committee, open to the participation of local NGOs and municipalities within the Ministerio de Turismo (Ministry of Tourism) had begun to take shape in Corrientes. This public-private structure of territorial governance formed by decree in 2016, and now known as the Comité Iberá (Iberá Committee) was indispensable for leading the process of protecting the land, promoting nature tourism, strengthening associations of local entrepreneurs and planning and oversight of the master plans for public works to increase the number of free access portals to Iberá, all necessary steps to generate favorable conditions for the return of the jaguar. Fully aware of the innovative nature of the process, Corrientes was at the forefront of rewilding in Argentina and South America. Currently, the Iberá Committee proudly receives technicians and politicians from other countries, provinces and municipalities to explain the details of the process of change they have been a part of.

Although the complex plan was put into place immediately and all parties were able to sign the agreements in record time, the donations and effective protection took four years of continuous efforts at all state levels. In December 2018, in the last session of the national legislature, Iberá National Park was finally created. The provincial park was mapped out by decree and expanded and ratified by provincial law at the end of 2021.

The project of reintroducing the jaguar had been developing and maturing over the course of more than ten years, through a series of meetings, workshops, trips, and talks with expert scientists, public officials, representatives of different sectors of the society, neighbors and conservation entities from other continents to receive guidance and constructive support through every stage of work. The enormous difference in the process of reintroduction of this species lay in the fact that it is impossible to free captive individuals that had generated a positive bond with humans, generally due to the provision of food. In Argentina the number of wild jaguars is very small and therefore the government technicians were not prepared to handle a capture and translocation request. The path forward had to be a project of raising the jaguars with minimal human intervention to eventually release the individuals when they were at sexual maturity and could wear satellite tracking collars to monitor the critical post-release stage within the park. We had to be prepared to monitor and feed them remotely in large enclosures in Iberá.

The release, which would eventually come, required all manner of precautions and training, gleaned from African and Brazilian sources-who were accustomed to living among large predators—to prepare neighbors, rangers and the government to take this big step. Ultimately, people's fears vanished when the first females and their cubs were released throughout 2021, and it was shown that jaguars are not interested in approaching humans and if there is enough prey, then they will not wander far from their release site. To date, the released jaguars have established their territory close to the reintroduction center where they hunt wild prey.

to the original 2004 list.

of Iberá and Corrientes.

The construction of the 40 hectares of pens in the Centro de Reintroducción de Yaguareté (Jaguar Reintroduction Center) began in 2012 and required input from international experts, two years of uninterrupted work—in extreme conditions ranging from drought to floods in Isla San Alonso-by a group of tenacious gauchos led by a passionate engineer. All of this was so that everything would be ready to receive the first jaguars in 2015.

COMPLETING THE WILDLIFE LIST

In 2016 when we had to present the rewilding plan to the national authorities for the second decade in Iberá, we proposed a broader list of species to be reintroduced in accordance with existing historical records to complete the wildlife list for the wetlands. Several species were added

Among the priorities, we committed to reintroducing the giant river otter (extinct in Argentina), the white lipped peccary, and to monitor the maned wolf and the puma, to reinforce the populations of ocelot, lowland paca, red-legged seriema and saffron-cowled blackbird. We also committed to evaluate the situation of the Paraguayan hairy dwarf porcupine, the tayra, the tufted capuchin monkey and several species of grassland birds in danger of extinction, such as the double-collared seedeater, the strange-tailed tyrant and the black and white monjita.

The lack of protected grassland corridors, the fragmentation of the gallery forests of the Paraná River, the encroachment of wild pines from the plantations around the wetlands, the proliferation of wild pigs and the changes to the wildfire patterns and global climate change are threats whose scale in time and space are difficult to predict and prevent. Surely the plan developed in 2016 will not be the last, though by the time we present the next one, we will have a more complete and functional ecosystem that contributes to the prosperity of the biodiversity and people



The conspiracy theories about the foreigner arriving to "steal the water," manifested in different ways. In the image below is a mural in the city of Mercedes in Corrientes where symbols of evil are shown on the left (a hand with US flag, a bat and a truck stealing water, flora and fauna) and on the right the beauty of Iberá which is under threat. These initial fears of the unknown, enhanced by prejudice against foreigners, disappeared completely when Iberá National Park was created by law and donated to the Argentine state.


CHAPTER 7

PLANNING REWILDING PROJECTS

The jaguar reintroduction project, like all rewilding projects, began with a meticulous and careful planning process, one of which resulted in the preparation of a document ready to be signed to return the apex predator to Iberá. PHOTO: CLT / FUNDACIÓN REWILDING ARGENTINA.

"A smooth sea never made a skilled sailor"

7.1 THE PLANNING PROCESS

Every rewilding project begins with a planning phase that culminates in the preparation of a document that is presented to the authorities for analysis and eventual approval. Most of the projects carried out by Fundación Rewilding Argentina involve the reintroduction of species in places where they have become extinct.

The planning process must be methodical and careful. This ensures that the final product is a solid and articulated project that analyzes existing information in detail, sets clear objectives, defines measurable results and proposes feasible methodologies to be implemented. Almost all of the projects presented by Fundación Rewilding Argentina have been and continue to be the first of their kind, such as those for the reintroduction of the jaguar, giant anteater, pampas deer and red-and-green macaw in Iberá and of reintroduction of the Wolffsohn's viscacha (from the chinchilla family) in Patagonia, among others. As there are no similar initiatives to which to refer, these projects often have methodologies and actions that are implemented for the first time and cannot be supported by the available literature. These circumstances generate levels of uncertainty that some stakeholders consider inappropriate when making some decisions.

While the planning process is important, project execution is central. There is a tendency in some institutions to hone in on a planning process that seeks to achieve ideal situations and control all possible variables that could affect the project. This often causes extraordinarily long planning processes that are so onerous that they are never implemented, leading to abandonment of projects before they are ever begun.

It should be noted that once a project is implemented, it is modified throughout its execution and therefore changes as it goes through different stages. Thus, after a few years of work, the project may differ from the one originally drafted, owing to the changes implemented in its process as knowledge is acquired and not necessarily due to any deficiencies in the planning process.

Any rewilding initiative entails a certain level of uncertainty and therefore it must be assumed that there will be risks, and the possibility of failure throughout the implementation period. This should be carefully analyzed and understood by the organization responsible for project execution, i.e., it must be willing to take risks, assume responsibility for failures and establish the best way to communicate them. It is possible that the fear of public disapproval is one of the main reasons that this type of project is so rare in Argentina.

Fundación Rewilding Argentina's project consists of a phase of experimental development during which we learn about the different animal handling techniques, including capture, transport, holding in captivity and monitoring. Once the existing techniques are improved—or even developed—and staff is trained for its execution, we can think about scaling them up for a greater conservation impact. The experimental phase is developed in one specific site and involves a small number of individuals; later we evaluate the possibility of working at several sites simultaneously, increasing the number of individuals and expanding the work with an experienced team.

For example the giant anteater reintroduction project in Iberá began in Rincón del Socorro in 2007, and continued later in San Antonio and later in Carambola, San Nicolás and Yerbalito. During the first 13 years of its execution, it involved the release of more than 90 animals, the majority of which were orphans that were rescued in different provinces of the north of Argentina and then rehabilitated.

During the first three years, the average of orphaned animals rescued was 4.3 individuals per year, with a survival rate of 66% while in the following ten years, rescues rose to 8.5 individuals per year and the survival rate climbed to 92%. At the same time, of the animals released in Iberá, the percentage of survival during the first year of life after release increased from 66% during the first five years to 89% in the following eight years.

The giant anteater reintroduction project was initially carried out in two sites in Iberá, first in Rincón del Socorro and later in San Alonso, and starting in 2016, started roll-out in three new sites simultaneously.

The giant anteater reintroduction project grew out of a careful and meticulous planning process but underwent numerous changes and adjustments during its implementation, leading to a marked increase in success indicators at each stage. The evolution of this project gives an idea of how the work can improve and scale as the methods are refined and the staff with the necessary expertise is increased. This dynamic nature is an inherent condition of all rewilding projects.

The giant river otter reintroduction project, like most of our projects, is the first of its kind on a global level, which entails a high degree of uncertainty and experimentation. PHOTO: ALONDRA, THE GIANT OTTER, IN HER PRE-RELEASE PEN TOGETHER WITH ONE OF HER THREE CUBS. THE LAST RECORDED BIRTH OF GIANT OTTER CUBS IN ARGENTINA WAS IN THE 1940S, MATÍAS REBAK.

The reintroduction of the giant anteater is a very good example of how projects evolve during the implementation, improving the likelihood of success at each stage and allowing them to be scaled up as they progress. PHOTO: AN ORPHANED GIANT ANTEATER IS BEING CARED FOR IN THE RESCUE CENTER LOCATED IN CORRIENTES. WHEN IT REACHES ONE YEAR OF AGE, IT WILL BE RELEASED AS PART OF THE REINTRODUCTION PROJECT BEING CARRIED OUT IN IBERÁ, BETH WALD.



"Rewilding is also always an experiment, because both the science and the accumulated experience are currently insufficient to foresee the full range of possible outcomes." Richard Corlett

7.2 INCORPORATING EXTERNAL REFERENCES

As we have already mentioned, the projects carried out by Fundación Rewilding Argentina are in general the first of their kind, so there is very little documentation to use for reference.

Our work teams are made up of people with a wide range of experience, whether it is formal education (or not), in managing rewilding projects, particularly in the case of species reintroductions. These teams include professionals that are referents of the species with which we work. However, it is sometimes the case that no one from Fundación Rewilding Argentina has any substantial experience with that particular species. For that reason, during the project planning stage we place special emphasis on identifying and interacting with the people and groups who do have experience with this species, called practitioners.

In Argentina there are groups who have brought value to our projects from the beginning and have even actively participated in their execution. Among others we can mention professionals from scientific organizations such as the Instituto de Biología Subtropical (Institute of Subtropical Biology), part of Argentina's Consejo Nacional de Investigaciones Científicas y Técnicas (National Scientific and Technical Resource Council, Conicet in Spanish), who, under the leadership of Agustín Paviolo, Mario Di Bitetti and Carlos De Angelo, contributed key concepts for the development of the jaguar reintroduction project. Organizations such as the Proyecto Pantano (Marshland Project) directed by Javier Pereira and the IUCN Peccary Specialist Group, under the direction of Mariana Altritcher, collaborated with the development of various techniques for managing the marsh deer and collared peccary, respectively. Dr. Adrián Di Giacomo of the Laboratorio de Biología de la Conservación de Corrientes (Corrientes Conservation Biology Laboratory, part of Conicet) played a prominent role in the early planning phases of the red-and-green macaw reintroduction project.

Just as there are external references that contribute to the improvement of a project, one recurring issue in these processes is the presence of detractors who tend to emphasize alleged weaknesses with the goal of preventing the project from coming to pass. In general these attitudes come from professionals and institutions with different levels of experience regarding the species or regions that we are interested in and they believe that they should be consulted when there is work planned that involves the objects of their study.

Much of the time the experience of these detractors is based on research to understand for example the diet, abundance and behavior of a specific species, identify pathogens that affect it or to carry out educational activities, but they do not have experience in implementing conservation strategies that require active management and therefore, rewilding makes them uncomfortable, because they consider it too risky or even unnecessary. So, they attempt to avoid the implementation of rewilding projects, requesting unfeasible clarifications and by requiring that risks be reduced to zero, which is impossible. These requests are made either directly or indirectly through the enforcement authorities, who are responsible for evaluating the project and issuing permits.



PHOTO: MATÍAS REBAK



PHOTO: MATÍAS REBAK



Veterinarian Mauricio Barbanti of the Universidade Estadual Paulista during the first translocations of pampas deer in Iberá.PHOTO: GUSTAVO CORREA.

Dr. Agustín Paviolo (left) from the Institute of Sub Tropical Biology/Conicet (IBS/Conicet) during the process of anesthetizing a jaguar in San Alonso, Iberá.

Les Carlisle (left), veterinarian of the South African firm and Beyond and one of the most experienced people in wildlife translocations worldwide, visits the giant anteater reintroduction project in Iberá. PHOTO: THE CONSERVATION I AND TRUST

Grant Tracy (left), of the South African wildlife capture and transport company Tracy & du Plessis, discussing ideas for the capture and transport of guanacos in Patagonia Park. PHOTO: FRANCO BUCCI.

Dr. Caroline Leuchtenberger of the Instituto Federal Farroupilha and giant otter expert for the IUCN Otter Specialist Group, during one of her visits to Iberá.

Drs. George Schaller, Ronaldo Goncalves Morato and Peter Crawshaw, biologists renowned for their studies of the jaguar in Brazil, during the reintroduction planning process in Iberá. PHOTO: ASTRID VARGAS.

Dr. George Schaller, famous for his pioneering studies of tigers, snow leopards, mountain gorillas and jaguars, navigating the Bermejo River in El Impenetrable. PHOTO: BETH WALD





Veterinarian Carolina Rosas of Fundación Rewilding Argentina, training in capture and immobilization of wildlife in South Africa. PHOTO: FUNDACIÓN REWILDING ARGENTINA



Augusto Distel (right) of Fundación Rewilding Argentina training with Dr. Joares May on capture and immobilization of maned wolves in Brazil

The incorporation of external references with extensive experience in wildlife management (known as practitioners) during the planning and execution stages enriches rewilding projects and increases their chances of success.

Unlike other countries in the world, Argentina lacks a strong tradition of wildlife management. Therefore, throughout a large part of the project planning we have relied on references from other countries, such as Brazil, where there is a well-developed history of wildlife management, both by NGOs and governmental and academic institutions.

In this respect, we have received much support from Dr. Flávia Miranda of the Tamandua Project during the planning phases for the reintroduction of the giant anteater; from Dr. Wanderlei de Moraes from the state company Itaipú for developing quarantines; from Dr. Ronaldo Goncalves Morato from the Instituto Chico Méndes de Conservación de la Biodiversidad (Chico Méndes Institute for Biodiversity Conservation); from Mario Haberfeld, Lilian Ramplin, Leonardo Sartorello, Joares May and Eduardo Fragoso from the NGO Onçafari; from Gediendson Ribeiro de Araujo from the Universidad Federal de Mato Grosso do Sul; and from Doctors Peter Crawshaw and George Schaller (both from the United States but with a long history of work in the Pantanal of Brazil) in connection with the jaguar reintroduction project.

We have also consulted and been trained by Dr. Patricia Medici of the Instituto de Pesquisas Ecológicas (Ecological Research Institute) with regards to tapir reintroduction and we have visited Roberto Azeredo, a reference for the reintroduction of cracids such as the barefaced curassow. At the beginning of the marsh deer reintroduction project, we received Dr. Mauricio Barbanti from the Universidade Estadual Paulista who collaborated with the first translocations of the species and later helped to draft the marsh deer reintroduction project in El Impenetrable. Together with Dr. Caroline Leuchtenberger from IUCN Otter Specialist Group, we have co-authored the giant otter reintroduction project and in Peru we have received training and advice from Drs. Gabriela Vigo and Donald Brightsmith, from The Macaw Society, for the development of the red-and-green macaw project. Astrid Vargas, who was the director of the successful Programa de Conservación Ex-situ del Lince Ibérico (Ex-Situ Conservation Program for the Iberian Lynx) helped us to conceptualize the design of the Jaguar Reintroduction Center.

Another place we have turned to in search of good examples and advice has been Africa, specifically South Africa, where there have been ongoing projects implementing rewilding for at least the last half century. This history has yielded exceptional experience and although they did not originate the term rewilding, without a doubt they have most experience with putting it into practice. In South Africa alone some 100 thousand wild animals are translocated yearly, so they have admirable examples of environmental recovery based on the reintroduction of large herbivores and carnivores that for various reasons had been eradicated.

In South Africa, a large part of what today is the Private Reserve Phinda (managed by the firm andBeyond) was, until recently, a large pineapple plantation. Today elephants, black and white rhinoceroses, cheetahs and lions, among other species, which were previously locally extinct there, thrive in its savannahs. In Mozambique the civil war-ravaged Gongorosa National Park, has today recovered almost all of its original wildlife thanks to the efforts of the Greg Carr Foundation, which has translocated a large number of herbivores

have been key to the success achieved.

to proceed with the reintroduction.

is very rarely the case.

In the particular case of Iberá, the French naturalist Alcides D'Orbigny visited the wetlands in 1823 and thanks to him (although he stayed only two days) we know that jaguars, anteaters and pampas deer among other large species lived there. Less than a century later, in 1910 when the first expedition of the Sociedad Científica Argentina (Argentine Scientific Society) entered Iberá for a period of several months, most of these species had already disappeared. At the end of this expedition, the naturalist Enrique Puysegur wrote, for example, that he had observed few alligators and capybaras and that they were able to infer the past presence of marsh deer because they had found bones of that species, but they did not see any alive. In addition, Puysegur notes that he was struck by the number of people (shellfish gatherers, gaucho hunters) he saw in the wetlands while touring it, who themselves complained about the lack of animals to hunt and thus sell their hides and feathers.

to supplement existing population numbers, and reintroduced carnivores such as lions, wild dogs and leopards which were locally extinct. At the same time in Malawi they have reintroduced lions and cheetahs in Liwonde National Park thanks to the vision of the African Parks organization. Our teams have visited all of these projects in search of experience and inspiration. The development of rewilding is so extensive in Africa that there are companies that are exclusively dedicated to the capture and transport of endangered species, such as Tracy & du Plessis, with whom we have also interacted to improve the planning of this aspect in our projects.

Africa represents an incredible opportunity, not only to understand specific aspects about herbivore and carnivore management, but also how to manage the many aspects (ecological, financial, social and cultural) of ambitious reintroduction projects that include several species. In addition, the example of Africa allows us to imagine how to scale up rewilding projects in Argentina and increase the impact on conservation of our ecosystems and species.

In general terms, the incorporation of external referents that have extensive experience in active management of species to the projects of Fundación Rewilding Argentina has been one the most enriching and rewarding aspects of the entire process. These dedicated, generous referents

7.3 PAST DISTRIBUTION OF SPECIES TO BE REINTRODUCED

One element to consider when drafting a rewilding project that involves the reintroduction of a species is its past distribution in the work area. This consists of determining if the chosen site is within the historical distribution range, and later analyzing if there is sufficient quality habitat

For this, exhaustive research is done of historical citations of locations close to where the project is proposed to be carried out, and if habitat is available, that location is considered part of the historical distribution of the species, as indicated by the IUCN. But it is not that simple, as many professionals and biologists working in government offices in environmental organizations or scientific institutions will not accept that the species was distributed in the area where the project is proposed to be carried out if there is not at least one concrete citation in the same place, which

""Everything we see in the present is an artifact, rather than the animals' true preferences. They are not where they want to be. They are where they can be."

Alejandro Martínez-Abraín



Iberá has sufficient quality habitat for the giant otter, a species that inhabited almost all of the Paraná River basin where the marshes are located. These attributes should be sufficient to reintroduce them in the Iberá region, however, the 1999 discovery of the skull in one of Ibera's lagoons, (photo), was key to the project's approval. PHOTO: CECILIA MORGAN.

Iberá was already defaunated in the 19th century. What would have happened if D'Orbigny had not traveled through it at the beginning of that century, before the defaunation process? The records of the giant anteater for that environment, for example, never would have been available.

In the same way, the giant river otter was never cited for Iberá until, in 1999, when, by chance a skull of this species was found on the Isla Biombo in the Laguna Fernández. What would have happened if this skull had never been found? Surely there would be a high degree of skepticism regarding reintroducing this species in Iberá and it is even possible that some critics would argue that the giant river otter was being introduced to a location where it had never existed.

This skepticism collides with the fact that the giant river otter inhabited latitudes as southerly as the central Entre Ríos and Santa Fe area. If the species had been present in that zone, why not in Iberá? We believe that the record of that skull, while valuable, should not have been necessary to demonstrate that the giant river otter did indeed live in Iberá, and that this wetland is within its historic range and that there is sufficient habitat, both in quality and quantity for it to thrive.

The case of the red-and-green macaws is paradigmatic since it has been routinely criticized because there is no information regarding historic distribution of the species due to lack of specific records in Iberá. While this is in fact true, the absence of published records does not ensure that the species is alien to Iberá because there are unpublished mentions by settlers who in the 1950s who had seen the species north of these wetlands, on the islands located in Paraná where according to them, they had not observed them for some time. Regardless of these records, it is important to note that the closest published record of the red-and-green macaw to Iberá is owed to D'Orbigny who on Christmas Eve 1820 observed a pair on the Río Paraná near Itá Ibaté. D'Orbigny caught one of them and the surviving bird chased the boat that sailed up Paraná through the remainder of the day, vocalizing as it flew.

This location is some 40 kilometers from the sites where the red-and-green macaw reintroduction project in Iberá, a distance that these birds can easily cover in a day. In fact, several of the individuals reintroduced in Iberá visit the shores of Paraná which is where the citations of D'Orbigny are from and they have even been observed to cover 80 kilometers in a single day.

To determine whether the original range included a given territory, it should fall within a general range of past distribution and possess the environments in which the species evolved and lived. The fact that there are no specific historical records of the species should not be considered an impediment to carrying out the reintroduction project if other conditions are met. The illustration shows the steamer ship in which Guillermo Araoz traveled the Bermejo River in 1886. We owe many of the sightings of the giant river otter, marsh deer, bare-faced curassow and jaguar along this river to him. ILLUSTRATION: GUILLERMO ARAOZ.

Iberá has a large extension of suitable environments for the red-and-green macaw. However, the reintroduction project was repeatedly questioned because there is no concrete record of the species in Iberá. The closest record was made by the French naturalist Alcides D'Orbigny in 1828, just 40 kilometers from the chosen reintroduction site and 20 kilometers from the marshes, distances that macaws easily travel in less than a day. PHOTO: NICOLÁS GUASTAVINO.





Pinturas River. Hatcher notes,

a kilometer from the camp.

It also turns out that many existing geographical citations are cataloged as "exceptional" and are therefore downplayed if they refer to the past presence of a species in a habitat where it is not currently present. For example, the huemul is a native deer that has traditionally been considered an inhabitant of the Andean sector of Patagonia where it spends the winter in the low-lying forests and the summer in more open areas at higher altitudes. However, the huemul also inhabited the Patagonian steppe—where the terrain is less abrupt and there is no woody vegetation—until it was eradicated by settlers. By 1900, the British writer Hesketh Prichard, records that to the northeast of Santa Cruz, in an area of steppe that "the indigenous people said that there was a time when these deer were more numerous in this region." For this reason the records of the huemul in the steppe are scarce and this worked as a justification to maintain that the records were exceptional. One of the mentions of the huemul in the steppe is that of John Bell Hatcher in April 1898, who observed them in the northeast of Santa Cruz, at the mouth of the Caracoles Canyon in the

I was not that surprised to find them there in a region devoid of forests and at a distance of between 80 and 200 kilometers from the Andes, it had all of the characteristics of a rugged, mountainous region, when it descended from the flat, narrow plateaus to the bottoms of canyons. Not only did I come across deer on several occasions in these canyons but upon returning to the campsite after that first extended trip in that region, while climbing the rift where we had pitched our tent, I suddenly encountered three deer at a distance of a little less than

For the skeptics, if the evidence of the animal's presence is clear, the argument is that the huemul was recorded in those sites because 120 years ago the environment was different, likely more humid and with small forests. In other words, if the historical record can't be denied by arguing that the species was accidentally observed in a strange environment, then it is claimed that the species was found there because the habitat conditions were more favorable at that time. Fortunately, Hatcher took many photographs whose landscapes are easily located and demonstrate no significant change from their current conditions.

The argument becomes much more interesting when we consider a point raised a few years ago by a group of investigators from the United States. They point out that ecology was in its heyday as the science which tries to explain abundance and distribution only in the 20th century, when the process of defaunation was already largely underway. Humans eradicated many species in a large part of the territory that they inhabited long before ecology appeared as a science, and this

The current distribution of most species only covers a fraction of the environments they inhabited in the past. Humaninduced territorial retractions occurred so early in history that we have not been able to record their presence in many of these environments. Until recently it was believed that the North American sea otter lived exclusively on the coast with dense kelp forests, but now it has recolonized brackish waters, which means that these coastal areas with kelp forests were where they were able to survive after the intense hunting for its fur. PHOTO: PD SCOTT/SHUTTERSTOCK.COM.

The huemul is a species that was traditionally considered to inhabit forested or forest-steppe boundary regions in western Patagonia. However, it also inhabited steppe environments, reaching as far as the Atlantic Ocean, from which it was eradicated very early in history. That early eradication is why the steppe is not included among the environments inhabited by the huemul and therefore no initiatives are being developed to recover it there. In the image is a downed huemul photographed by Clemente Onelli in 1903. PHOTO: CLEMENTE ONELLI.

is why the species were never registered in environments or territories in places where they are no longer distributed. Therefore we do not know with certainty what their preferred habitat was, and in this sense, the species distribution patterns that we see now do not indicate where they were historically distributed, but instead where they can survive because it is there that they have been able to evade human impact.

Many species are erroneously classified as habitat specialists because we exterminated them very early on from other environments where they were also distributed, which explains the absence of records there. Most species are not specialists, but rather generalists and can withstand a wide range of physical and biological conditions. For example, nowadays the huemul probably inhabits steeply pitched forest environments because it is where it was able to survive, not because it's the optimal environment for the species, as it is often noted. Similarly, we may mistakenly label some species as nocturnal when they are actually only active at night because they are heavily hunted or harassed during the day.

There are numerous examples all over the world that support this position. For a long time the North American Pacific sea otter was thought to be an exclusively marine animal, and associated with the vast kelp forests as they had never been recorded in any other environment. But when these animals began to recover towards the end of the 20th century, they colonized brackish water estuaries where no one thought they could live. In the same way, alligators in the southeastern United States were thought to only live in freshwater wetlands, whereas now they can be found in saltwater sites. In the same vein, many species of European vultures and eagles that were thought to nest only on inaccessible cliffs have returned to nest in trees where they had previously stopped nesting due to being harassed.

Lastly, there is another point that is used to argue about the possibility of reintroducing a species and it is based on the idea that there may have been natural environmental changes of such magnitude from the time of extinction to the present that the species would not be able to survive if it were reintroduced.

However, this is a fallacy since the extinct species in natural environments of Argentina have disappeared in the last 300 years or so, a mere sliver of time in relation to possible environmental changes of relevance over extensive territories. In addition, the species that we work with are, for the most part, flexible and adaptable and do not restrict their distribution to a particular environment. The jaguar for example—a species that has been questioned as to whether it could thrive again in Iberá due to possible environmental changes that have taken place in the past 100 years inhabits everywhere from deserts (like the Sonora) to places that spend several months of the year flooded (such as the Amazon basin), from sea level up to 2200 meters of altitude, and from flat areas like the Pantanal or Iberá itself to the rugged mountain forests of western South America.

What happens is that the very planning of rewilding projects questions decades of established truths, which are rarely supported by solid scientific evidence but which have grown stronger over the years. The way we characterize the past distribution of species is one of them.

In this sense, what we consider today to be a healthy environment is in fact a biologically impoverished environment, which past generations would perceive as degraded. If the experience, memory and knowledge of past generations is lost, then the actual degraded condition is considered normal or healthy and it becomes the new baseline.

A second example is found in the 1934 law that creates national parks in Argentina, which establishes that "the regulation tends to preserve the characteristics of landscape intact and to beautify without altering its original conditions." This law proposes a static conservation model for ecosystems that were already degraded but which, at the beginning of the 20th century, and as a result of the changing baseline syndrome, were considered healthy.



NATURALIZING ENVIRONMENTAL DEGRADATION: THE SHIFTING BASELINE SYNDROME

The decision to reintroduce species into historic ranges is frequently questioned by academic, conservationist and government sectors. This guestioning normally takes the form of arguments that call into doubt the historic distribution of the species given the current one, thereby ignoring the historical processes that led to the retraction in distribution and the decline in numbers of the species to be reintroduced.

This negationist phenomenon was described by Daniel Pauly in 1995, who named it the Shifting Baseline Syndrome. The syndrome happens when there is a gradual change in what we accept as the original condition of a natural environment. This change, which we now understand to be the original, is due to the lack of experience, memory and knowledge of the past condition of that natural environment.

For example the current world population of green sea turtles is only some 300 thousand individuals. The IUCN Red List of threatened species it was categorized as "endangered" because it has suffered a decline from 48-67% of breeding females in the last 150 years. However, it is now estimated that in the 16th century there were some 35 million green sea turtles and that the population present 150 years ago represented only a tiny fraction of the original global population. Therefore, the population of green sea turtles on which the reduction in population is estimated and recovery goals are set is a population which is already severely depleted, and is a clear example of changing baseline syndrome.

This syndrome has great implications for conservation policies as it acts as a placebo and represents one of the main obstacles to finding solutions to environmental problems. When decision makers assume, either through ignorance or omission, that the currently degraded state of ecosystems represents a healthy condition, they delay or impede the development of restoration strategies through active management like that proposed by rewilding.

The giant river otter was a common presence in the Bermejo River until about 150 years ago according to many travelers' records. However, these records were forgotten or disputed to the point that the existence of the skull of this species in the Museo Argentino de Ciencias Naturales (Argentine Natural Science Museum) whose origin is the upper basin of this river came to be seen as a labeling error. The appearance of Teuco, (a wild male giant otter) in the middle of the Bermejo River in 2021 again demonstrated that failing to include this river in the giant river otter's range is an example of the shifting baseline syndrome described in this chapter. PHOTO: ÁLVARO BECERRA.

"Wilderness without wildlife is mere scenery."

7.4 GEOGRAPHIC ORIGINS OF THE INDIVIDUALS TO BE REINTRODUCED

Another aspect related to the location of the reintroduction site is the geographic origin of the translocated individuals, which is directly tied to their genetic characteristics.

Until recently, different subspecies (geographical varieties) of several of the species we work with at Fundación Rewilding Argentina were recognized. The giant otter, jaguar, guanaco, tapir and puma, among others, had defined subspecies based on morphological (shape) and morphometric (size) characteristics that seemed to reflect different evolutionary histories and therefore notable genetic particularities that had to be conserved because they were associated with the different biogeographical regions inhabited by these species.

With the development of the field of genetics it was observed that the majority of these differences did not actually exist or that they were so subtle that they were no longer justified at the subspecies level and that in general they were not related to biogeographical regions, but rather to barriers that limit, but do not prevent the displacement of individuals, such as the Amazon River.

With new technologies such as telemetry with GPS devices it has been possible to establish that certain individuals of large mammal species (wolves, pumas and jaguars, among many others) can travel hundreds or even thousands of kilometers. For birds it can be even longer distances, and this makes the isolation between populations less likely, which results in a lower frequency of subspecies differentiation. Of course there are desirable genetic variations to observe when reintroducing an extinct species or supplementing a declining population, but with the understanding that in general these differences are subtle and are not usually associated with biogeographic regions but with physical barriers such as a large river or mountain range.

In the United States, the Florida panther was recognized as a subspecies (also called a "geographic race") of puma that had only a few remaining isolated individuals, and problems caused by inbreeding began to appear. The translocation of individuals from Texas to reduce inbreeding and save these panthers was systematically rejected under the pretext of conserving the particularities of this supposed geographic race and only could finally be implemented when extinction was imminent. The attempt to conserve supposed geographic particularities that later proved to be non-existent at all costs almost led to the extinction of the puma in Florida. PHOTO: JO CREBBIN/SHUTTERSTOCK.COM.

Until just a few years ago it was accepted that there were nine subspecies or geographic races of jaguars whose differentiation was explained by evolutionary adaptations to different environments, but recent studies established that the jaguar does not present these differences and therefore, there are no subspecies. In general, large mammals with large ranges do not present particularities that sustain their separation into geographic races. However, in the reintroduction project for the jaguar in Iberá we prioritize the entry of animals from nearby areas to try to conserve these small differences. PHOTO: MARIUA AND ONE OF HER FREE CUBS IN THE GRASSLANDS OF IBERÁ, MATÍAS REBAK.

When the possibility of reintroducing a species no longer exists, because it is extinct on a global scale, its ecological role can be restored by introducing a very similar species, a process which is called ecological replacement. It is still unclear whether or not the completely extinct violet macaw of northeastern Argentina is the same species as the Lear's macaw that still inhabits northeastern Brazil. If they are not identical, the only possibility for the return of the important ecological role of the glaucous macaw would be to replace it with individuals of the virtually identical Lear's macaw. PHOTO: CLAUDIA BRASILEIRO / MACAULAY LIBRARY AT THE CORNELL LAB OF ORNITHOLOGY.



On the other hand, many of the genetic structures described in large mammals (such as jaguars) are recent and are the result of human impacts that fragmented the environments and interrupted the dispersal movements and therefore gene flow. These impacts result from the creation of large barriers such as hydroelectric dams, fields subjected to intensive agriculture, large highways and extensive areas of human population that present little permeability to the movement of species, resulting in a genetic structure that is often confused with a natural characteristic of the populations under consideration.

For example the jaguars in the Mata Atlántica (Atlantic Forest) in Brazil and Argentina present genetic differences with jaguars from other ecoregions due to the fact that the remnants of the Atlantic Forest today are "islands" that are disconnected from each other and from other regions. These genetic differences are undesirable and could be neutralized through the translocation of individuals, replacing the processes of dispersion that are likely impeded by infrastructure development. The panther or cougar in Florida in the United States is one such example. Until recently, panthers that lived in this state were considered a different subspecies, whose genetic particularities had to be protected. This meant that panthers from other nearby states could not be incorporated to help recover its greatly diminished population because doing so would "contaminate" it genetically. Thus, the number of panthers in Florida shrank to only 30, in which malformations began to appear due to inbreeding depression via endogamy. In spite of this situation, an unsuccessful attempt was made to continue working with these few remaining individuals without resorting to the translocation of individuals from other origins, but in the face of the imminent extinction of the species in Florida, the opinions of other groups prevailed, and some animals were moved from Texas to reduce inbreeding. Today, although panther conservation in Florida is far from being resolved, there is no longer a risk of inevitable extinction due to genetic problems. Moreover, new studies indicated that this subspecies differentiation was not valid and that the genetic particularities of these Florida panthers were due more to the isolation of a few individuals due to human activity than to natural causes. A similar situation happened when we proposed bringing Tania, a captive jaguar to El Impenetrable to breed her with Qaramta, the only known wild jaguar in that region, so that they could reproduce and begin the recovery of the species in the Argentine Chaco. A genetics expert on this species opined that the transfer of Tania and joining with Qaramta should not be carried out because the female had Yunga and not Chaco genetics. The jaguar does not present relevant genetic differences related to biogeographic regions in all of its distribution (from the southern United States to northern Argentina). Additionally, the Yungas and Chaco are neighboring, contiguous regions in the north of Argentina that have a wide transition zone. The delay in the transport and breeding due to this opinion threatened the cross between the two because Qaramta might move from the territory or even be hunted. Finally, the crossbreeding could take place and the birth of two cubs is today the hope of recovery of the jaguar in the Argentine Chaco. Some time later, new analyses confirmed that there are no relevant genetic differences between jaguars from the Yungas and Chaco regions.

Some proponents of rewilding call this tireless obsession with conservation of subspecific differences and even more subtle genetic particularities "taxonomic tyranny," and consider it a dangerous practice that could contribute to the extinction of a species' population.

When implementing a rewilding project, the geographic origin of the individuals that will contribute to reintroducing an extinct species or supplement a diminished population must be analyzed. To begin, it is important to identify whether the possible genetic differences between individuals from the site of origin and destination is due to natural causes or whether on the contrary, they are products of human-induced isolation. If there are genetic particularities of natural origin then the relevance of these from the point of view of conservation must be evaluated. If the genetic differences result in a greater capacity to adapt to the destination environment, then they should be taken into account since they will increase the chances of survival of translocated individuals to their new environment. If on the other hand they are not adaptive, then they are not relevant. There are numerous examples of species that present geographic varieties with clear genetic

There are numerous examples of species that present geographic varieties with clear genetic differences and that, when faced with the complete extinction of one of them, was successfully replaced with other varieties. For example, the Arabian subspecies of ostrich became extinct in the 1960s and was replaced with ostriches belonging to the North African subspecies. This made it possible to recover the species and its ecological role, although it was no longer possible to conserve the subspecies and its genetic particularities. The success of the reintroduction also showed that the subspecific differences did not determine adaptations to the environment or at least did not determine adaptations of relevance.

There are even more extreme examples involving the ecological replacement of an extinct species. One of them is of the South Island kōkako, a bird species from New Zealand that became extinct in 2004 and was replaced by the introduction of another species, the North Island kōkako. In this case the species could not be recovered, but its role in the ecosystem could be. The glaucous macaw is a bird that inhabited the northeast of Argentina and became extinct on a global level although some researchers believe it may be the same as Lear's macaw that still survives in the Northeast of Brazil. Whether or not these two macaws belong to the same species, it might be possible to restore the glaucous macaw through the reintroduction or ecological replacement with Lear's macaws to recover its important ecological role as a consumer of fruits and seed disperser in the grassland savannas and palm groves of Corrientes.

When planning a rewilding project we must take into account the geographic origin of the individuals to be translocated so that their genetic characteristics correspond to those of the population to be restored. However, we should not fall into the extremist trap of trying to conserve subtle differences without adaptive value or that have recently originated due to human actions, especially when this would make it impossible to recover an extinct or practically extinct species, such as the jaguar in the Argentine Chaco, or when this means the disappearance of a remaining population as in the Florida panther or cougar.



The subspecies of ostrich that inhabited the Arabian Peninsula had disappeared completely and the species was reintroduced, translocating individuals from a subspecies from North Africa. In this case, the more pragmatic option of recovering the species and its ecological role prevailed over the purist option of not intervening because it was impossible to recover the original subspecies. ILLUSTRATION: KEYL, WOOD AND E. A. SMITH / WIKIMEDIA COMMONS. "The claim that low abundance leads to genetic "defects" must be taken a step further: these "defects" must be shown to affect demographic rates. [...] Focusing solely on genetics in conservation is a bit like treating a terminal cancer patient's blood pressure."

Michael Conroy

7.5 GENETIC VARIABILITY OF THE FOUNDING POPULATION

The genetic variability of a population is made up of the variation of genetic material in that group of individuals. Not all of the individuals, even if they belong to the same species, are genetically identical. Moreover, the more genetically diverse they are, the better prepared the population will be to cope with possible environmental changes. Therefore one of the goals that a species reintroduction project should focus on is that the founding population should have as much genetic variability as possible.

Population viability analyses (the probability that a population will become extinct in a given time period) began at the end of the 1970s in view of increasing environmental destruction and the consequent confinement of many wildlife populations in parks and reserves that could sustain only a limited number of individuals. This gave rise to theoretical rules, such as the 50/500 rule developed by Michael Soulé and Michael Gilpin, which posits that a population of fewer than 50 individuals will become extinct in the short term due to "inbreeding depression" (crossing of related individuals that leads to the development of undesired characteristics) and that a population of fewer than 500 individuals will become extinct in the long term as the result of environmental changes which it will not be able to adapt to due to lack of genetic variability.

Gilpin recounts that shortly after publishing this rule, Soulé received a call from a despondent Australian colleague. He was working with a conservation project with a species of parrot of which only 48 individuals remained and wanted to know if he should abandon his efforts since the number of remaining parrots fell below the 50/500 rule. In Gilpin's words, the colleague was asking for permission to allow this species to go extinct, and Soulé's response was the unacademic but blunt, "there are no hopeless causes, only hopeless people." The moral of the story is that conservation efforts aimed at saving this bird from extinction continued and were successful, so these rules should be taken as guidelines, but not considered to be set in stone.

Rewilding projects seek to generate populations with high genetic variability even though many species naturally have low variability. The narwhal is an Arctic cetacean whose genetic variability has remained low over an evolutionary time scale, which has not detracted from its ability to adapt to the remarkable environmental changes that have occured in the Arctic over thousands of years. IMAGEN: DOTTED YETTI/SHUTTERSTOCK.COM.

Rewilding projects must minimize endogamy to avoid problems of genetic depression. However, some species such as the common dwarf mongoose naturally exhibit a high degree of inbreeding without affecting their survival. PHOTO: MICHAL ROSA / WIKIMEDIA COMMONS.







In fact, genetic factors are not the main drivers of the high current rate of species extinction. In practice, species become extinct because they are hunted or over-hunted, because their habitat is degraded or is lost, because competition from domestic or exotic animals is introduced, among other causes. However, in these already diminished populations, the loss of genetic variability can lead to inbreeding depression, or the inability to adapt to environmental changes and contribute to the definitive extinction of the population.

In the particular case of rewilding projects, there are several ways to maximize the genetic variability in a reintroduced population. One of those is to manage the number of founding individuals from that population. For that reason defining this number is one of the most controversial aspects in these projects. It is generally accepted that the greater the number of founding individuals in the reintroduced population, the greater genetic variability and the greater the chance of success. However, on many occasions it is not quite so simple to arrive at an allegedly adequate number, either because the sufficient number of individuals are not available, because it is complex or onerous to obtain them or because there is not sufficient capacity to capture and transport them. There are numerous cases of successful reintroductions in which the initial number of individuals was extremely low, especially in projects dealing with critically endangered species with only a very few individuals available on the planet. For example the Chatham Islands thrush in New Zealand was recovered beginning with five birds: two females, of whom only one bred, and three males. In the year 1980 it was the rarest bird species on the planet, but in 2011 there were already some 200 individuals and its numbers continued to increase. Something similar happened with the Mauritius kestrel (a bird of prey) which, from only four founding individuals in 1974, three females and one male, already had a population of 500 in 2019.

For example, there are species with low genetic variability, such as the narwhal (a cold-water cetacean), the Andean condor and the cheetah. But the low genetic variability that characterizes these species is the result of natural processes that have been going on for millennia and do not present problems of conservation linked to this low variability.

> Recent genetic studies of the jaguar population of the Brazilian Pantanal (which, together with the Amazon have the healthiest populations of this species) showed that there are natural cases of inbreeding. PHOTO: CAMERA TRAP / JAGUAR REINTRODUCTION PROJECT.

There are successful examples of species recovery from extremely low numbers of individuals and therefore with populations with a high degree of inbreeding. The Chatham Island black robin in New Zealand was recovered from three males and one female. PHOTO: LEON BERARD / WIKIMEDIA COMMONS.

The pampas deer population reintroduced in San Alonso, Iberá, began with 22 specimens and today numbers around 150 to 200 individuals. PHOTO: MATÍAS REBAK.

In South Africa numerous species reintroduction projects have been carried out, which for various reasons started with a low number of founding individuals. Of 125 reintroduction cases analyzed, 96% were successful in establishing new populations, despite the fact that most of these projects started with fewer than 15 individuals and several of them involved the reintroduction of large species with conservation problems.

Other examples of the establishment of successful populations from a small number of founders come from the introduction of exotic species, as happened with beavers in Tierra del Fuego, where they were brought by the Ministerio de Marina (now the Ministerio de Defensa, or Ministry of Defense) in 1946. Only 20 specimens were brought from Canada but they reproduced so successfully that they invaded the entire island on both the Argentine and Chilean sides. They crossed to other nearby islands and have even arrived on the continent.

Our experience also indicates that populations can become established starting with a relatively small number of animals. In Iberá, the populations of anteaters now thriving in Rincón de Socorro and San Alonzo began with only 31 and 22 individuals respectively, while the pampas deer in San Alonso also started with just 22 individuals. For the collared peccary reintroduction project, founding populations with 50 and 70 animals were established in San Alonso and Rincón de Socorro, respectively, so practice shows that it is possible to successfully reintroduce different species starting with founding nuclei with few individuals.

Genetic theory states that by randomly capturing and translocating 20 founding individuals from a wild population, 97.5% of the genetic variability of the source population is captured (of course, these 20 individuals must later reproduce so that this variability is incorporated into the reintroduced population).

A second aspect to keep in mind is the number of offspring that each translocated specimen because this is where the key to capturing genetic variability of the source population lies, rather than obtaining a large number of founding individuals. Genetic theory also says that, if an individual leaves behind seven descendants over the course of its life, these animals will contain 99% of the genetic load of their parent, with very little information being lost.

For this reason, Fundación Rewilding Argentina's projects focus on ensuring that translocated individuals survive and reproduce, and that their offspring have a high survival rate. Therefore, we dedicate a lot of time and effort to the monitoring of translocated individuals and we are extremely interventionist in the initial phases of the project as we will mention in Chapter 11.6. We supplement translocated individuals (and their offspring when possible) if they have difficulty finding food on their own after release, provide veterinary care when we detect injury or disease, and capture and relocate them to the release site if they disperse to sites unsuitable for their survival.

In short, during the early stages we maximize survival by intervening whenever necessary and possible; in many projects we even perform predator removal in the early stages to decrease mortality.

Finally, it is ideal that the animals comprising the source population not be closely related. In general it is perceived that inbreeding is a problem in itself and that it does not occur in natural conditions, although that may not be the case: the jaguar population in Pantanal is in perfect health despite the fact that cases of inbreeding have been identified through genetic analysis, and some species such as the dwarf mongoose naturally present high levels of endogamy without this constituting a problem for their survival. We can therefore conclude that in conservation, inbreeding is a problem if it leads to low levels of genetic variability or to the aforementioned "inbreeding depression," that is, to the appearance of characters that decrease the probability of survival of an individual.

In their initial stages, species reintroduction projects may prioritize demographic aspects (rapid increase in the number of individuals) over genetic aspects. Once the new population is established, it is always possible to conduct genetic variability analysis and make changes to maintain or increase that variability when necessary. In this sense genetic theory also mentions that one immigrant individual per generation (ideally between one and ten) is sufficient for small (fewer than 500 individuals), isolated populations to avoid genetic deterioration. This immigration is known as genetic rescue and it can be simulated by translocating individuals once the population is established, not to increase the number of individuals but to maintain or increase the genetic variability. There are examples of genetic rescue of species that displayed low genetic variability and problems of inbreeding depression although none of these are associated with reintroduction projects but rather with populations diminished by human factors. The most well-known is that of the Florida panther or cougar in the United States, mentioned in Chapter 7.4 whose genetic depression was resolved with the translocation of just six individuals from Texas.

to deviate.

There are also examples of populations of species that thrive with a reduced number of individuals, high levels of endogamy or low levels of genetic variability whether that is due to natural causes, is caused by humans or as the result of a rewilding project. Using the knowledge provided by conservation genetics to influence decision-making in this type of project helps to obtain more genetically diverse populations that therefore have a greater probability of persistence over time. The problem arises when these rules become rigid truths from which it is apparently impossible

"The idea of maintaining populations as 'pathogenfree' has also come under reconsideration. There is a growing realization that pathogens are important for host evolution and that conservationists must not forget that pathogens themselves deserve conservation as important components of biodiversity."

7.6 SANITARY ASPECTS

Planning a rewilding project that involves the translocation of individuals for the purposes of supplementation or reintroduction must consider the health status of the animals and the source and destination environments.

The idea of translocating individuals that are free of pathogens (disease-causing organisms) might seem ideal; however, in addition to being unfeasible, it is also not desirable for various reasons. First, pathogens are an important part of the evolution processes that affect host species; second, pathogens may be part of the biodiversity of a region and therefore deserve conservation actions and third, those "naïve" individuals who have not experienced the proper interaction with pathogens are more likely to die during the process of adaptation, since they lack immunological competence to cope with diseases that may exist in the release environment.

Wild animals affected by reintroduction projects carry and transport pathogens that are, for the most part, in balance with the host, are present in the release environment and are of conservation interest as are their hosts. In these cases, it is not appropriate to eliminate the pathogen.

However, the translocation process may affect the existing equilibrium between pathogens and their hosts, jeopardizing its success. In these cases the intervention will consist of temporarily attenuating the pathogen loads during the process of capture, transfer and release of the individuals in their new environment, but does not necessarily seek their elimination. This management protocol is similar to others that we perform on translocated individuals and aids their successful adaptation to the new environment (wound treatment, food supplementation) and when we find that the individual has adapted to its release environment, the intervention ceases. For example, when the pampas deer translocated to Iberá in a large pre-release pen, and we detected an increase in the abundance of the parasite *Haemonchus contortus* in their feces, which led us to inoculate them with an antiparasitic agent (using darts). This lowered the parasite loads and improved the health status of the animals and their ability to adapt to the new environment.

Implementing the proper approach to the health aspects of rewilding projects is the key to their success. To ensure this, Fundación Rewilding Argentina has a large staff of veterinarians and two model quarantine facilities in Argentina, including constructions that handle imported birds and felines for conservation projects (upper photos). PHOTOS: MATÍAS REBAK.

The main vector of pathogens affecting wildlife are humans and livestock. For example, human-transmitted tuberculosis has severely affected primate populations such as chimpanzees. In contrast, wild animals translocated as part of rewilding projects have very rarely been involved in disease transport. PHOTO: D.G.KULAKOV/WIKIMEDIA COMMONS.





There are also cases where some pathogens present in the individuals upon being translocated or in their source and destination environments may have severe consequences on the rewilding project or on the destination environment or the species it harbors, and therefore must be eliminated. The health status of the place of origin is directly related to the health status of the individuals to be translocated, so the health evaluation of the individuals to be translocated aims to prevent them from carrying pathogens that compromise survival, diminish or prevent their ability to adapt to the new environment or limit or prevent the reproduction of the translocated animals. At the same time, the evaluation at origin should reduce the risk that the animals, upon being translocated, introduce pathogens whose natural distribution does not include the area of destination, even if it does not particularly affect the species. The treatment of the sanitary aspects at origin will depend on the origin of the animals and will differ between animals that come from captivity and those from the wild (See Chapter 11.4). In turn, the sanitary situation at the destination addresses the pathogens present in the release environment that affect the survival and reproduction of translocated individuals and therefore their ability to establish a new population. In this case, the control or elimination of the pathogen is more complex (and sometimes impractical) and can lead to the decision to not continue with the rewilding project.

currence to zero.

The potential introduction of new pathogens in the target environment is a critical aspect of projects that involve translocations, so thorough risk assessment analyses are undertaken. These analyses include identifying pathogens of interest, analyzing the susceptibility of the rewilding species and others in the target environment, determining the presence of the pathogen at the release site and assessing the presence of vectors that may help its spread. It should be noted that while these analyses are important for risk reduction they do not reduce the probability of oc-

It has been widely demonstrated that the introduction of pathogens can have a negative impact on various wild populations. However, this problem does not originate so much in the translocation of animals for conservation purposes, but those carried out for other purposes: the main vector for the transportation of pathogens to natural environments where they do not exist are humans, domestic and wild animals that are legally or illegally commercialized, and wild exotic animals that are introduced deliberately or inadvertently.

Domestic livestock are responsible for transmitting numerous pathogens to wildlife. Pampas deer have been documented to have been affected by hoof-and-mouth disease and huemul (native Patagonian deer shown in the photograph) populations in some Chilean localities are being affected by ovine-transmitted lymphadenitis capseosa. PHOTO: FRANCO BUCCI.

Normally the treatment of pathogens does not seek to eliminate them. Elimination should be the goal when the pathogen prevents the successful establishment of the species to be reintroduced or when it is not found in the target environment and can negatively affect other species already living there, including livestock and people. In the image, a red-and-green macaw is anesthetized for a health check that is part of the quarantine period it undergoes when it is incorporated into the reintroduction project. PHOTO: MATÍAS REBAK.



Exotic species are major pathogen transmitters.. The malaria virus and the mosquito that transmits it were introduced in Hawaii, where they caused the extinction of some bird species such as the O'o, which, for other reasons, already had very low populations. ILLUSTRATION: JOHN GERRARD KEULEMANS / WIKIMEDIA COMMONS

Examples of pathogens transmitted from humans to wild animals include Mycobacterium tuberculosis (which causes tuberculosis) which has severely affected primate populations; and Salmonella and Campylobacter which have caused high mortality in seabirds, even in Antarctic and sub-Antarctic regions.

Domestic animals have also caused the collapse of many wild populations. A well-known example is that of cattle plague (caused by the Rinderpest virus) which was introduced in cattle from East Africa, which decimated native ruminant herbivores such as the African buffalo and wildebeest. In Argentina the introduction of hoof-and-mouth disease is mentioned as being the cause of the drastic decrease of populations of native herbivores such as the pampas deer.

Transport of wildlife for non-conservation purposes has also caused the introduction of pathogens. An example is the Squirrelpox virus which was introduced in England with the Carolina squirrel, an exotic species in that country and which severely affected the populations of the native common squirrel. In Hawaii, the introduction of the parasite Plasmodium relictum and of the mosquito vector Culex quinquefasciatus decimated populations of native birds, even contributing to the extinction of some of them, such as the O'o and the Nukupu'u, whose populations already had low numbers due to other causes.

On the other hand, there are few examples of the introduction of pathogens in the framework of conservation projects involving translocations. Among those we can mention the fungus that causes chytridiomycosis in amphibians, introduced on the Spanish island of Mallorca together with specimens of the midwife toad linked to a project for the reintroduction of the species. At the time of introduction, the fungus was unknown and therefore its effect on populations of amphibians was also unknown.

Finally, it is important to highlight that to date there are no records of species that have become globally extinct directly as a result of the introduction of a disease. The aforementioned chytridiomycosis, introduced in Oceania and the Americas through the illegal and legal trade in amphibians was mentioned as the main cause of the extinction of 90 species of amphibians, however, subsequent studies showed that the link between the presence of the disease and the extinction of this species was not properly documented. The only exception seems to be the extinction of the Christmas Island rat, which was affected by a pathogen of the genus Trypanosoma through the introduction of the exotic black rat.

Degradation of natural systems and wildlife trafficking are partially responsible for the appearance of emerging diseases such as CoVid-19, AIDS, Ebola, avian influenza, malaria, dengue fever and meningitis. For example, malaria and dengue fever are associated with deforestation and climate change, and the spread of meningitis rises during prolonged periods of drought. In general, the negative impacts caused by human activities on ecosystems result in the appearance of new and dangerous diseases.

Scientific information indicates that the interpersonal transmission of SARS-CoV-2, the virus that causes CoVid-19 is the mechanism that explains the current pandemic; there is no evidence that shows contagion from animals to people. On the contrary, there have been records of people transmitting the virus to domestic and wild animals. In the case of the latter, infections have been infrequent with low lethality and affecting individuals in captivity where the contact with people is close and repeated. The only exception is the 2021 discovery that wild white-tailed deer have antibodies to SARS-CoV-2, which suggests that these animals were exposed to the virus, though the mechanism of transmission is unknown

- to this parasite.

COVID-19 AND WILDLIFE TRANSLOCATION IN ARGENTINA

Despite the scientific evidence, some Argentine government agencies recommended the suspension of research activities, transport and translocation of wildlife regardless of their taxonomic group. Due to the weakness of their scientific arguments, all of the national and provincial agencies that are responsible for wildlife management, with the exception of Tucumán, rejected this recommendation. Instead, the agencies developed a series of protocols that would minimize possible contagion of wildlife from people. For example, the National Parks Administration allowed the continuation of projects that required the handling of wildlife so long as a series of sanitary protocols were complied with. This proactive attitude, aligned with scientific evidence, put an end to attempts to prohibit what should be promoted: research and restoration of ecosystems through the reintroduction of species.

Thus Fundación Rewilding Argentina continued to carry out translocations during the pandemic, while observing the necessary protocols. It is worth mentioning that these translocations were authorized by the Dirección Nacional de Biodiversidad y el Servicio Nacional de Sanidad Animal (National Directorate of Biodiversity and the National Animal Health Service), which paradoxically were two of the organizations that recommended suspending translocation activities and other activities that involved the handling of wildlife.

In the context of a crisis brought about by environmental degradation, the measures to be adopted must be oriented towards generating policies and undertaking actions that tend to conserve and restore natural environments to avoid the appearance of new pandemics. These includes translocations for conservation purposes, whose suspension was recommended even when the scientific knowledge indicates that they must be encouraged. The UN's recent launch of the Decade on Restoration of Ecosystems leaves no doubt in this regard.

THE TAPIR REINTRODUCTION PROJECT IN IBERÁ AND EQUINE TRYPANOSOMOSIS

The reintroduction project in Iberá began with the release and successful adaptation of several individuals who even began to reproduce. However, a year and a half after the first release, the animals were infected with the Trypanosoma evansi parasite, which causes equine trypanosomosis. The presence of this parasite in Iberá was known, but although its introduction in the Americas in cattle occured hundreds of years ago, it had never been diagnosed in tapirs. Although it was possible to eliminate the parasite through veterinary treatment, the animals did not generate immunity and became infectected again. As a result, seven tapirs died and the survivors were recaptured. The project was then paused until we could better understand the dynamics of this parasite in relation to tapirs.

Although the project had to be suspended, it generated new, important information for the conservation of the species.

1. Equine trypanosomosis and its high mortality rate were recorded in tapirs for the first time which has important implications for the conservation of the species throughout its range.

2. Colleagues from Brazil informed us that tapirs with symptoms similar to those produced by equine trypanosomiasis have been observed in their country (both in captivity and in the wild), so it is possible that the parasite is affecting wild and captive populations without having been diagnosed.

3. A medication was identified that effectively eliminates the parasite but does not generate immunity to it.

4. The main host of Trypanosoma evansi in Iberá is the capybara and the vector is the horsefly. The parasite lives for a very short time in the vector which means the contagion only occurs if the horsefly bites one infected animal and immediately bites a healthy one. It could be that the high number of capybaras all over Iberá due to the absence of their main predator is a factor leading to the high prevalence of this parasite. It would be interesting to evaluate rates of Trypanosoma evansi infections once the jaguar begins to exercise its ecological role and there are changes in the abundance and behavior of capybaras.

5. We are currently sampling wild populations of tapirs in El Impenetrable (Chaco) to try to determine if there are wild populations resistant

"Rewilding is focused more on restoration processes than on the pristine, original states [...] Rewilding thus provides an opportunity to develop new approaches to conservation that are more holistic and see nature and humans as intertwined, and not distinct from each other."

Sarah Durant

7.7 PUBLIC PERCEPTION

Rewilding projects seek to generate complete and functional ecosystems, that is, to ensure that the keystone species that belong to those ecosystems are present and in sufficient numbers to fulfill their ecological roles. Understanding how society perceives these species is fundamental for planning the execution of projects that seek to reintroduce them or increase their numbers in a given place.

Public perception can be evaluated on different geographic scales: national, regional and local. At Fundación Rewilding Argentina our work is strongly linked to the territory. So it is of particular interest to us to understand the perception of local communities as it seeks to generate a positive impact through rewilding and through the economy of nature model. Furthermore, the position that these communities take towards the rewilding projects will determine to a large extent their success or failure.

Public perception of the species that we work with can be formally and systematically evaluated through surveys. It can also be done through the analysis of news articles where evaluations that generally reflect the sentiments of a broad segment of the public are published.

Surveys allow us to quantitatively assess what a group of people think about one or more species. If these evaluations are undertaken at the beginning of a reintroduction project, they allow us to establish baseline values that can later be reassessed as the project goes on. However, they do not provide information to help us implement work agendas that improve the public perception of the species.

Many times the authority that evaluates the projects requests that we carry out these surveys prior to beginning a rewilding project in order to either approve or reject it. However, the truth is that the public's positive perception of a species is constructed in tandem with the implementation of the project and especially in the territory, so no rewilding project should be approved or rejected on the basis of the perception evaluated before the project's start or at the beginning of its implementation.

Public perception of rewilding projects is ideally not only evaluated beforehand and with quantitative data, as sometimes is required. It must also be evaluated qualitatively in the area of rewilding, and as the project develops, to build work agendas that reinforce positive opinions and revert negative ones. People living near Iberá Park visit the Jaguar Reintroduction Center to help enhance the positive perception of the species. PHOTO: MATÍAS REBAK.

In Patagonia in general and in the province of Santa Cruz in particular, there is a poor perception of the guanaco which is linked, among other things, to the traffic accidents attributed to it. However, official statistics indicate that only 1% of traffic accidents on Santa Cruz roads involve impact with a guanaco. Making these statistics known helps to change the negative perception of the species. PHOTO: FRANCO BUCCI.

In Patagonia and other regions of Argentina the negative perception of the puma is related to the existing conflict between the carnivore and cattle ranching. In Santa Cruz, some believe that the creation of Patagonia Park leads to an increase in predation because pumas take refuge there and then prey on cattle in neighboring fields. However, using satellite telemetry to track 15 pumas allowed us to determine that these animals mostly stay within the park's territory and rarely enter into neighboring fields, and that their diet is composed of 97% wild prey, mostly guanacos. PHOTO: CAMERA TRAP / FUNDACIÓN REWILDING ARGENTINA.





The return of the extinct species to Iberá was represented in the carnivals of the city of Corrientes, one of the most important local festivals of this province and one with deep cultural roots. In 2020 The Sapucay troupe, representing the return of wildlife, won the carnival's competition. PHOTO: GUILLERMO BILLORDO

On the other hand, qualitative evaluations that are based on exchanges between different stakeholders or through news media discourse analysis, while less systematic, are also richer in terms of the information they provide. These evaluations complement the quantitative analyses and indicate the reasons underlying the perception of a species and therefore allow us to develop work agendas to reinforce positive evaluations and reduce negative evaluations during the implementation of a rewilding project.

In Iberá we conducted perception surveys in different communities when beginning the giant anteater and jaguar projects which showed a strong positive assessment of these species. In Patagonia we did the same type of analysis about the puma and guanaco through informal interviews and evaluating news articles and the public assessment was negative. However, in spite of the differences in perception, both in Corrientes (Iberá) and in Santa Cruz (Patagonia), rewilding projects with these species were begun.

In Iberá the qualitative information showed that the high positive perception of the jaguar was mainly associated with the strong link between this species and the local culture, so the message of the project was directed at reinforcing it. The jaguars were once again present in the shamans' songs, murals were painted in many cities with representations of them, town streets were named after them, and they were present in the themes of the Corrientes Carnival (a very important cultural event in this province) and their figure and name were recovered and proudly displayed at the entrance of the town of Concepción de Yaguareté Corá, whose name contains the Guaraní word for jaguar.

In Patagonia, meetings with various stakeholders, and the dominant discourse revealed the underlying reason for the negative perception of guanacos, pumas and protected areas. These perceptions are so widespread that it is not necessary to carry out any formal analysis to understand their importance and origin. For example, people dislike guanacos because they are heavily implicated in traffic accidents. Pumas are known for killing cattle and the protected areas are disliked for being "breeding grounds" and refuges for these species. With this knowledge it was possible to propose a work agenda aimed at informing people about the real magnitude of the impact of the guanacos, pumas and protected areas in order to demonstrate that these ideas were couched in beliefs, but not in reality.

In the case of the guanaco, we checked the statistics on road accidents in Santa Cruz, which indicate that only 1% of these are caused by this species. With respect to the puma we implemented studies of its ecology to glean information about its use of space and diet and the preliminary results indicated that the pumas captured in Parque Patagonia circulate mainly within the park and to a lesser extent on the nearby ranches and that their diet is composed 97% of wild prey, (guanacos in particular).

perspective of damage prevention.

valuation of the species.

Following this analysis, it is clear that the local perception of a species cannot be measured solely through the percentage of acceptance and rejection obtained prior to the start of the rewilding project, which is often a requisite. Perceptions are built during the implementation of the project and change as the communities witness the birth of a new economy linked to the creation of a natural park and the species that return to their place of origin.

In this way the first informal evaluation of the community's perception allowed us to direct our work and obtain solid information relatively quickly and efficiently to contrast the current perception the people of Santa Cruz have of the fauna and the protected areas. Three years after the rewilding project began, the perception towards these species notably improved. For example in 2017 all of the articles published about the puma in one of the largest circulation newspapers in Santa Cruz referred to the damage to livestock and the need for its eradication. In 2020 the vast majority of the articles about the puma in the same newspaper mentioned the importance of this feline as a keystone species in the ecosystem and as a driver for local development through wildlife tourism. And an important fact to highlight: the articles that made reference to the puma-cattle conflict no longer proposed the eradication of the feline, but approached the conflict from the

In addition to working on the existing causes that generate positive or negative perceptions about the species, rewilding projects contribute to a high positive perception based on a new economic valuation of wildlife that introduces the economy of nature model. As the rewilding project is implemented, the species become part of a restorative economy that becomes an engine for development and job creation and which is translated into a change in the socioeconomic indicators of local communities, whose improvement will be closely linked to an increase in positive

Improving the public's perception of a species requires gaining support for the rewilding project that involves that species and thereby the degraded natural ecosystems, which is particularly important in reintroduction of keystone species. In Iberá, after ten years of work, the people of Corrientes requested and celebrated the release of the first jaguars, but it was a long road with many stages in order for that to take place. We used breeding animals who were known by name, we saw the birth of the first Corrientes jaguar cubs in more than half a century, neighbors to the project visited the reintroduction center and saw this species for the first time in their lives, Iberá became more and more known as a tourism destination thanks to the charisma of this feline and wildlife observation generated employment and helped to recover the local culture and pride.



CHAPTER 8

REWILDING PROJECTS APPROVAL

In Argentina there are no regulations for the presentation of rewilding projects. In order to approve the construction and launch of the Jaguar Reintroduction Center in Iberá, the government had to develop regulations specifically for this purpose, as none existed for this type of complex. PHOTO: CHIQUI, ONE OF THE MALE JAGUARS THAT FORMED PART OF THE BREEDING STOCK AT THE REINTRODUCTION CENTER IN IBERÁ. PHOTO, RAFAEL ABUÍN AIDO.

"It is not enough to fight for the land; it is even more important to enjoy it. While you can. While it's still here. So get out there and [...] mess around with your friends, ramble out yonder and explore the forests, climb the mountains, bag the peaks, run the rivers, breathe deep of that yet sweet and lucid air, sit quietly for a while and contemplate the precious stillness, the lovely, mysterious, and awesome space. Enjoy yourselves, keep your brain in your head and your head firmly attached to the body, the body active and alive, and I promise you this much; I promise you this one sweet victory over our enemies, over those desk-bound men and women with their hearts in a safe deposit box, and their eyes hypnotized by desk calculators. I promise you this; You will outlive the bastards."

Rewilding is a novel conservation strategy in Argentina and all of South America, especially with respect to the reintroduction of a regionally or locally extinct species or the supplementation of species whose populations are severely depleted. The incipient development of rewilding in Argentina collides with the lack of general regulations that organize, facilitate and stimulate the presentation of projects.

On the other hand, in the countries that have implemented rewilding for a few decades, governmental agencies responsible for wildlife conservation have drawn up regulations for the implementation of this type of project and many times they are the ones that execute them. For example, the return of the wolf in Yellowstone National Park was carried out by the US Fish and Wildlife Service, the equivalent to the National Directorate of Biodiversity in Argentina. In South Africa, South African National Parks, the equivalent of the National Parks Administration in Argentina implements numerous species reintroduction initiatives, among them the project that restored the splendor of the renowned Kruger National Park. In Argentina there are or there have been some rewilding initiatives carried out by state organizations as mentioned in Chapter 4, although this has been the exception.



When the agency that regulates the activity also implements it, the regulations are more realistic and are developed as a tool that organizes, facilitates and stimulates the activity. Argentina is a federal country and its National Constitution establishes that the natural resources (including wildlife) are the domain and jurisdiction of the provinces. However, the national government has the right to intervene when the project is developed within the jurisdiction of the National Parks Administration and when the interprovincial or international transit of species is involved. For this reason, most projects must be approved in at least two different jurisdictions, which complicates the evaluation process. In the case of species designated as Monumentos Naturales Nacionales (National Natural Monuments) such as the huemul and jaguar, the intervention of the national government is confusing because the provinces have never ceded jurisdiction over these species.

One of the consequences of the lack of regulations that guide the presentation of rewilding projects is that it is not defined through which administrative act they should be approved. At times, the enforcement authority has established that, due to the lack of regulations, the project cannot be carried out, and at other times, to the contrary, it has stated in the absence of regulations, the project should not be evaluated but could be carried out. For this reason, some projects that we have presented were never formally evaluated or approved, although they could be implemented (however, the majority were approved either with a note or by ministerial resolution). The execution of rewilding projects exceeds the duration of a government's term, so they must be approved by administrative acts that guarantee their execution over the long term, so as not to be affected by political changes.

Another consequence of the lack of regulations is that the decision to determine the contents of a rewilding project is in the hands of the person in charge of the evaluation. This means that for a single rewilding project different (sometimes external) evaluators request information at different times, significantly delaying the project's analysis and eventual approval. For example, on one occasion, a well-known Argentine NGO requested that we submit an environmental impact statement as a requirement for approving the reintroduction of the marsh deer in El Impenetrable National Park, in Chaco. This request is clearly paradoxical because their evaluations are designed to prevent negative effects of works or activities that degrade the environment, its components or people's quality of life. The reintroduction of a native species generates exactly the opposite: it reestablishes lost ecological interactions that contribute to returning health to the ecosystem. Luckily the request was rejected.

State agencies that evaluate and approve projects must have experience in their implementation. This is the case, for example, in South African National Parks, the counterpart to our National Parks Administration in that country, which has carried out numerous reintroductions of species such as the black rhino in Zakouma National Park. PHOTO: KYLE DE NOBRIEGA/AFRICAN PARKS.

In Argentina, regulations should be developed to guide, facilitate and stimulate the presentation of rewilding projects. These regulations should be flexible to allow for the inherent uncertainty of these projects. PHOTO: A MALE OCELOT IN ITS PRE-RELEASE PEN IN IBERÁ, WHERE THE WORLD'S FIRST REINTRODUCTION PROJECT OF THIS SPECIES IS BEING CARRIED OUT, WHICH ENTAILS A HIGH DEGREE OF UNCERTAINTY AT EVERY STAGE, SEBASTIÁN NAVAJAS.

The Guidelines for Reintroductions and Other Translocations for Conservation Purposes, developed by the IUCN Species Survival Commission (a specialist group) have been extremely useful in filling this gap in defining the content of rewilding projects. This document details the aspects that should be considered when considering conservation actions based on animal movement, and in general enforcement authorities assume that a project that presents information on the different issues set forth in the IUCN guidelines can be analyzed and eventually approved.

Projects developed by Fundación Rewilding Argentina and later approved by the government agency(ies) with subject matter competence become their own type of guidelines. For example, the sanitary treatment that we propose in a rewilding project that is later approved, becomes the norm that must be complied with, since there are no other more general regulations on the matter. Thinking of it this way, the projects that we present have sometimes been the impetus for the drafting of regulations, which help to partially fill the existing gap, though it does not solve the underlying problem which is the lack of clear rules when it comes to implementing this type of project. In addition to organizing the presentation of rewilding projects, the rules must be conceived as a stimulus to facilitate them and not as a list of commandments of regulations that request a level of detail and precision that is impossible to deliver or comply with. This is precisely the spirit with which the IUCN document cited above has been prepared, where the authors clarify a) "that the guidelines are designed to provide guidance on the justification, design and implementation of any conservation translocation" b) but "they are not an advocacy document for conservationist translocations,"and c) "these guidelines are consistent with the guiding spirit of the Convention on Biological Diversity." An anecdote by way of example: in one project we worked on we were asked for the exact dimensions of a pre-release enclosure for animals and later were asked for a report to explain why the constructed enclosure measured 20 centimeters less than the stipulated measurements (which was due to the natural irregularities of the terrain).

Another problem in Argentina, in addition to the lack of regulations, is that the vast majority of government technicians that analyze and eventually recommend approval of rewilding projects have never worked on this kind of initiative. When analyzing them it generates insecurities that they try to ease by requesting details that are impossible to provide. In addition, government agencies often consult external referents related to the species that is the object of the project. If these referents are experienced in active management they generally make recommendations that enrich the project, but if they are not, their participation is limited to highlighting the uncertainties and requesting more specificities, which, as mentioned, are in some cases impossible to satisfy.

If there are also prior projects that involve the active management of the species that have not yielded favorable results, insecurities give rise to the sense that the project will be impossible to implement, as happened with the pampas deer. In the 1960s, the Province of Buenos Aires began to develop the Proyecto Venado (Deer Project) which involved the translocation of some 50 individuals from environments in Bahía Samborombón that were unfavorable for their development to more suitable terrain. During the translation, approximately 60% of the animals died but at the same time, the surviving individuals reproduced and came to form a nucleus of 43 deer, but the lack of support for continuity of the project and health problems caused the last six females to die in 1998. Although the results were not good, the project provided knowledge about the management of the species that could have been used to undertake improved conservation programs. However, subsequent recommendations were limited to prohibiting further management activities and to carry out more studies and monitoring of the remaining population in Samborombón, which continued to decline. The failure of this project was the main argument used by government technicians and professionals linked to this species to recommend that the national government not approve the reintroduction of pampas deer in Iberá. Ultimately the project was approved by the province of Corrientes and it culminated in the establishment of the largest deer population in a protected area in Argentina.

ing of what is entailed.

In summary, any regulation of rewilding projects should consider a series of characteristics inherent to this type of work. First, these projects necessarily involve a level of uncertainty in their execution because in many cases they include learning processes as they are the first of their kind. Secondly, it is not unusual that during project execution the need to resolve unexpected situations quickly arises. These attributes require flexible regulations that allow those responsible for the project to make executive decisions in the field, and justify their actions, and not the other way around. In Chapter 20 we will discuss the possible contents and spirit of these types of regulations.

It is therefore fundamental that governments invest in the development of rewilding projects that are carried out by government technicians trained in this field. This would not only increase the number of projects in Argentina but also would provide evaluators with a better understand-



CHAPTER 9

Doug and Kris Tompkins not only conceived of and financed the Iberá Project. They were involved in the execution of the projects and came to live in the territories where they were implemented. PHOTO: RAFAEL ABUÍN AIDO.

FINANCING AND COSTS OF REWILDING PROJECTS

"If anything can save the world, I'd put my money on beauty." Douglas Tompkins

The projects that Fundación Rewilding Argentina implements through the economy of nature model and that include rewilding as a strategy are, above all, long-term actions. The purchase of land and its subsequent donation for the creation of a national park, the restoration of environments and species and the development of a new economy in the local communities are lengthy processes. For example, the first purchase of lands in Iberá dates back to 1998 and the creation of the National Park occurred 20 years later, and the work to restore species began in 2007 and is still ongoing.

Therefore, financing must be guaranteed for the long term and ideally at the beginning of each project, minimum financing for the period required for its implementation should be ensured. Fundación Rewilding Argentina does not have paying members and in general, it does not execute state funds. Rather, projects are financed by philanthropists who have a long term vision and commitment and share the foundation's values.. We work with a small number of philanthropists, and in general they contribute-through their foundations-funds that finance the entire project.

In the specific case of Iberá, everything was financed from the beginning by Tompkins Conservation, although over time new donors came on board who have in the past or continue to fund specific aspects of the project, especially rewilding initiatives such as the reintroduction of the jaguar, red-and-green macaw and giant otter. In addition, Doug and Kris Tompkins coordinated the implementation of the activities and therefore spent six months of the year in Iberá, and the other six months in Chile, where they engaged in similar projects. As a result, they had detailed knowledge of the project, of the progress and setbacks and of the opportunities and difficulties inherent in its implementation. Iberá was the first rewilding project to be executed through the economy of nature model in Argentina, and it was key to its success that its main contributor was also its executor.

Fundación Rewilding Argentina has fundraising teams based in Buenos Aires as well as abroad in partnership with other organizations. Although this team actively seeks donors, most of Fundación Rewilding Argentina's contributions come through ties to Doug and Kris, whose work is world-renowned.

After the first meeting between the interested philanthropist and the foundation, our fundraising team makes sure to explain the project in one or more preparatory meetings and finally they are invited to visit the territory where we work. This last step is key since all of the staff is involved in receiving the philanthropist and this is generally where the interested party becomes involved with the organization and commits to its funding. Doug and Kris left the imprint of beauty, local work and sustainability in each one of their projects. That is why the donor feels a connection not only to the process of species reintroduction or creation of parks, but also to the traditional style of houses where the foundation staff lives, with the hand-hewn furniture, with the coffee table books of spectacular photos, with the design of the signage, with the organic gardens and native vegetation surrounding the houses where native animals such as the greater rheas, marsh deer and capybaras (in Iberá) tapirs and peccaries (in El Impenetrable) and guanacos and the lesser rhea (in Patagonia) can wander peacefully.

But above all, they fall in love with the people involved with the projects, from the work team composed mainly of young Argentines who have decided to live in the territory, far from cities and towns, who carry out their daily work with great love and commitment. They also fall in love with the local actors who do not have a work relationship with the Foundation but who undoubtedly are also part of the projects. Among those we include provincial leaders who tell stories about the transformation of the territory through the economy of nature model, local leaders who point out the increase in employment, the incorporation of women into the economy, the decrease in the exodus of young people and even many of their return to the territory. There are also local residents that once hunted wildlife and today make a living guiding tourists to observe it; artisans and chefs who have recovered local art and recipes; locals who have remodeled a room of their homes to receive visitors. In this sense, Iberá is a showcase, a mature project in which we can shine a spotlight on what we want to do in other areas of Argentina.

One of the most important aspects of fundraising is generating a relationship of trust with the donor where they feel and see that their contribution is helping to generate the change they want to see in the world. That is why it is very important to listen to their concerns, discover their interests and learn why they want to work with our foundation.

When a donor or other strategic partner (for example, a government representative or journalist) visits us in the territory where we carry out our projects, they should see a visual representation of the values that we embrace: eco-localism, natural beauty and knowledge-based decisions. Photos: the organic vegetable garden at Rincón del Socorro in Iberá, where we harvest vegetables to feed staff and visitors; the CHISPA project for organic vegetable production in Patagonia Azul; carefully designed hand-carved signage in Patagonia. PHOTOS: MATÍAS REBAK, MAIKE FRIEDRICH.

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In general, long term donors, whether for the Iberá project or in the other projects as in Patagonia, El Impenetrable or Patagonia Azul periodically travel to the territory where they develop or in many cases already have an avid interest in experiencing how a rewilding project is managed. For them, donation is also a learning process.

of the country.

In the process of fundraising it is essential that the projects develop clear and precise objectives that reflect the Foundation's vision. At times, some organizations change their objectives to more closely align with that of their donors, who end up defining the work agenda. To avoid this problem, Fundación Rewilding Argentina first prepares the projects and then seeks out potential donors to finance them.

substantial additional costs.

A philanthropist's decision to support a project is just the beginning of the connection; then we must work to achieve effective, easy communication so they feel continuously involved with the work. Depending on their preferences, this communication can be through email updates, regular phone or video calls from the field. The goal is to keep the donor interested and enthusiastic with the project so that they stay involved and sustain or increase their support.

Most of Fundación Rewilding Argentina's donors are foreign, as in Argentina, philanthropy is not common, especially with regards to environmental issues. This is a cultural issue entrenched by local laws, which discourage patronage. However, our experience suggests that this situation is shifting as a result of an increase in environmental philanthropy on the part of Argentine citizens. This trend should be accompanied by modifications in incentives and the legal framework

As one might imagine, the projects that we execute are costly. This is for several reasons. First, it is because they are ambitious projects that involve purchasing large tracts of land, the construction of quality public use infrastructure and the reintroduction of species such as top predators, whose management is complex. In addition they require us to hire qualified personnel and provide them with the necessary amenities, training and equipment to ensure the success of the project. Lastly the approval times for some government permits can go on for longer than expected, generating

One point to bear in mind is that in the particular case of the species reintroduction, it is quite common to have to deal with unexpected situations that require a rapid response, and this too, adds to the project costs. At the same time, these unknowns at times will lead to not meeting objectives in the proposed time frame, so they must be well explained to donors to increase their confidence in the team and sometimes even involve them in the search for solutions.



Donors are driven by the desire to leave a legacy on the planet and many of them also have a personal interest in learning how to manage a rewilding project in the territory, and this is the reason they visit us periodically and get involved in the implementation. PHOTO: ANNE DEANE, FOUNDER OF OUR STRATEGIC PARTNER FREYJA FOUNDATION, VISITS THE REWILDING AND TRAIL-BUILDING PROJECT IN PATAGONIA PARK, ARGENTINA, MATÍAS SERRANO HUMPHREYS.

Currently we are carrying out rewilding strategies in four locations: Iberá, El Impenetrable, Patagonia; and Patagonia Azul. These projects include not only the rewilding strategy itself, but also the creation of the park and the development of local restorative economies. Running each one of these projects costs between one and 1.5 million dollars per year, with approximately 45% of these costs allocated to payroll. One of the main challenges of these projects is to make them sustainable, because Fundación Rewilding Argentina will eventually withdraw from the territory, but the results obtained through the economy of nature model must endure. In the case of the parks the involvement of the National Parks Administration (or its provincial equivalent) guarantees the control of threats, fire management, maintenance of surveillance infrastructure and public use. In the case of restorative economies, the initial infrastructure investments that Fundación Rewilding Argentina (especially to facilitate public access to the parks) makes are followed by much larger investments in public works, ideally located in the communities surrounding the park, financed by the state and executed by provincial governments. Entrepreneurs may be subsidized by the foundation as they initiate their activities, acquire the capacity to invest to develop their enterprises and in the case of the reintroduced or supplemented species, self-sustaining populations are established that do not require complex interventions to guarantee their long-term permanence.

Thus, Fundación Rewilding Argentina then withdraws from the territory and the economy of nature model continues in operation, which is the best indicator of a project's success.

The projects that Fundación Rewilding Argentina implements must become self-sustaining and allow the foundation to ultimately withdraw from the territory. This is achieved when the state takes over the park that has been created, and invests in public works to improve the region's infrastructure, when the entrepreneurs acquire the ability to invest in the development of their own ventures and when the reintroduced or supplemented populations of wildlife no longer require complex interventions to persevere. The Lechuza Cua refuge in the Carambola Portal of Iberá Park, recently rebuilt by the state after it was razed by fire. PHOTOS: MATÍAS REBAK.





CHAPTER 10

THREAT CONTROL AND ERADICATION

Cattle ranching degrades native vegetation, displaces native herbivores and encourages conflicts with predators. Despite being one of the greatest threats to wildlife, ranching is not generally perceived as such and is even tolerated in places where it is illegal, such as national and provincial parks. PHOTO: VILLAGER WITH COW AND DOG IN EL IMPENETRABLE NATIONAL PARK, GERARDO CERÓN.

"Most extinctions are avoidable-especially as we learn more about the implications of different threats, and [...] in adapting and applying effective conservation management techniques."

Carl Jones and Don Merton

The territories where we execute rewilding projects have experienced severe defaunation and degradation of their natural environments as a product of various human activities. The four sites where we currently work are a clear example of this. In Iberá, we reintroduced the jaguar, giant anteater and collared peccary, three species which had become locally extinct. In El Impenetrable the giant river otter, the guanaco and the marsh deer had disappeared, while in the terrestrial sector of Patgaonia Azul the pampas deer and in the sea, the kelp forests had been eliminated in several sectors. In Parque Patagonia some species had disappeared locally such as the Wolffsohn's viscacha, and the coypu, while others disappeared regionally, such as the huemul deer and southern river otter. At the same time, many species, though they did not become extinct, suffered a severe loss of population, which caused their ecological extinction, or in other words, caused the loss of their ecological roles.

Before reintroducing species to recover the integrity of an ecosystem the possible causes of the extinctions and population reductions must be analyzed. In general they originate from human activities.

In the territories where we work, the ecosystems are degraded, but have not been completely destroyed. In these territories the main causes of species disappearance were hunting, fishing and livestock activities. In general, we do not work in territories that are intensively affected by mining or hydrocarbon activities, nor in areas that are severely degraded through largescale agriculture and forestry.

In particular, hunting has caused the decrease or disappearance of many species' population, especially those with commercial value for their skin or pelt such as the capybara, the giant river otter and the yacare and broad-snouted caimans. It has also had an impact on species that people hunt for sport such as the marsh deer, the huemul and the puma, and those that are part of the local diet such as the gray brocket (a native deer), tapirs and both the collared and white-lipped peccary. On the other hand, control hunting, linked to cattle ranching, has affected numerous species such as the jaguar, puma, red fox and the guanaco. Currently most of these activities are illegal and clearly recognized as a threat to wildlife.

Cattle ranching is another cause of the disappearance or decrease in population of many species due to the use of dogs as work animals and an excessive use of fire to promote regrowth, which heavily impacts native fauna, as does the fencing off of fields into plots. In addition, livestock profoundly changes the natural ecosystems causing the disappearance of some types of vegetation as occurs in El Impenetrable where this activity has transformed wet and dry grasslands into impoverished shrublands dominated by Prosopis ruscifolia and Vachellia aroma. At the same time, cattle compete with and displace native herbivores, which causes a drop in the number of predators or the appearance of conflicts when in the absence of native prey, predators begin to prey on livestock. To all of this is added, as mentioned in Chapter 7.6, that cattle are one of the main vectors of pathogens that affect wildlife.

Unlike hunting, cattle ranching is a legal activity that sustains many regional economies but is not permitted in provincial or national parks. One of the great challenges of managing this threat in the parks is that it is not perceived as such and many national and provincial parks are chronically and illegally invaded by cattle, without any action taken to avoid their impact over natural ecosystems which the parks are aimed at protecting. El Impenetrable, El Rey, Baritú, Aconquija and Lanín are only some of many examples of national parks illegally entered by cattle without any effective action being taken

Wildlife hunting is another of the main causes of native species extinction. Unlike cattle ranching, illegal hunting is clearly perceived as a threat, and is little tolerated by society and officials. PHOTO: JAGUAR CARCASSES IN PANTANAL, BRAZIL, PANTANAL ARCHIVE.

At Fundación Rewilding Argentina we invest a lot of resources in controlling or eradicating invasive alien species, one of the main causes of biodiversity loss. This activity is costly and difficult to finance and the message is not well-received in a society that in general does not accept the elimination of animals. The rabbit is an exotic species introduced on four islands in Patagonia Azul, Chubut where it significantly degrades the soil and vegetation. PHOTO: CAMERA TRAP/FUNDACIÓN REWILDING ARGENTINA.





Invasive species are another category of threat and represent one of the main causes of the global disappearance of species due to the predation and competition they exert on native species. Dealing with them is complex on many levels. Firstly because control and eradication are difficult and expensive and secondly because obtaining funds to manage exotic species is complex so restoration projects for native species and natural ecosystems should also include funding for it. At the same time, the eradication of exotic species is a delicate topic communications-wise, as it often involves the sacrifice of animals, which society generally rejects even though exotic species cause the death of millions of individuals of native species every year. In countries where the introduction of native species have had particularly devastating effects, organizations such as the Australian Wildlife Conservancy have managed to incorporate these activities into their communication strategy. Our teams invest tremendous effort and resources in controlling exotic species such as feral pigs, spotted deer, chinaberry and glossy privet, and even in eradicating them in the case of rabbits, cats and feral cats on the islands of the Patagonia Azul coast.

At the beginning of each project, activities to eliminate threats on the Foundation's properties are both preventive (constant presence of personnel in the field, and construction of wire fences to impede entry by livestock) and also controlling (keeping out hunters, and corralling cattle that break through the fences). In some situations criminal or civil legal actions can be initiated, as was the case with the cattle ranching company Forestal Andina, which built embankments in the interior of Iberá to drain large areas of the marshlands, and the mining company Patagonia Gold which tried to implement open-pit gold mining in Patagonia Park, near the Cueva de las Manos, a UNESCO world heritage archeological site.

It is clear then, that in a park, whether it is created and managed by the state or that is in the process of being created and the lands are still managed by Fundación Rewilding Argentina, the hunting of native species and livestock is not permitted, while exotic species should be eradicated or where that is not possible, controlled.

> The reduction or elimination of threats to wildlife and ecosystems can be carried out in a punitive manner when they are illegal. However, rather than this approach, it would be ideal to promote conservation activities. For example, nature tourism activities based on wildlife observation (in this case a tapir) carried out by local people can replace illegal hunting on the Bermejo River in El Impenetrable, Chaco. PHOTO: MATÍAS REBAK.

Communication and activism campaigns make it possible to raise awareness broadly and act quickly in the face of a threat that may cause irreversible damage or a major change to a species or ecosystem, for example the installation of the salmon industry in coastal marine environments of Tierra del Fuego Province. PHOTO: SIN AZUL NO HAY VERDE.

Beyond these situations, the best solution is to replace the activities considered threats with other, constructive ones to stop using repression as the main management strategy, since prolonging it over time is highly undesirable and unsustainable. This is where tools such as communication and activism campaigns and the generation of a new economy that brings training and environmental education activities come into play.

Communication and activism campaigns bring about rapid change and reach a wide number of people living in diverse locations (see Chapter 14). This is particularly useful because certain threats must be addressed immediately to prevent significant or irreversible damage to a species or its environment. In addition, by reaching a large number of people these issues quickly become a part of the political agenda and therefore gain importance for decision makers who are often the ones who must act to eliminate or reduce the threat. For this reason we implement communication campaigns using mass media such as social networks or print and broadcast media with the goal that a broad public recognizes an activity as a threat that must be controlled or eliminated.

We carry out this type of campaign, for example, to raise awareness about the problem of poaching along the Bermejo River in El Impenetrable National Park. One extreme form of this tool is the activist campaigns-which we also implement-where an aggressive, but non-violent action is developed that attracts the public's attention and is then widely communicated. If it is effective, it means that whoever must act to reduce or eradicate the threat does so quickly, as was the case with the prohibition of the installation of the salmon industry in Tierra del Fuego, with the prohibition of open-pit gold mining in Patagonia Park and with the order for to demolish embankments in Iberá.

Other tools we use to eliminate threats and that are aimed at local people are the generation of a new economy and associated environmental training and education activities. These tools complement those previously mentioned and proactively produce profound, long-lasting change, but the results are slower to materialize and therefore their use must be constant and over a prolonged period of time. As Fundación Rewilding Argentina is an organization that acts on location, it is here where we can apply tools that require long-term action.

If some threats, such as hunting and cattle ranching represent a significant part of a community's livelihood, people will not abandon these practices based solely on the fact that they know they cause significant damage to natural ecosystems. They will only abandon them when they find other, more profitable activities. In this sense, the development of a restorative local economy through the economy of nature model is very useful to reduce threats in a protected territory.

In general, the authorities that analyze rewilding projects want the threats to be eradicated or notably reduced before they begin, or in the early stages of the projects' execution, and it is clear that these projects must present a strategy that addresses the threats that caused the disappearance or decline of the species. However, it must be understood that this type of action is part of a longer process and that the threats will have been eliminated or reduced to an acceptable minimum when the project is mature, that is, when the park is consolidated, when local populations prosper from the new restorative economy and when the species that return have populations that no longer require our intervention to maintain themselves.

This new economy will generate increasing income for the local populations to the extent that threats towards the native species and natural environments are reduced or disappear. Environmental education is another tool that produces slow but long-lasting changes and we use it especially with local people who embrace these new economies, so that they understand that the threats that affect the ecosystems and wildlife are the same ones that affect their income.

Iberá is a very good example of the use of these tools in the territory with the goal of reducing or eradicating threats. For example, in Colonia Pellegrini many of the people who once collected shellfish in the marshlands now work as park rangers or wildlife observation guides. This change began in Pellegrini in 1983 when the Iberá Provincial Reserve was created, and deepened as years went on. Similarly, many ranchers in Iberá are now engaged in wildlife observation ecotourism activities and some have even abandoned cattle ranching. Others continue to engage in it, sometimes with fewer animals and they understand that wildlife also generates income, even more so than ranching. All of these people welcome the existence of a park and the return of wildlife. This economic reconversion is accompanied by environmental education activities for each one of these entrepreneurs, which highlight the link between these projects and the care and restoration of nature. Nowadays, cases of poaching and cattle encroachment into Parque Iberá have diminished as a result of the development of proactive actions that generate employment and educate the entrepreneurs. As a result, there is little need to work on repressing these threats. Something similar is happening-to a different degree in other towns in Iberá and in the towns and localities near El Impenetrable, Parque Patagonia and Patagonia Azul.



CHAPTER 11

PROJECTS

Qaramta's enormous paw, photographed during capture and anesthesia for him to be fitted with a satellite monitoring collar. Qaramta is a 114 kilogram male jaguar and the only individual of this species whose presence is confirmed in El Impenetrable National Park. His discovery in September, 2019 allowed for the launch of a major awareness campaign about the jaguar's situation in the Argentine Chaco and to establish an unprecedented reintroduction project. PHOTO: GERARDO CERON.

IMPLEMENTATION OF REWILDING

"Large conservation programs, like new scientific disciplines, start with a heroic age. A few individuals push forward, risking failure and harm to their own security and reputations. They have a dream that does not fit the norm. They accept long hours, personal expense, nagging uncertainty, and rejection. When they succeed, their idiosyncratic views become the new normal. Their individual stories are then rightfully seen as epics. They become part of environmental history."

11.1 STRUCTURE, ATTRIBUTES AND FUNCTIONING OF FUNDACIÓN WILDING ARGENTINA'S WORK TEAMS

Fundación Rewilding Argentina has a board of three leaders, an administrative office in the city of Buenos Aires, and teams in the territory where rewilding projects are carried out.

Fundación Rewilding Argentina's personnel and work teams have a number of specific attributes. Most of our personnel live in the territory where the projects are carried out. Many of them come from the area of influence of the project, and almost all of them have previously participated in the Foundation's volunteer program. In addition, the leaders in the field can and do make proactive, quick decisions on the basis of sparse information. The work teams have a hierarchy that prioritizes the ability to make decisions and practical knowledge over academic training. Teams are multidisciplinary and in continuous, periodic contact with the Foundation's board to coordinate work agendas in accordance with the needs of each territory.

Fundación Rewilding Argentina has an office in Buenos Aires, where ten percent of the staff works, mainly dedicated to financial and administrative management. The rest of the staff lives and works in the territories where the rewilding projects are carried out, in the provinces of Corrientes, Chaco, Santa Cruz and Chubut. In this way, personnel become neighbors to the towns close to the projects as is the case in Colonia Pellegrini, San Miguel or Concepción del Yaguareté Corá in Iberá; La Armonía and other places near El Impenetrable; Perito Moreno and Los Antiguos in Patagonia and Camarones en Patagonia Azul.



place every day.

In addition, many of our team members are locals, and were either born or have lived for many years in these villages and sites. This helps our team to incorporate knowledge of local particularities, and to train people so they have a strong, lasting bond with the projects when the Foundation leaves. It also generates local employment for as long as we are present in these regions.

Choosing the right people to join the projects is one of the most important tasks, and it is a matter of success or failure. That's why most of the Foundation's employees have at one point volunteered on one of the projects. Fundación Rewilding Argentina has a volunteer system that lasts about three months, during which the volunteers learn the particularities of the work culture of each different team and territory where we carry out our projects. In turn, we learn about the volunteers: getting to know them over a few months of volunteering is a much deeper look into who they are than a simple glance at a résumé.

This unique characteristic of the Foundation's work emulates the seal that Doug and Kris Tompkins have left on their work. They moved to the places where they were implementing projects in Argentina and Chile. They had their homes there and carried out their life project. Doug would say that conservation should be done in the field, that there is nothing more political than the territory itself and therefore, doing conservation work consists of fighting small battles in that

Implementing innovative rewilding projects is not easy. It entails a high degree of uncertainty, high levels of public exposure and other conditions that are far from under their control. Almost on a daily basis the field teams must resolve unexpected and complex situations with minimal information available, as is often the case for people working in animal management. Therefore they must be extremely observant to detect situations that require attention, to quickly make decisions and take action. Those working in the field have to have practical knowledge, but above all, they have to know who to consult to obtain more information to make the best possible decision. To that end, Fundación Rewilding Argentina has a renowned group of professionals and network of external collaborators available 24 hours a day, 7 days a week to assist those in charge of the territories to make decisions. All the same, the entire team has to be cognizant of the fact that at times it will be impossible to glean more information before taking action, so fear of making a mistake cannot come into play before making a decision. In addition, once a decision is made, regardless of outcome, it will serve as a lesson for the future.

Around 90% of Fundación Rewilding Argentina's staff works and lives in the territories where the rewilding projects are carried out. Photos: Fundación Rewilding Argentina staff in some of their daily activities at El Unco (Patagonia), San Alonso (Iberá), El Sauce (Patagonia Azul) and El Teuco (El Impenetrable) biological stations. PHOTOS: FRANCO BUCCI, MAIKE FRIEDRICH, SOFÍA HEINONEN, SEBASTIÁN NAVAJAS.



they rely on a hierarchy based on capacity and degree of responsibility for decision-making, but which is not necessarily correlated to each member's level of formal education. To decide who will play which role, we look at personal traits such as management abilities, teamwork, conflict resolutions, the ability to seize opportunities and proactivity in decision making often based on scarce information and with a high degree of uncertainty. While possessing an advanced degree may be of some benefit, it is not a prerequisite as we particularly value practical knowledge and experience acquired by interacting with their coworkers and practitioners (people who work on similar projects) around the world. To encourage this interchange, we invest a lot of resources in inviting these practitioners to come and learn about our projects and sending our team to participate in theirs.

One of the identifying characteristics of Fundación Rewilding Argentina's work groups is that

Fundación Rewilding Argentina's teams are made up of people with a broad range of knowledge and interests. Some of them have a background in natural sciences, including biologists, veterinarians, agronomists or park rangers, but most of them have other interests and may be communications professionals, political scientists, lawyers, business administrators, architects, engineers, landscape architects, accountants, designers and photographers. Conservation and therefore also rewilding is first and foremost a social discipline. Without knowledge of biology, one cannot do rewilding, but having only that education is not sufficient. The wide range of backgrounds and interests are essential for the success of our projects.

Having a team of people from many fields including those who do not have formal studies challenges us to implement training so that all of the workers have basic knowledge of social and natural sciences, beyond what they might have learned through their education or work experience. For example, we must provide social science tools to the people most closely linked to working with natural resources so they can carry out the political management necessary to execute the projects. We also provide knowledge of the natural sciences so that those working on social issues can better explain the underlying rewilding work. All Fundación Rewilding Argentina staff are trained to clearly convey the organization's mission and vision, as well as the key messages associated with the rewilding projects we carry out, which are developed in each chapter of this book.

Fundación Rewilding Argentina's teams are made up of people with knowledge and interest in the natural sciences but also in other fields. Without knowledge of biology, rewilding cannot be carried out, but the diversity of knowledge and interests is what guarantees the projects' success. Photos: institutional relations staff with Corrientes Governor Gustavo Valdés in Iberá; the foundation's scientific director Emiliano Donadio with Dr. George Schaller in Patagonia; Patagonia Project photographer Franco Bucci; Juan Aguirre of the Iberá community team explaining the jaguar project to local people. PHOTOS: MATÍAS REBAK, BETH WALD, MATÍAS SERRANO HUMPHREYS, MATÍAS REBAK.



Rewilding projects depend on the availability of individuals to be translocated, to reintroduce species or supplement populations and ideally these animals come from the natural habitats that they inhabit. Under certain circumstances when this is not possible, captive animals are used, as has been the case with the reintroduction of the Arabian oryx, Przewalsky's horse, the California condor, European bison, black-footed ferret, and red wolf, which relied on animals from captivity because these species are extinct in the wild. Captive animals may also be used in the initial stages of a reintroduction project to provide the opportunity to develop species-specific handling techniques in more controlled circumstances before working with wild individuals. There are various reasons to prefer individuals from natural environments over those from captivity. First, there is usually greater availability of individuals in the wild than in zoos, breeding centers or wildlife rescue centers. Also, the cost of producing and keeping animals in captivity tends to be higher than capturing them in the wild. In addition, animals who have been born and raised in the wild are much better adapted to the target environment due to behavioral, morphological or physiological characteristics, while those been born or kept for significant time in captivity will need to be taught how to obtain food or avoid predators, and despite intense training, their survival will be lower in comparison to wild-caught animals. For example, in the case of the red-and-green macaw project we are carrying out, many of the individuals that come from captivity must be taught to fly, since they have never flown or have only flown short distances, to the point where their muscles are completely atrophied. In addition to these characteristics, the animals obtained from captivity carry less genetic variability than those of wild origin and are more likely to have pathogens acquired in the enclosures where they

were kept, since they are often in close contact with other individuals of the same or different species.

The coordinators of each project define the objectives of each territory together with the three board members and then the territory coordinators define the strategies and activities to achieve the objectives together with their teams, as framed by the economy of nature model. This is why each rewilding project (Iberá, El Impenetrable, Patagonia and Patagonia Azul) typically has two coordinators, one in charge of the creation of a park for public use and linked to community development, and the other who heads the conservation projects. Both the board of directors and the handful of technical specialists who are not in the territory itself must be on call to help to resolve situations faced by the territory coordinators. These coordinators and their teams are responsible for reaching the objectives of the project that they are in charge of, and the degree of compliance is analyzed in quarterly meetings. The attributes of our staff, the structure of our teams and the interactions they participate in allow us to maintain various simultaneous important rewilding projects in several regions of the country with a view of incorporating more projects in other territories.

11.2 ORIGIN OF INDIVIDUALS FOR REWILDING PROJECTS

"Obstacles to reintroducing or moving a species are rarely ecological but social, political and economic." Roy Dennis

Many of our team members were born or have lived for a long time in the towns and villages located near the projects. In this way, their knowledge of the local particularities are incorporated into the teams, people are trained to remain involved in the projects after the Foundation withdraws, and we contribute to generating local employment for the duration of our presence in these regions. PHOTOS: HÉCTOR IN IBERÁ, MATÍAS REBAK; ALEJANDRO IN PATAGONIA AZUL, MAIKE FRIEDRICH; ZULMA IN EL IMPENETRABLE, MATÍAS REBAK AND ROCÍO IN PATAGONIA, FRANCO BUCCI In Argentina, what should be the exception is the rule, since nearly all of the species reintroduction projects carried out here (most of them managed by Fundación Rewilding Argentina) are populated with individuals from captivity. As mentioned, in some cases it is useful to do so in the beginning stages, to try out different techniques. In the projects that we manage it has been positive to work with individuals from captivity as they are more easily handled, for designing harnesses and collars to fit very high frequency (VHF) tracking devices for anteaters, collared peccaries or red-and-green macaws. It has also been advantageous to work with tapirs from wildlife rescue centers to improve the transport trailer design.

In other cases, it has been decided to work with individuals from captivity because the species were extinct in Argentina and, therefore, there was no availability of wild individuals. This happened with the red-and-green macaw, a project in which all individuals were from zoos, wildlife rescue centers, seizure from illegal owners or from private donations. Likewise, the giant river otters were from European zoos. Ideally, agreements should be reached with countries that still have wild populations of these species to do translocations of animals living in the wild, as is the case between countries in many regions of the world, particularly in Africa.

Working with individuals that originate in captivity means that institutions that housed them become part of the rewilding project. In Argentina there are many institutions that have become involved, making a great contribution not only to our projects but also reinforcing the need for their existence, by allocating some of the animals they house for species conservation. As a result, the link generated between conservation on and off site has been very positive. Money never exchanges hands for the animals in rewilding projects, they are always donated.

One of the underlying reasons for working with animals that come from captivity in Argentina is once again, the prevailing conservation paradigm. Under this framework, any active wildlife management is considered a threat based on the notion that the best way to conserve is not to intervene. At Fundación Rewilding Argentina we not only do not share these ideas but also believe that one of the goals of protected areas–especially of national parks–should be to provide individuals to other territories to join reintroduction or supplementation projects.

Individuals to be translocated should ideally be of wild origin. There are several reasons to prefer them over captive specimens. The first is that animals born and raised in the wild adapt much better to the destination environment due to behavioral, morphological or physiological characteristics. PHOTO: TRANSLOCATION OF PAMPAS DEER FROM AGUAPEY TO IBERÁ AS PART OF THE SPECIES REINTRODUCTION PROGRAM, RAFAEL ABUÍN AIDO.

National parks are a source of animals for species reintroduction projects around the world. In India the tigers of Ranthambore National Park were used to reestablish populations in the Sariska and Panna protected areas. PHOTO: DAVIDVRAJU / WIKIMEDIA COMMONS.

If national parks and other protected areas are correctly managed, the species they host will have healthy populations that produce surplus individuals. This transforms them into animal donors for rewilding projects as they can be donors innumerable times without affecting the health of their ecosystems. This is the case of the tapir in El Impenetrable National Park and of the marsh deer in Iberá National Park. PHOTOS: GERARDO CERÓN, BETH WALD.





Many projects that we have carried out or are about to start could have been set up with individuals from natural environments, as opposed to those from captivity, if the permits to do so had been obtained. By way of example, we can cite in Iberá the reintroduction projects of the giant anteater, collared peccary, tapir and even the jaguar. This would have made the projects more efficient and less costly, but above all, it would have allowed them to have a larger scale and therefore a greater impact on conservation.

The reintroduction of the pampas deer in Iberá is the first reintroduction project in Argentina that managed to successfully establish a population of a species translocating wild animals to a place where the species had become extinct. This is doubly important because it involves an endangered species. The reestablished deer population in Iberá has already grown to be the third most populous in Argentina and the largest that lives in a protected area. These translocations were possible because the source population and the destination were under the same jurisdiction, Corrientes province. The national wildlife management authority was opposed to these translocations, but Corrientes was not only groundbreaking in allowing the translocation of wild individuals of an endangered species but later also authorized the transport of some deer from the consolidated population in Iberá (San Alonso) to another (Rincón de Socorro) to help generate a second nucleus. This is the only instance in Argentina where animals were translocated starting with a source population from a protected area.

More recently we have translocated wild individuals of the Wolffson's viscacha and coypu in Patagonia Park, Santa Cruz with the goal of recovering locally extinct populations of both species. Other translocations have taken place in Argentina involving wild individuals that were kept in extensive captivity, specifically in the case of guanacos. Guanacos living on private farms in the province of Río Negro were translocated to the Quebrada del Condorito National Park in Córdoba and to the Luro and Pichimahuida Provincial Reserves in La Pampa.

> The reintroduced population of pampas deer in San Alonso, Iberá, has already acted as a source of animals to reintroduce this species in the Laguna Iberá portal, another sector of the National Park. PHOTO: RAFAEL ABUÍN AIDO.

Sometimes the origin of the founding individuals straddles the line between wild and captive. This is the case for most of the giant anteaters released in Iberá who were orphaned pups whose mothers were killed by dogs or hunters, and who spend a period of time in a rescue center before they can be released. PHOTO: MATÍAS REBAK.

Examples of the first type of translocation are rare and exceptional. One such example was the reintroduction of the marsh deer at the Estação Ecológica de Jataí (Jataí Ecological Station) in Brazil, where eight individuals were translocated from a section of the Paraná River that was inundated (and therefore destroyed) by the construction of a dam.

donor model.

When translocating specimens that live in the wild, it's important to ensure that removing individuals will not negatively affect the source population. In general the agency analyzing the projects requires that exact population numbers be provided. Though sometimes this is possible, as for many species there are no methods available to arrive at an exact figure of a wild population. The most logical approach is to propose conservative extraction rates and monitor the trajectory of the source population over time, either in terms of exact numbers or a general overview. If a population decrease is detected, determining whether this is due to extraction of individuals should be conducted, and if so, then the removal rate should be reduced. If there is no decrease, a higher extraction rate can be proposed, if deemed necessary. We have made these abundance calculations for the source populations of pampas deer, Wolffson's viscacha, and coypu. We have also looked at population numbers for the marsh deer in Iberá or guanaco populations in Patagonia, for which we propose extraction of individuals to translocate them to El Impenetrable.

In the case of the pampas deer, where the extraction of animals was carried out in Aguapey (Corrientes) it was observed that the cattle and forestry fields from which the animals were extracted had the greatest number of deer and that those populations were sustained over time. On the other hand, in most of the ranchlands where no animals were removed, populations were low and trending lower. This data demonstrates not only that the rates of extraction were reasonable but that the decision to not intervene does not ensure that a population will remain stable over time.

There are situations in which the founding individuals of a new population straddle the line between captive and wild. One of these involves most of the giant anteaters released in Iberá which were originally wild animals, but who ended up in captivity. In fact, in the northern provinces of Argentina, there is a tradition of hunting giant anteaters, many of whom are female carrying their young. The hunters do not kill the cubs, but instead bring them home. On average about ten of these cubs annually end up in a rescue center managed by Fundación Rewilding Argentina, and after a year, they can be released in Iberá via the reintroduction project for the species. The commitment of the governments of the provinces of Salta, Jujuy, Formosa, Chaco and Santiago del Estero is key to the rescue of these orphaned anteaters.

Something similar has happened with jaguars in Brazil and Paraguay. For various reasons (though generally also because the mothers are hunted) some wild specimens are rescued by these countries' governments, and then housed in rescue centers or similar institutions. Thus the Brazilian government rescued the females Juruna and Mariua and the male Jatobazinho, who were later rehabilitated and sent to Argentina by the organizations NEX and Onçafari, to later be released in Iberá.

In order to give scale to rewilding projects, the translocated individuals should be of wild origin and only if this is not possible should captive individuals be used.

NATIONAL PARKS AS A SOURCE FOR WILD ANIMALS FOR REWILDING PROJECTS

When thinking about the origin of the animals for rewilding projects, we use an example from medicine. There are people who are organ donors, and those that donate blood. A person donates their organs once in their life, and only at the end of their life. On the other hand a blood donor can donate many times and must be in good health to do so. Something similar takes place with natural environments and the donation of individuals. There are environments that are close to death and can only donate animals once, and there are healthy environments with species at carrying capacity that produce "surplus" animals, and can be donors on repeated occasions without negatively affecting their health. However, government and NGO conservation institutions prefer that the source of individuals for translocation be in a degraded or endangered state (soon to be destroyed), rather than in a protected and healthy environment. This is because they view translocations as a threat and not as a conservation tool, as their beliefs are couched in the paradigm of hands-off conservation.

Examples of the second type abound the world over, except in Argentina. Most individuals translocated to form new populations come from healthy, well-preserved environments where species are at carrying capacity and therefore produce surpluses every year, which if not "harvested" are lost. This includes in particular national parks and other protected areas. South Africa, along with other African nations, is among the pioneers with the longest track record of translocating animals that come from protected areas. These reintroductions go hand in hand with the active management of the receiving ecosystems, which results in restoring the ecological functionality of natural systems. For example the Maremani Nature Reserve in South Africa served as a source of African elephants to repopulate Zinave National Park in Mozambigue. Likewise, Zinave received warthogs, borhor reedbucks and waterbucks (types of antelope) translocated from Gorongosa National Park, also in Mozambique. In the coming years translocations of giraffes, zebras, wildebeests, cape buffaloes, and impala, kudu, and eland antelope are expected from other parks to Zinave. African wild dogs have, in turn, been reintroduced to Gorongosa National Park from groups translocated from Isimangaliso State Park in South Africa.

These experiments are not limited to the African continent. All of the plains buffalos in North America come from a combination of animals translocated from Yellowstone National Park and five captive herds. Elk have been translocated from Yellowstone to more than 38 states or provinces in the United States, Canada and Mexico, while Yosemite National Park has served as a source for mule deer to repopulate other protected areas where they had become extinct. In India tigers from Ranthambore National Park were used to reestablish populations in the protected areas of Sariska and Panna. Examples of this type also exist in Oceania and Europe, which serves to emphasize the fundamental role that national parks and other protected areas play in rewilding projects.

In Argentina, we are taking first steps, although so far it has been impossible to get a national park to serve as a source for individuals for a rewilding project. The conservation movement in Argentina still adheres to the organ donor model rather than blood



Although it is desirable to work with individuals of wild origin, almost all species reintroduction that is carried out in our country uses individuals from captivity. At times this is because the species has become completely extinct in the wild, as is the case with the giant river otter in Argentina. However, most of the time it is due to the authorities not authorizing translocations of wild individuals, as is the case in other countries. PHOTO: MATÍAS REBAK

THE INVOLVEMENT OF INSTITUTIONS THAT KEEP CAPTIVE ANIMALS IN REWILDING PROJECTS



The red-and-green macaw is another species that is completely extinct in Argentina. The reintroduction project in Iberá uses captive-bred birds, most of which are from the Ecoparque of Buenos Aires and Temaikén, where the macaws are raised in a way that makes it easier for them to adapt to life in the wild, PHOTO: TOMÁS CUESTA.

In Argentina, the institutions that keep various wild species in captivity have progressively become involved in species reintroduction projects. At the beginning they were few and contributed animals sporadically and without long-term planning, but today there are many national organizations that participate in these programs as strategic partners, both in Argentina and in other parts of the world, some of them with projects designed to provide individuals sustainably over time. Some of the first organizations to become involved are the Reserva Experimental Horco Molle (Horco Molle Experimental Reserve) in Tucumán and Salta's Estación de Fauna Autóctona (Native Wildlife Station), which have contributed in particular tapirs and collared peccaries. With regards to the jaguar project, first steps were taken thanks to the commitment and conviction of Batán Biopark in Mar del Plata, the Bubalcó Zoo in Allen (Río Negro) and the Ecopark of Buenos Aires. Later, additional institutions came on board, which were the Mendoza Ecopark, the Guaycolec Station in Formosa, the Zoos of Córdoba and Río Cuarto, the La Plata Zoo, the La Máxima Biopark in Olavarría, the Esmeralda Farm in Santa Fe, the Yastay Preservation and Rescue Center in La Rioja and the Center for the Care of Native Wildlife in Jujuy. Two institutions have gone even farther and have developed breeding programs to nurture individuals for the red-and-green macaw reintroduction project for the long term, which are the Buenos Aires and Temaikén Ecoparks. Other organizations will soon join. In Brazil, the Criadouro Onça Pintada (Jaguar Breeding Center) opened the doors to the movement of animals from that country by sending a female jaguar as well as several bare-faced curassows. This was followed by the Refugio Bella Vista managed by Itaipú Binacional which brought tapirs and barefaced curassows. Also from Brasil, the Criadouro Científico NEX sent the first wild jaguars, later joined by Onçafari who shipped a wild male from the Pantanal in addition to sharing the incredible practical management experience they have with us. For the transportation of animals from Paraguay, authorities from both sides of the Entidad Binacional Yacyretá (a public-private organization that manages the Yacretá hydroelectric dam over the Paraná River) sent the first jaguar individual from the Atinguy refuge that they manage. Later the Establecimiento Faro Moro also joined to send more wild jaguars and the Urutaú Refuge sent the first red-footed tortoises.

In Europe, the Endangered Species Programme of the the European Association of Zoos and Aquaria (EAZA) deftly managed the studbook of the giant river otter, which has allowed the transfer of animals to the zoos of Budapest (Hungary), Eskilstuna (Sweden), Givskud (Denmark) and Bioparc de Doué-la-Fontaine (France).

In the province of Corrientes, the Aguará Conservation Center, a strategic partner of Fundación Rewilding Argentina, where one of the quarantine centers we manage is located and which has become a national model of a fauna rescue center deserves a special mention.

11.3 REWILDING AND WILDLIFE TRANSPORT

The translocations are, in essence, similar to moving livestock with the difference being that in the first case the animals are wild and are of different species. This range of species requires the development of specific techniques for their transfer, since wild animals will have had less experience with transport than cattle. Our work teams routinely innovate to substantially improve animal welfare during their transport.

At the heart of rewilding is wildlife transport, called translocation. Translocation is defined as the intentional transportation of one specimen into part of its original range from which its populations have disappeared or been severely depleted in historical times, in both cases due to human activity.

The translocation of wild animals replaces or reinforces movements that occurred in the past but that no longer take place or take place only sporadically, generally as a result of the presence of human-made barriers. These movements are indispensable so that species can return to a place where they have become extinct, to increase the population numbers in areas where they still exist, but where populations are sparse, and to maintain or increase a population's genetic variability. Translocated animals may be captive-bred or captured in the wild. In the latter case the transport is more complex since the animals—unlike those reared or kept in captivity-have never been handled.

In South American countries, the internal transport of wild animals for the purposes of translocation is very limited, and between countries, practically nil. Furthermore, in the rare instances where it does take place, few individuals are involved. This may be because in South America with the exception of guanacos, vicuñas, some peccaries such as the whitelipped peccary and in the past the pampas deer, and huemuls, the animals tend not to cluster in groups in open spaces, which impedes large-scale transport of individuals. In addition to the technical difficulties inherent to transport, there are additional administrative complications; bureaucratic requirements with little or no logic. A good example of this is the jaguars from the neighboring national parks of Iguaçu (Brazil) and Iguazú (Argentina). Some of these jaguars move freely between the two parks crossing the Iguazú River. But if for some reason, it were necessary to translocate an individual from the Brazilian national park to the Argentine one, the animal would need to undergo extensive quarantine in both the country of origin and destination. In addition, entry into Argentina can only be via Ezeiza International Airport (in Buenos Aires, over 1300 km away), unless an exception is granted for them to enter through Puerto Iguazú.

"Recolonization always is a nice dream to have. It absolves everyone, especially wildlife agencies, of any responsibility. It doesn't require any effort on the part of the many wildlife organizations except to act as cheerleaders, wishing them the best, sending their hopes and prayers, while boosting their membership along the way."


In contrast, in other regions of the world wildlife translocation is widely-used in conservation or even for productive purposes, transfer procedures are simpler and more realistic. Certainly the best examples come from Africa, where, over many decades of work, a great deal of experience in wildlife transport has been developed. In many regions of Africa, due to the presence of diseases that made raising cattle impossible until relatively recently, meat consumption was restricted to meat from wild animals, which meant people developed many techniques for how to handle them, which included transport. Also, the flourishing activity of wildlife-based tourism on that continent—whether for observation or hunting—contributed to the development of wildlife transport. The state or NGOs, can translocate animals, but it is mostly undertaken by private companies specialized in wildlife capture and transport.

In countries such as South Africa, annually some 100 thousand wild animals are translocated, likely the most of any country. In Africa there are emblematic, vast cases of animal transport such as Operation 500 Elephants which was carried out by the NGO African Parks, translocating them to the Nkhotakota Wildlife reserve in Malawi, where they had become extinct.

Fundación Rewilding Argentina is certainly the organization that has translocated the largest number of wild animals for conservation purposes in our country. From 2007 to the present we have transported anteaters, pampas deer, marsh deer, collared peccaries, tapirs, jaguars, ocelots, giant river otters, Wolffson's viscachas, coypu, red-and-green macaws, bare-faced curassows, and red-footed tortoises. Little by little we have perfected the capture and transport techniques for each of these species using boxes and trailers, and transport via air, land and water. We translocate some 150 individuals per year, so we understand the need to scale up rewilding projects that use translocations, which would allow us to achieve greater impact on Argentine wildlife conservation.

It should come as no surprise that the translocation of wild animals for conservation purposes is strongly criticized by its opponents, using arguments related to animal welfare, the spread of pathogens via translocated animals (see Chapter 7.6) or genetic contamination by reintroducing varieties different from its original inhabitants (see Chapter 7.4). All of these aspects are surely important but they should not constitute an impediment to carrying out translocations.

> In South Africa about 100 thousand wild animals are translocated every year, a number which is probably not surpassed in any other country. In Argentina, one of the challenges to scaling up rewilding projects and generating a greater conservation impact is increasing the transport capacity for wild animals. PHOTO: WHITE RHINO TRANSPORTED IN SOUTH AFRICA AS PART OF A REINTRODUCTION PROJECT, RHINOSWITHOUTBORDERS.COM

There are incredible examples of animal translocation initiatives. One of them is 500 Elephants, a project, carried out by the African Parks organization, which transported that number of individuals to repopulate the Nkhotakota Wildlife Reserve in Malawi. PHOTO: AFRICAN PARKS.

One of the ways to immobilize animals is injecting them with tranquilizer darts. The immobilized animals can then be tagged for later monitoring in the same site or transported as part of reintroduction or supplementation projects. PHOTO: A FUNDACIÓN REWILDING ARGENTINA PARK RANGER SHOOTS A TRANQUILIZER DART AT A GUANACO IN PARQUE PATAGONIA, FRANCO BUCCI.



Once again, the dominant conservationist paradigm of non-intervention favors passive conservation strategies, in this case limiting animals' movement to those that occur naturally—such as dispersal— rather than developing assisted movement such as translocations. We would argue that the two strategies are complementary, especially since natural movements often no longer exist or are inefficient, as mentioned by John Laundré whose quote begins this chapter. In the eastern United States, cougars have been mostly exterminated, but every now and then a lone one is seen, usually young males who are later hit by cars or hunted. This situation led Laundré to term them "dead cats walking." In other words, animals' genetic lineage is curtailed, because they will not produce young nor generate a founding nucleus of future populations. At the same time, the cougars' sporadic appearance has been used by US government agencies to avoid having to develop a formal cougar reintroduction plan, and the liabilities that would entail. In solitary species like these felines, the establishment of a new population based on isolated dispersal events is highly improbable. This phenomenon is particularly pressing in the northern and central part of our country where agriculture and ranching have fragmented natural habitats, and the historical pressure of hunting has caused the extinction of many species of large mammals and native birds. We must scale up rewilding actions such as translocation for conservation purposes to overcome phenomena such as "dead cats walking."

The diversity of species transported in rewilding projects requires the development of specific techniques for their transport, which also takes into account the animals well-being. Photos: trailer for tapir transport, box for jaguar transport, transport of anesthetized deer by helicopter and giant otter transport box. TOP PHOTOS: RAFAEL ABUÍN AIDO. BOTTOM PHOTOS: RAFAEL ABUÍN AIDO, CAMERA TRAP / FUNDACIÓN REWILDING ARGENTINA.

CAPTURING WILD ANIMALS

To translocate animals, they first must be captured. In the cases of captive animals, capture is relatively simple, though it is important to note that in some cases transferring the animals to the transport units requires the use of mobile handling structures like chutes and pens, which zoos and shelters that provide us with animals generally do not generally have. Therefore, we must bring our own, to avoid having to chemically immobilize the animals.

In the case of free-ranging animals, capture is more complex and whether for translocation or research purposes, is species-dependent. In the case of the pampas deer, marsh deer and huemuls, we capture and sedate them using tranquilizer darts. The pampas deer are then transported by air, and are kept under sedation with drugs delivered by respirator, while the marsh deer are transported overland in boxes after reversal of the tranquilizers. Huemuls are captured for research purposes and therefore they are freed where they were captured after the anesthesia is reversed.

In the case of guanacos and vicuñas, when it is for research purposes, we use the same method as with the huemuls, whereas when it is for translocation, guanacos are herded into a transport trailer. Coypu and Wolffson's viscachas are captured using Tomahawk spring traps and later transported in wooden crates without being chemically immobilized.

We capture pumas, jaguars and tapirs with fixed snare traps which trap an animal by one limb and hold them at the capture site. The animal is then chemically immobilized and once recovered from sedation it is freed. Wildcats and pampas cats are captured in Tomahawk spring traps, tranquilized and ultimately released in their capture site once the effects wear off. Maned wolves are captured and processed in the same way, using larger cage traps. Rheas are flushed into nets for capture, and condors are captured with nets triggered by explosives to trap them while they are eating carrion.

The staff of Rewilding Argentina has experience in the capture of 18 species of wild birds and mammals in our country.



Jaguar populations in Argentina are extremely reduced or isolated. Therefore the long-term conservation of this species in the country cannot exist without the intentional movement of individuals between different regions. PHOTO: JATOBAZINHO THE JAGUAR IS BEING TRANSPORTED FOR THE REINTRODUCTION PRO JECT IN IBERÁ RAFAFI ABUÍN AIDO

When this mapping does not exist, the presence of pathogens in the source environment can be confirmed or ruled out by prior sampling on the population from which the individuals will be translocated. This has been done in source populations of Laysan ducks to test for the presence of the parasitic nematode Echinuria uncinata. If the pathogen is not detected in these samplings, then it is assumed that it is not present and the individuals are then translocated without individual analysis. In Argentina, evaluations have been carried out at environmental and population of origin level to propose translocations of guanacos. These are appropriate when a large number of individuals are translocated.

11.4 SANITARY ASPECTS DURING TRANSLOCATIONS

Animals translocated in rewilding projects are evaluated vis a vis their health status to reduce the likelihood that they carry pathogens that affect either their performance or the other animals living in their destination environment upon release. The type of monitoring implemented depends on the origin of the translocated animals.

Ideally, reintroduction or supplementation projects should use animals of wild origin. In this case the practicality of conducting exhaustive health checks is limited because handing the animals can cause undue stress or even death of the individuals. In any case, although information about pathogens in these free-living animals is generally scarce, their pathogen load is considered natural and therefore unlikely to negatively affect the translocated individuals or the destination environments. This strategy is modified when the animals to be translocated come from captivity. In this case it is both possible and desirable to carry out exhaustive health examinations.

Since handling of wild animals should be kept to a minimum to avoid high levels of stress during capture and transport, it is particularly important to have information about pathogens of interest in these individuals' location of origin. If the pathogen is not present in the environment it is assumed not to be present in the animals to be translocated. This type of information is available for many pathogens via mapping of their geographic distribution. Therefore, at the time of translocation, care should be taken to ensure that the animals' area of origin has a similar or better sanitary status than the destination area in terms of pathogen presence. For example, the pampas deer translocated to Iberá come from an area of the province of Corrientes that is free of hoof-and-mouth disease, so it is assumed that these deer will not carry this disease and, therefore, it is not necessary to analyze translocated individuals for the presence of this virus. This strategy is applied when transporting cattle and is also used in other countries with certain species of wildlife, such as in South Africa, before translocating Cape buffalo to avoid the introduction of tuberculosis to areas free of this disease.

"Examples of catastrophic disease introduction is rarely associated with formal translocation programmes. The majority of global emerging disease events result from changing ecological conditions or unintended transport of pathogens and their release into the environment in naïve populations, during domestic, wild animal and product trade." Richard Kock



When the translocation of animals of wild origin involves capture and immobilization individual animal health can be checked through blood draws and saliva tests. The test results are known when the animals have arrived at their release site, where they are generally kept in holding pens. If the analysis detects one or more undesirable pathogens, the affected individuals are removed from the project. We have used this strategy in the pampas and marsh deer reintroduction projects. As previously mentioned, when individuals for translocation have come from captivity, health checks are more exhaustive because the animals may carry pathogens that are not specific to the species or place of release. This necessitates rigorous quarantines and special facilities where the animals spend no less than 45 days, but as they are accustomed to being in captivity, it is relatively safe to keep them in quarantine for as long as is necessary. Fundación Rewilding Argentina manages two quarantine sites in the localities of Paso de la Patria and San Cayetano, in the province of Corrientes. These locations have model, complex installations adapted to each species we work with. The design of every sector of the quarantine pens meets or exceeds the norms of animal welfare, facilitates the handling of each species in accordance with its needs and protects the health and well-being of the sanitary personnel in charge.

In addition, pathogen management can be carried out on wild individuals depending on the handling to which they will be subject during transport. When animals are captured but not immobilized, they can be preventively treated for parasites while they are in the transport cages, and thereby unable to move. This can be done orally or by injection, as is the case with guanacos, for example. Once they arrive at their destination, the animals can be kept in holding pens for a prudent period of time while under observation for the appearance of possible symptoms.

In contrast to the procedure with wild-caught animals, captive animals evaluated in quarantine can be subjected to different procedures when undesirable pathogens are detected. When these pathogens cannot be eliminated, the affected animal is removed from the project, and under some circumstances may be euthanized, as might happen if a jaguar tested positive for the virus that causes feline leukemia or if the red-and-green macaw carried the virus that causes Pacheco's disease.

When individuals of wild origin must undergo quarantine, it should be short and in an expansive pen to avoid stress. PHOTO: THE PEN AT CRIADOURO CIENTÍFICO NEX IN BRAZIL WHERE JURUNA AND MARIUA, TWO WILD FEMALE JAGUARS WERE QUARANTINED BEFORE BEING TRANSPORTED TO IBERÁ, MATÍAS REBAK.

Captive-kept animals tolerate longer quarantines and do not require as much space. Treatment of pathogens that animals like the giant river otter or giant anteater carry vary by case. Sometimes no intervention is necessary, sometimes the pathogen must be eliminated before the animal is released, and sometimes the animal carrying a certain pathogen must be dropped from the project. PHOTOS: MATÍAS REBAK.

When animals of wild origin are translocated in reintroduction or supplementation projects, as is the case with the pampas deer, the ability to do exhaustive health checks is limited, because handling the animals causes them undue STRESS. PHOTO: PAMPAS DEER IN A PRE-RELEASE PEN POST CAPTURE AND TRANSLOCATION. IT WILL REMAIN HERE FOR ABOUT TEN DAYS BEFORE IT IS RELEASED, UNTIL TEST RESULTS ON PATHOGENS OF INTEREST ARE COMPLETE, KARINA SPØRRING.

On the other hand if there are effective treatments available, the individual is treated until the pathogen is eliminated, as is the case with Dirofilaria which causes dirofilariasis in many mammals, including in humans, *Chlamydia psittaci* which causes psittacosis, another important zoonotic infection, Giardia which is an intestinal parasite transmitted by food or water contaminated with *Cytauxzoon* and *Anaplasma* or *Erlichia*, all blood-borne pathogens. Finally there are cases in which a pathogen will not affect the performance of its carriers, nor the target environment and in these cases the individuals with the pathogens are not necessarily treated to eliminate them. An example in our region would be the pathogens that cause toxoplasmosis and leptospirosis.

As mentioned in Chapter 7.6, our actions must be guided by the premise that the presence of most pathogens carried by an individual is part of its natural condition, and therefore desirable to maintain and its elimination is required and necessary only in certain cases. It is also fundamental to understand that the sanitary measures taken in the rewilding projects significantly reduce the transmission of undesirable pathogens, but they do not reduce the risk to zero, an idealized goal that is impossible to achieve.

11.5 RELEASE STRATEGIES FOR TRANSLOCATED ANIMALS: HARD AND SOFT RELEASE

Releasing translocated animals in the context of rewilding projects is done through hard or soft releases. Hard releases consist of immediate release after arrival at their destination, where animal handling and thereby stress to the individuals is reduced to a minimum. In general, hard releases are implemented when wild animals are translocated.

In contrast, soft releases are more gradual. In these, once the animals arrive at the destination, they are kept in pre-release enclosures to allow them to acclimatize. The time spent in these enclosures depends on the species and how the animals appear to be adapting to the new environment. Soft releases are used more frequently with animals that come from captivity and also in particular cases in which animals, whether captive or wild, arrive sedated to the destination. Soft releases rely on structures called pre-release enclosures built at destination sites and serve several functions. Here all individuals that are transported either sedated or anesthetized recover and are kept under observation. The structures also anchor the animals to the destination area, discouraging, after release, a behavior called homing whereby the animals roam over large distances in search of their former territory. Finally, pre-release enclosures are essential during the adaptation stage for animals coming from captivity.

Hard release is when an animal is released immediately upon arrival to its destination, and is used when translocating wild animals. Animal handling is reduced to a minimum to keep the process as stress-free as possible. Photos: hard releases of a leopard in Gorongosa National Park (Mozambique) and a Wolffsohn's viscacha in Patagonia Park (Santa Cruz, Argentina). PHOTOS: PIOTR NASKRECKI, FRANCO BUCCI.

Soft releases are more gradual. Upon arrival at the destination, animals are kept in pre-release pens so they can get acclimatized. The pampas deer released in Iberá and the coypu released in Patagonia are individuals of wild origin and their stay in the pens is short, and done only to avoid them from dispersing when released. PHOTOS: MATÍAS REBAK, MATÍAS SACHINA.





specific situations.

a recovery room.

pre-release period for at least a year.

Between hard and soft releases there is a range of possible nuances, which can be adapted to

We have implemented hard releases with Wolffsohn's viscachas where individuals are captured in cage traps in their area of origin, anesthetized, fitted with radio collars and transported in specially-designed boxes to their destination area. Recovery from anesthesia happens in these transport boxes and once they are fully awake, the animals are released. The entire operation takes place over the course of a day, in this way minimizing their stress in capture and transport. All of the translocated individuals have survived this process.

With the pampas deer, we have implemented a specific form of soft release, which is relatively short and is most notable for the capture technique at the site of origin. The animals, all wild, arrive anesthetized to the destination area and are put into a one hectare fenced pre-release enclosure. The fence is 1.8 meters in height and the enclosure is half-shaded. Inside there is a small, conditioned recovery room so animals do not injure themselves when they wake up. With marsh deer, the process is similar, but as they don't arrive anesthetized, their enclosures do not require

For the pampas deer we also had to make another modification to soft release to avoid the aforementioned "homing" behavior. We observed that after releasing many animals they roamed tens of kilometers before settling down, which means leaving the territory protected by the Iberá Park. Even keeping them for two to four weeks in a one kilometer enclosure in an attempt to anchor them did not eliminate this dispersal behavior. One solution was to keep them even longer in the enclosure until the females birthed their first calves, to reinforce the anchoring to the release zone, but this was not possible in the smaller corral, so we built a 30-hectare enclosure to prolong the

Here we were faced with another issue, using the same materials that we used for a one hectare enclosure for a thirty hectare one was too costly, so we used an electric fence in the one-hectare corral which was inside of the larger enclosure so that they would learn to respect it. This made the construction of the thirty hectare pen quite simple and consisted of a perimeter of eight strands of wire (five of which were electrified) that were 165 centimeters high, and inside of that there was another band of two electrified wires at a distance of one meter from the perimeter wire. This was enough to keep the deer in the corral for two years, during which several deer gave birth. After they were released, there is no record of "homing" behavior and the animals remained in the release area.

"The subversive ecologist says: Maybe we've gone too far. We've simplified nature too much, rid it of too much of its variety. A subversive ecologist might wonder if we could "informally" reintroduce native species that have been eliminated. It's a sort of biological monkey-wrenching. Let's bring mountain lions back to places where they've been extirpated by ranchers and hunters. Let's bring back the "varmints" that keep ecosystems functioning. Is it wrong to help them survive?"

Michael Soulé

Red-and-green macaws remain for a very long time in pre-release enclosures because they must be taught how to find and eat native fruit, avoid predators and to fly. PHOTO: MATÍAS REBAK.

Collared peccaries remain for a long time in the corrals so they can progressively adapt to the release environment. These pens are mobile, which allows us to establish different groups in different territories and avoid fights among the released peccaries. PHOTO: RAFAFL ABUÍN AIDO

For other species, such as the giant anteater, the collared peccary or the tapir, soft release is more complex since those animals come from captivity and the adaptation to their new environment includes, for example, offering native food inside of the pen. With these animals, we started working with pre-release pens similar to those of the pampas deer but we observed that, because they were territorial, when released the groups (in the case of the peccaries) and individuals (in the case of the giant anteaters and tapirs) they tended to settle near this pen and defended their territory when new individuals were released, causing fights and serious wounds and sometimes even death. We therefore switched to pens built with moveable panels that allowed us to release animals in areas not already occupied by previously released and established animals.

When release time arrives, the doors of the pen remain open. This is for two reasons, first some animals take a few days to leave the corral permanently and second, some animals return to the pen periodically, where for a time, they continue to be offered food. Once we determine that the animals are relatively well established in a territory, we close the corral gates.

Jaguars require a soft release but with a few modifications. They travel over great distances and can conflict with human activities, which makes it essential to avoid this roaming. Some of the jaguars to be released in Iberá were born there, so anchoring is reinforced because they do not know any other territory, but others are wild specimens originating in Brazil or Paraguay and they could display dispersal behavior. To avoid this, they are kept in pens of between 1.5 and 30 hectares. The challenge here is to manage the animals without human contact, particularly so they don't make any positive associations with people, such as the entry of food by the reintroduction center workers. In these pens, above all we must develop (in the case of animals born there) or maintain (in the case of wild animals brought from Brazil and Paraguay) the animal's hunting instinct, and therefore designed a mechanism for entry of prey animals into the corrals, in tandem with video surveillance so that we can remotely observe that there are no jaguars nearby who might witness the moment the prey animals are introduced. We thereby conduct a soft pre-release without the animals perceiving that the prey is introduced by humans, which prevents them from developing a positive bond with humans and allowing them to be released.

In addition to the pre-release pens we use two complementary methods to limit the jaguars' movements and reduce the probability of dispersal. Males establish their territory based on the availability of prey, but also the availability of females, and they should therefore be released at a second stage, when there are several females established. As for the females, they are released with their young when the cubs are three or four months old, able to follow their mothers, but unable to travel long distances.

Bare-faced curassows are pre-fledged in a twelve meter high corral where they learn to avoid predators and to spend their nights in the treetops. PHOTO: RAFAEL ABUÍN AIDO.

Ocelots must learn to hunt live prey before being released. Since a large part of their diet consists of birds, their pre-release pens must be roofed so that their prey cannot escape. PHOTO: SEBASTIÁN NAVAJAS.





for up to three years.

With the red-and-green macaw, an extreme soft release strategy is implemented. As the species is completely extinct in Argentina, there is no way to obtain wild individuals in our country for their reintroduction in Corrientes. Therefore all of the individuals come from captivity, and most of them have little to no experience flying. During their stay in our installations we show these birds how to fly in specially constructed flight pens adjacent to the pre-release enclosures. Every day, each individual is transferred to this annex pen so that they begin to try flying between two perches a distance apart and they are called with the sound of a whistle and then rewarded with a treat every time they land on one of them. In the first stage flight ability is worked on, and little by little we move the perches until they are 30 meters apart, a distance that they fly many times during flight training. Later, when their flight muscles begin to develop and they perfect their takeoff and landing, obstacles are placed between the two perches so that they learn to maneuver mid-flight. The red-and-green macaw is also one of few species being reintroduced in Iberá that has pred-

ators as adults (specifically foxes and wildcats). They are generally hunted when they land and try to feed from the ground, so they are taught to perform rapid vertical take-off flights to immediately gain altitude. They are also subjected to stress in the form of an embalmed fox which simulates an attack every time the birds land on the ground. Once the birds are ready, they are transported to the release site, using small cages that are hung from trees and from which they fly progressively farther until they abandon the cages completely. From the arrival of the animals until their release, we work to progressively replace the captive diet with a wild diet that consists of native fruit and seeds.

Soft release and the associated pre-release corrals are also a fundamental part of the reintroduction of the giant river otter. For this species we built complex enclosures that straddle dry land and water where the animals from captivity form pairs and reproduce several times until they form a consolidated family group before being released. In these enclosures, they learn to dig, to use natural dens and also to catch live fish. Basically, the pre-release enclosures are where the otters learn all of the necessary skills in order to survive once released, which is why they stay there

> The pre-release of giant otters sourced from zoos is done in enclosures that cover both land and water. There they learn to build and use their own dens and to catch live fish. PHOTO: MATÍAS REBAK.

Jaguar pre-release takes place in a set of different-sized enclosures, the largest of which is thirty hectares. The main objective of the pre-release is that they acquire hunting skills and do not generate positive associations with humans. Therefore the animals are managed remotely, using cameras, and live prey is brought into the pens through structures designed so that the jaguar does not associate humans with the food provided. PHOTO: MATÍAS REBAK.

"A cynic might describe rewilding as an atavistic obsession with the resurrection of Eden. A more sympathetic critic might label it romantic. We contend, however, that rewilding is simply scientific realism, assuming that our goal is to insure the long-term integrity of the land community."

Michael Soulé and Reed Noss

In the case of the bare-faced curassow the pre-release enclosure is 12 meters tall and has several large trees inside. Since these birds are mainly from captivity they need to learn that at night they have to climb trees to sleep, to be safe from predators and they learn this behavior in the enclosures.

The release of the animals that are a part of rewilding projects must guarantee high rates of survival. In some cases this requires minimal or no intervention. But in other cases, achieving this goal requires very intense management that includes the construction of complex pre-release enclosures, necessitating the help of people who have undertaken similar projects before, and above all it demands great ingenuity, superb observation and the ability to experiment and adapt.

11.6 MONITORING OF INDIVIDUALS

In rewilding projects all released animals have some kind of marking—natural or artificial—that allows us to recognize them after release and for the rest of their lives. Thus we are able to identify them when we observe them in person or view images taken by camera traps. Natural markings might be specific fur coloration that makes it easy to identify individuals, for example in jaguars and giant otters, while artificial markings include the tags on birds' legs as in macaws and barefaced curassows, or ear tags or clips of their ears as with peccaries and pampas deer.

Almost all of the released animals are also fitted with a VHF radio transmitter which permits us to find them in the field from several kilometers away. Each individual's transmitter is on a different frequency and the wildlife monitors bring a portable receiver into the field to track signals emitted by different animals. The system is similar to how radio stations work. Each transmitter is like its own FM radio station whose signal is picked up by a radio receiver at a specific frequency. The transmitters are attached to the animals via a mount on a collar, harness or backpack. Sometimes the transmitters must be implanted through a surgical procedure in the animal's abdomen. This is done when the morphology of the animal impedes them from wearing the transmitter externally, as in the giant river otters or when the external transmitters can cause them harm, as in the collared peccaries.

It can be a challenge to define the appropriate mount for the transmitter, which means at times we must either design one or substantially improve those offered by suppliers. For example, the harnesses used on the anteaters were designed by our teams and are used today in other similar projects. We designed harnesses to attach the tiny transmitters to austral rails, and we made design changes to prevent the collars from injuring the tapirs' necks, and we found a way to fit collars to the peccaries to avoid them ensnaring their forelegs. We also incorporated shields into the macaw transmitters so that they do not damage them with their beaks.

For the jaguars, who can travel long distances on a daily basis and do not always allow for close contact with the monitor, we use a different type of tracking technology. The jaguars' collars have a GPS (Global Positioning System) that shows the location of the individual every three hours. This information is sent periodically from the satellite to an online platform where the data can be visualized on a map or satellite image. This system allows for near real-time tracking of the animals, including notifications that arrive via email when the animal enters a territory of interest previously programmed in the transmitter. We have used this type of technology in research projects involving pumas, guanacos, rheas, marsh deer, huemuls, maned wolves, tapirs and South American fur seals.

Neither the transmitters nor the mounts interfere with the animals' normal activities, and both their shape and weight take into account the animals' well-being. Many of these tracking devices have an automatic release feature that activates when the transmitter battery is close to running out, so the animal will not wear the transmitter for the rest of its life. In other cases we recapture the animal to remove the transmitter when tracking is no longer necessary.

from captivity.

Once the animal is located and its condition evaluated, depending on its condition, the choice may be made to intervene. Here the monitor's role is essential and this is why they must have a great capacity for observation and decision-making based on what they observe in the field. The monitor is the one who decides if an animal should be recaptured because it has wandered too far, when to request that a veterinarian evaluate the animal for wounds or parasites or when food rations should be maintained, lessened or increased in the case of recently released animals. Other interventions may include providing roosting or brooding shelters for their young, as happens with nesting boxes supplied for red-and-green macaws. This is necessary because an animal that comes from captivity cannot be expected to behave as a wild animal simply because it has been released. Sometimes this only happens over the course of several generations.

The tags and tracking devices described so far are essential to evaluate the released individuals' performance in the context of rewilding projects, and especially to gauge the survival of individuals, and for females, the production of offspring. In particular, the transmitters permit intensive tracking during the period immediately after their release in order to follow up and possibly provide assistance to help individuals adapt to their new environment, especially if they come

Monitoring the individuals allows us to clearly report on project progress to both the permitting authorities and to donors of funds and animals. It is also useful for communicating hopeful stories of conservation to the general public through press releases, newsletters and social media. Because the animals are tagged and individualized, they usually also have names, which turns them into the protagonists of epic and inspiring stories, as when they go from a life in captivity to the wild or contribute to the repopulation of their species.

Monitoring individuals when they leave pre-release pens can be intense and somewhat interventionist at first. This is especially true for animals that come from captivity. Each animal is localized once a day to determine its location, whether it is eating, how active it is and also to identify the possible appearance of wounds or the presence of external parasites.



and becomes population-based.

The monitor has to have a great deal of knowledge about the species and also about each released animal because their behavior is a combination of their species' characteristics as well as their individual features. We have monitored collared peccaries, for example, that become completely independent just a few days after being released, while others take months to do so. Some individuals have required food supplementation because they feed on a certain fruit that later becomes unavailable, and they have to be supplemented again until they can find another food source. In addition, monitors often must introduce these wild foods to the released individuals so they become familiar with them and begin to find them on their own.

Something that has been mentioned but is worth emphasizing is that the monitor is someone who must not hesitate when choosing between multiple courses of action. They are never going to have all of the information they desire, but they must decide whether or not to intervene, and face the risks of doing so. Not intervening may lead to the death of a released individual while too much intervention may lead to the individual never reaching independence. For the monitor, the life of each reintroduced individual counts, and they must do everything within their power for these animals to successfully adapt to life in the wild.

When the released individuals begin to reproduce, we monitor their descendants much less. In general the free-born animals don't have tags or transmitters, and learn to manage independently. When births replace translocations as the source of animals, monitoring ceases to be individual

Jaguars can range widely, which does not allow for close-up monitoring. Therefore, we use a different type of technology to track them: GPS collars that record their location every three hours. The information is periodically transmitted via satellite to an online platform. PHOTO: MATIAS REBAK.

Monitoring individuals after they leave the pre-release pen requires intense and interventionist management at the beginning. This is especially necessary for those individuals that come from captivity, such as this collared peccary that has been released but is still supplemented with food until it is able to obtain food on its own. PHOTO: RAFAEL ABUÍN AIDO.

All individuals released as part of a rewilding project have some kind of marking (natural or tagged) that allows them to be recognized for the rest of their lives so we can identify them in person or when they are registered by camera traps. In addition, almost all of them are fitted with a radio transmitter to locate them from a distance. These tags allow us to monitor the individuals' adaptation and evaluate the success of releases. PHOTO: GIANT ANTEATER IN SAN ALONSO IBERÁ WITH A RED EAR TAG AND A HARNESS WITH A RADIO TRANSMITTER, MATÍAS REBAK.

"This [Rewilding] comes at a time when the field of conservation science is going through a difficult and controversial stage of redefinition, with pragmatism challenging purism."

Nathalie Pettorelli

11.7 POPULATION MONITORING

As a rewilding project progresses, translocated individuals become independent, begin to reproduce and our intervention is reduced or finalized. When the released animals feed independently and reproduce frequently, we halt translocations and remove the transmitters placed on the animals, (or they simply stop working as the batteries run out). At this point individual monitoring comes to an end and we begin to focus on group attributes such as population density (or abundance).

Population densities can be estimated in absolute or relative terms. Absolute densities are those that calculate the number of individuals per unit area. For example, in Patagonia Azul we speak of a density of 10 and 7.5 guanacos per square kilometer in 2020 and 2021 respectively. These absolute densities are estimated using sampling designs that are species- and environment-specific. When working with species whose adults have body masses of more than one kilo and inhabit open environments, counts can be made via direct observation while moving along a line (transect) that is straight or winding, whether on foot, horseback or in a vehicle. Animal counts are done directly and this data, together with other information determining the area covered is used to estimate the absolute density. Sometimes it is impossible to cover open areas because they are flooded, as is the case in many parts of Iberá, so aerial transects are done by light aircraft or using drones. The observations are made by taking photos over the course of the journey, and then counting the number of animals that appear in the photos. This number is linked to the covered area. We have used this method to estimate absolute density of marsh deer and capybara on San Alonso Island, in central Iberá.

In covered environments such as forests or prairies with tall vegetation, the direct count of animals via transect is difficult due to the lack of visibility, and therefore we use camera traps arranged in a grid. A typical grid design is one that divides the study area into equal sized squares (for example, three by three kilometers), with a camera installed in the middle of each square. After a certain period of time (e.g. one month), the memory cards are recovered for photo analysis. This method allows us to estimate absolute densities of individuals that can be identified because they are tagged or have distinctive natural markings (fur patterns). Therefore this method is frequently used with felines, especially those with spotted coats, like the jaguar. The cameras make it possible to work in covered environments and with elusive species, which is often the case with carnivores.

When released animals feed on their own and there are frequent breeding events, we stop translocations and remove the transmitters they wear. In addition, the offspring of these animals will generally not be tagged and will not be subjected to the same intense management as their parents. In the images, pampas deer and collared peccaries born at the reintroduction site have neither tags nor tracking devices. PHOTOS: MATÍAS REBAK, RAFAEL ABUÍNAIDO.





On the other hand, relative densities are estimated using signs left by animals, or the number of animals observed as a function of some unit of sampling effort, such as the number of tracks per kilometer traveled, the number of scat piles per hectare or the number of individuals photographed per camera per day. This method is used to quickly obtain reliable and robust relative density indicators based on a fundamental assumption: the number of signs of animals per sampling unit is directly proportional to the number of individuals in the population. In other words, if in Site A 50 sets of tapir tracks are found in a square kilometer, and in Site B 20 sets of tapir tracks are found in a square kilometer, and given the fact that these sites are similar, we can conclude that Site A has more tapirs than Site B. Examples of these indicators of relative abundance are the tracks, scat piles and burrows in the transects.

Absolute and relative densities can be used to monitor populations over time at a given site or to compare populations of the same species among different sites. In addition to evaluating the evolution of reintroduced populations and source populations over time, absolute and relative densities are used to monitor how a predator may affect prey populations. In our case it is of particular interest to understand how the reintroduction of the jaguar in Iberá will affect various populations of prey species, including the capybara and the marsh deer. Therefore, in collaboration with Conicet's Institute of Subtropical Biology we have estimated the absolute densities of those two species through aerial transects before releasing the jaguars. As we also expect the jaguars to affect the populations of other carnivores such as foxes and pumas, we also evaluated the relative density of these species using camera trap grids.

The number of lesser rhea scat piles counted on 500 meter transects has been used to evaluate the trend (rising, falling, stable) over time of the population of these species in Patagonia and Cuyo (in this case the relative density is measured via rhea feces pile per hectare). The relative density of vicuñas, which is also evaluated along transects and measured via latrines (dung piles) per hectare have been used to compare the abundance of vicuñas among high Andean deserts. In Iberá we use the number of photos of anteaters via camera trap obtained during periods of 30 days to monitor the annual population trends of the reintroduced population there. Similarly we use the number of photos of tapirs per camera trap also obtained over 30-day periods to monitor the annual population trends of tapirs in El Impenetrable. In the latter case, monitoring is a tool that will allow us to evaluate how this population behaves when we begin to take specimens from this area to populate areas where the tapir has become extinct.

> For some species it is impossible to estimate absolute densities, so relative densities, which are calculated by sampling, are used instead. For example, for giant anteaters, we use the number of individuals photographed per camera, per day. On the other hand, relative abundances do not calculate the exact number of giant anteaters in a territory, but they provide information about population trends, i.e. whether the number of animals holds steady, increases or decreases over time. PHOTOS: CAMERA TRAP / FUNDACIÓN REWILDING ARGENTINA.

In addition to the absolute and relative densities, there are other population attributes that can be evaluated to monitor a population, such as the mortality, birth, growth and population rates. The problem is that these attributes are very complex to estimate and involve design plans that are generally expensive and entail a lot of field time, which makes them unsustainable in the long term, which is exactly what these studies require.

Authorities frequently request information about population size to extract individuals for translocations. Although concern for the state of the source population is understandable, the methodological, economic and time complications of estimating the population makes it prohibitive, and therefore a strategy of removing a limited number of animals combined with yearly population monitoring to estimate absolute or relative densities is perfectly acceptable.

When reintroduced populations grow and increase in number of individuals, they begin to have an impact on ecological processes in the ecosystems they inhabit. Monitoring these processes requires other methodologies and presents new challenges.

11.8 MONITORING ECOLOGICAL PROCESSES

The loss of ecological processes, including the interaction between species is one of the most devastating effects of the current biodiversity crisis, and often results in the extinction or numeric decline of the populations of different species. For example, the extinction of the jaguar in Iberá resulted in the loss of at least two important ecological processes: predation, the process by which jaguars kill and eat other species, and competition, the process by which the jaguars interfere with other predator species such as puma and foxes. Both predation and competition can determine the abundance and distribution of interacting species, which in turn have other, less visible, but equally meaningful effects on a large quantity of organisms whose connection to the jaguar is less obvious.

The implementation of rewilding projects is focused on reversing the loss of these ecological processes, restoring them through the reintroduction of extinct species and the supplementation of those that are scarce. Once the species and their populations have recovered, we must evaluate the success of the projects by monitoring progress in restoration of different ecological processes. This type of monitoring, which is done at ecological, community or ecosystem level is extremely complex and requires the participation of researchers with experience in different branches of ecological sciences. We therefore often collaborate with research groups to evaluate the recovery of ecological processes and their effects on ecosystems.

Absolute population densities can be estimated by calculating the number of individuals per unit area. In the case of pampas deer, we use transects (delineated paths we trace) recording the number of individuals directly or using cameras. PHOTO: RAFAEL ABUÍN AIDO.

Sometimes we estimate the population numbers of a species that are not part of reintroduction or supplementation projects, such as the capybara. In these cases we are interested in population trends of the main prey of a reintroduced species: the jaguar. PHOTO: MATÍAS REBAK.

"It is not enough to understand the natural world; the point is to defend and preserve it." Edward Abbey





of these birds' clutches.

on Iberá's ecosystems.

Apex predators affect a large number of species and ecological processes. In the case of the jaguar, its return to the Iberá marshes is expected to restore several of these processes. The first among them is predation and to evaluate this process we are working with investigators and fellows from Conicet's Institute of Subtropical Biology (IBS for its name in Spanish), based in Puerto Iguazú, with whom we began to generate baseline data against which to compare information once the jaguar population is consolidated. First, we evaluated the abundance and and behavior of the main potential prey, such as capybaras and cervids, and second, we evaluated the state of the grasslands where capybaras and cervids feed, since the jaguar can affect the vegetation, by decreasing the number of herbivores feeding on it causing it to increase in both biomass and density.

The second process to be restored by jaguars is interspecies competition. Jaguars are dominant over other, smaller predators such as pumas, foxes, ocelots and weasels, who they either kill or displace out of certain areas, leading to positive effects on small animals such as grassland birds. For this reason IBS investigators installed camera grids to evaluate the abundance and distribution of other predators that could be affected by the return of the jaguar. At the same time, Conicet's Biology Conservation Laboratory headquartered in Corrientes is now evaluating depredation rates of foxes and other small predators of grassland bird nests, including endangered ones such as the strange-tailed tyrant, the black-and-white monjita and the endemic Iberá seedeater. It is possible that the jaguar will affect the abundance of small predators, with positive effects on the survival

Another important process that the jaguar influences is supplying carrion, since the remains of its prey are fed on by scavengers. Conicet's Grupo de Investigaciones en Biología de la Conservación (Conservation Biology Research Group) based in Bariloche is currently evaluating carcass abundance and its use by different species, and it is expected that the return of the jaguar will result in increased carcass availability which will have beneficial effects on scavenger species. Although preliminary, the initial data from the first-released jaguars from 2021 suggest an incipient reestablishment of predator-prey interactions. In fact, the three females and one male that were released already hunt and feed on capybaras and cervids, in addition to wild pigs, which might result in natural control of an introduced species and would reduce the negative impacts of pigs

Once the species and their populations have recovered, we must evaluate the rewilding's success by monitoring progress of the restoration of different ecological processes, which is the ultimate goal of these projects. This type of monitoring is extremely complex and includes the effect of predators on their prey, for example, the effect of the jaguar on the capybara. PHOTO: MATÍAS REBAK.

Meanwhile, the released red-and-green macaws have also begun to reestablish their processes such as trophic interaction with the flora of Iberá via feeding on fruit and seeds, with the potential to exert a regulatory role on some plant species (study conducted by researchers from the aforementioned conservation biology lab demonstrate that the macaws feed on at least 49 species present in Iberá). The monitoring of this interaction is done through direct observation and the use of the DNA meta-barcoding technique, which determines the species present in an animal's diet by genetically identifying the food remains found in bird droppings. Likewise, field observations indicate that the macaws might play a second role as fruit and seed dispersers, since it is noted that they transport the fruits of at least nine species of plants up to a distance of 900 meters, which would allow the movement of seeds between isolated populations of species, favoring gene flow and the establishment of forest patches in fragmented landscapes. The roles of the red-and-green macaw as a seed regulator and disperser have not yet been tested to evaluate the germination potential of the transported seeds.

With relation to the reintroduction of large herbivores (such as the pampas deer), the objective is to reestablish the process of herbivory, a particular type of predator-prey interaction and the role of these herbivores as prey of the large predators that are recolonizing or being reintroduced in Iberá such as the puma and jaguar, respectively. Monitoring the deer-vegetation interaction was implemented in tandem with the Center for Biodiversity Dynamics in a Changing World, University of Aarhus (Denmark) and as with the macaws, the work is based on determining the plant species present in their diet based on the DNA meta-barcoding technique in samples obtained from the deer's feces. Initial results indicate that the pampas deer occupies a significantly different trophic niche (it feeds on different species of plants) to those of the herbivores present in Iberá, whether native or introduced, with the potential of restoring specific ecological functions. At the same time, IBS monitoring of the three released jaguars shows that they and the deer have begun to interact as they probably once did before both species disappeared from Iberá.







In Patagonia, the puma-guanaco interaction is analogous to that of the jaguars and their prey in Iberá. Pumas interact with guanacos and this interaction has the potential to affect a large number of species and processes in the regions where this occurs. In this case, our work centers on understanding how this interaction works to ensure its conservation where it is ongoing, and efficiently promote its restoration in areas where the interaction has disappeared, due to the extinction of either of the two species. Monitoring of this interaction is conducted on a scale unique to Latin America with projects in three locations, Parque Patagonia and Parque Nacional Monte León in Santa Cruz and Patagonia Azul in Chubut. In the immediate future we hope to incorporate at least one more locality. The work is being implemented in collaboration with a number of US universities and Conicet researchers, and includes assessing the intensity of the interaction between pumas and guanacos, the effects of the pumas on small predators and the indirect influence of pumas on vegetation through changes in the number and behavior of guanacos.

As we have previously mentioned, but it is worth noting, the loss of ecological processes generates biodiversity loss and consequent negative effects. For example, when biodiversity is impoverished, the productivity and stability of ecosystems are diminished, leaving them more defenseless against the different natural and artificial disturbances that may arise. At the same time, several studies link the loss of biodiversity with the increase in presence of pandemics as revealed by an analysis of 202 studies in 61 species of parasites that show that ecosystems with a low number of host species, i.e. less diverse, are less likely to prevent the spread of parasites. Finally, biodiversity loss significantly reduces the ability of ecosystems to sequester and store carbon, resulting in increased greenhouse gas emissions and intensifying climate change.

The ultimate goal of our rewilding work is to restore these fundamental ecological processes to sustain healthy, complete and biodiverse ecosystems. For this reason, finding ways to measure the degree to which these processes are recovering is essential to evaluate the success of our actions.

> Red-and-green macaws have begun to re-establish processes such as trophic interaction with Iberá's flora. Field observations suggest that the macaws are filling the role of fruit and seed dispersers by transporting the fruit of at least nine plant species up to 900 meters. This action allows the movement of seeds between isolated populations of species, favoring gene flow and the establishment of patches of forest in fragmented landscapes. PHOTO: CAMPSITE OF RESEARCHERS STUDYING MACAW-PLANT INTERACTIONS IN IBERÁ, FUNDACIÓN REWILDING ARGENTINA

Another important process influenced by the jaguar is the provision of carrion for species that depend on it. It is hoped that with the return of the jaguar there will be a greater availability of carcassases, which will have a beneficial effect on scavenger species. The image shows the data recorded on a capybara carcass that has been preyed upon by the jaguar and also consumed in part by scavenger species such as vultures and big hairy armadillos. PHOTO: SOF(A HEINONEN.

The reintroduction of large herbivores such as the pampas deer reestablishes the herbivory processes. Early studies of the deer's diet in Iberá indicate that they occupy a different trophic niche, by feeding on different plant species than other herbivores present in Iberá, both exotic and native, and therefore have the potential to restore specific ecological functions. PHOTO: SEBASTIÁN NAVAJAS.

"ANIMATING" THE CARBON CYCLE: **REWILDING AND THE CLIMATE CRISIS**

By carbon cycle we refer to the process by which this element circulates among the atmosphere, the oceans and the land. In the atmosphere, carbon combines with oxygen to form carbon dioxide, one of the main gasses responsible for the greenhouse effect that leads to global warming.

Human activities, especially burning of fossil fuels, have increased the concentration of carbon in the atmosphere to levels never before seen in the last 5 million years, generating an unprecedented climate crisis.

There is a strong link between biodiversity and the climate that is increasingly recognized by scientists and the public, which is related to the fact that natural ecosystems capture and store atmospheric carbon, helping to mitigate climate change (in fact, they capture half of the carbon emitted by human activities).

This storage capacity could be increased by a factor ranging from 1.5 to 12 by implementing rewilding projects that restore keystone species and their ecological interactions. "Animating the carbon cycle" is the concept that explains this increase in the capacity of ecosystems to capture and store carbon as a result of implementing rewilding projects.

The recovery of wildebeest populations in Serengeti National park caused this ecosystem to go from emitting carbon into the atmosphere to sequestering up to 8 million tons annually, specifically as a result of the suppression of grassland fires due to wildebeest herbivory. The annual tonnage of carbon is equivalent to the annual carbon emissions produced each year by Kenya and Tanzania as a result of burning fossil fuels.

In North America it is estimated that the restoration of the food web of which wolves, moose and boreal forest trees form a part would increase the sequestration of carbon in this ecosystem at a rate of 150 million tons per year. This is equivalent to the carbon that Canada releases annually to the atmosphere as a result of burning fossil fuels.

In the rainforests of Africa, elephant browsing and trampling prevents small trees from proliferating while allowing larger ones to grow. This is beneficial given that larger trees capture and store more carbon than smaller ones, so if elephant populations were restored to historic levels, the ecosystem that they inhabit would capture 85 million tons of carbon annually, equivalent to that emitted every year by France in the burning of fossil fuels.

Whales store an average of 33 tons of carbon in their bodies and when they die, this carbon is deposited and is stored in the seabed. In addition, whales release elements such as nitrogen and iron in their waste, which stimulate the growth of marine phytoplankton which is a major atmospheric carbon sink. If whale populations were to recover to their historic levels (today only a quarter of whales that once inhabited the seas remain) they would help capture the equivalent of the carbon produced per year by Russia or all of the African nations.

Rewilding is one of the nature-based solutions that can tackle different environmental crises, including climate change and it is both more effective and less expensive than other technology-based solutions. However, society still underestimates and undervalues the potential of rewilding. We believe that rewilding should be adopted to reach the goals of agreements like the Paris Accords, which seek to achieve net zero carbon emissions by 2050 and thus limit global temperature rise to just 1.5°C.



Humpback whale in Patagonia Azul where these cetaceans converge to feed. The Patagonia Azul Biosphere reserve seems to be a key site for several species of marine mammals and birds. Fundación Rewilding Argentina's team has identified some 30 humpbacks that had not yet been recorded and whose migratory routes are unknown, PHOTO: GONZALO GRANJA

For example, through the design of a clever experiment, a group of researchers discovered that pairs of birds with nests exposed to the sounds of predators lay fewer eggs, and incubate them for less time, decreasing the number of hatchlings. They also feed the chicks less frequently, increasing mortality. As a result, pairs that were exposed to the sounds of predators produced 40% fewer chicks than pairs that were not exposed to the sounds. These results have been repeated in a large number of experiments involving invertebrates and small vertebrates.



LANDSCAPES OF FEAR: PREDATORS' EFFECTS ON PREY BEHAVIOR

Historically in ecology, predators were understood to affect the populations of their prey through a single mechanism: the elimination of individuals through predation.

In 1999, Joel Brown and his team published the bases of a new concept that would revolutionize the studies of predator-prey interactions and would have a profound impact on conservation science. They postulated that predators not only kill their prey, but they also change its behavior, which has profound effects on prey populations and the ecosystems where these species interact.

This is how the "ecology of fear" emerged. It holds that all of the efforts made by certain prey animals to avoid being eaten can reduce their fecundity, survival and even the number of individuals, even more so than predation itself.

In systems where the experimental manipulation is more difficult, clear associations have been detected between the presence of predators and certain prey behaviors. Impala and wildebeest spend more time staying hidden in areas with predators than in areas where there is no threat. Mule deer and vicuñas feed for less time in habitats where the risk of attack is greater and red deer modify their use of space depending on the presence of wolves. These behaviors have given rise to the concept of "landscapes of fear," areas that present different levels of risk to prey, which behave according to the perceived danger. Thus, prey invests more time in hiding than eating in risky areas and the opposite holds true in areas that they perceive as safe.

At the same time, this behavior can also affect biological communities and ecosystems. Vegetation in areas that prey animals perceive as risky are relieved of the pressure of intensive grazing, and the plants can grow and develop a more complex structure that provides habitat for invertebrates and small vertebrates. If the vegetation that develops is woody, then carbon storage capacity is increased. In addition, the constrained movement of animals due to the mosaic of risky and safe areas generated by the predator can even dynamize the circulation of nutrients in the environment.

> The reintroduction of predators into an area can have effects that go beyond predator-prey interaction and can affect entire biological communities and ecosystems. Understanding how these mechanisms function is key to promoting the conservation of species that require large areas to thrive. The monitoring we are carrying out in Iberá with the jaguar and in Patagonia with the puma will allow us to generate new information about how these predators generate landscapes of fear for their prey (capybaras and guanacos, respectively) and on how to restore these landscapes in other ecosystems.

An alert vicuña in San Guillermo National Park, trying to detect the presence of a puma. In this park the puma generates landscapes of fear: vicuñas avoid spending time in sectors where they are likely to be ambushed and hunted, thus reducing grazing pressure on the vegetation. In addition, if they enter these areas, they spend more time guarding and less grazing. PHOTO: MARCO ESCUDERO.

Concepción del Yaguareté Corá, Corrientes, celebrating Arami and Mbarete's first birthday. These jaguars were born in 2018 at the Reintroduction Center in Iberá seventy years after the species became extinct in Corrientes. PHOTO: MATIAS REBAK. REWILDING AND PEOPLE



REWILDING AND PEOPLE

CHAPTER 12

REWILDING AND NATURE TOURISM BASED ON WILDLIFE OBSERVATION

Nature tourism in Argentina focuses on the observation of spectacular landscapes such as Iguazu Falls, and is limited by the number of existing spectacles, with only a few provinces receiving most of this tourism, where tourism is en masse. As an alternative, nature tourism based on wildlife observation could be carried out in various sites in any province of Argentina. PHOTO: FLORIAN VON DER FECHT.

"Now, go outside. Find the wild." Jim Williams

Argentina is currently thriving, and has an auspicious future with regards to nature-related tourism activities. In 2017 alone, tourism in our country generated \$15 billion via consumption of goods and services, exceeding the value of beef production and the automotive industry and is equal to the figure corresponding to oil and gas exploitation and soybean production. In addition, tourism is one of the most labor-intensive sectors of the economy and therefore generates the greatest number of jobs.

Within tourism, nature-based tourism represents approximately 30% of those \$15 billion and it is the economic sector with the greatest potential for growth. This is partly explained by the fact that Europe and the United states—where most tourists come from—have a mostly urban population (75% and 82% respectively) who seek nature-related experiences during their free time. In Argentina, our urbanization rate is even higher (92%) which contributes to national nature-based tourism. It is estimated this type of tourism will contribute to the creation of 300 thousand new jobs in the next ten years, driven also by people's need to connect with nature once the CoVid-19 pandemic ends.

Currently, nature-based tourism in Argentina is focused on observing visual spectacles, many of them located in national parks and other protected areas, such as Iguazú Falls, the Perito Moreno Glacier and the lakes and forests of Patagonia, and the Talampaya Canyons. On the other hand, nature tourism based on wildlife observation (especially of large mammals) is barely developed at all in Argentina. An exception is in the Chubut Province where tourism based on the reproduction of marine species like the Magellanic penguin, sea lions and elephant seals, has existed for decades. However, in Chubut, the tourist observes a reproductive colony in the same manner as they observe a landscape, which leads to a large-scale experience similar to those in the parks mentioned above.

At Fundación Rewilding Argentina we see nature tourism based on wildlife observation differently. For one thing, it requires more activity, both in concept and on the part of the tourist. Animals must be observed slowly and carefully, and visitors must continue on their way without disturbing them. Visitors can get within range of the animal on foot, on horseback or by canoe or kayak and explore these places, increasing the likelihood of spotting the animal by using local guides. This introduces an element of adventure and experience that in general landscape-based tourism does not provide. It is essential to avoid having nature-based tourism become large-scale and also to incorporate the local communities in the development of the activity.

Another important point is that nature tourism based on observing landscapes or reproductive colonies of marine species is limited by the scarceness of existing natural panoramas, so just a few provinces will have the largest concentration of this type of tourism and the visits will become overly populous.

On the other hand, tourism based on wildlife observation, like that we suggest, could be carried out in many sites of any province of Argentina, and especially in areas where it is difficult to successfully develop traditional productive models based on agriculture and livestock. This is the case of Iberá, of El Impenetrable and certain sectors of Patagonia where we work. These territories are stigmatized as marginal from the point of view of traditional agricultural and livestock production, but they are central to implementing rewilding projects through the economy of nature model (see Chapter 5) that has wildlife observation tourism as a central pillar and the main economic activity for income generation and job creation. These territories tend to have elevated indices of poverty and unemployment, but at the same time they often contain interesting remnants of nature that have been defaunated.

If nature tourism is based only on scenic landscapes and not wildlife spectacles, then there will be interest in creating parks, though they will be small in size and only maintain or even worsen the current situation of defaunated environments, since the economic activity will not be related to restoring native fauna. PHOTO: GUANACOS IN PATAGONIA PARK, SANTA CRUZ, FLORIAN VON DER FECHT.

It is essential that public parks promote and facilitate visitor access. This allows local entrepreneurs to set up where they can carry out their activities, and tourists with less disposable income can also participate in wildlife observation. Photograph of marsh deer in Iberá. PHOTO: MATÍAS REBAK.

It is ideal and even essential that private landowners become a part of the economy of nature model and run tourism activities based on wildlife observation on their land, as takes place in various African nations. PHOTO: A LION AND A GROUP OF TOURISTS DURING A SAFARI IN OKAVANGO, BOTSWANA, PHOTO: @andbeyond.com

In the northern Pantanal region, boat-based jaguar observation has developed, which in 2017 produced an annual net income in the region of almost seven million dollars. PHOTO: MATÍAS REBAK.



The way we work is as follows: the economy of nature is developed in a territory (a park) that is to be positioned as a national and international destination for wildlife observation, and which should be given an appealing name like Iberá, El Impenetrable, Patagonia or Patagonia Azul, and this name should be used every time it is mentioned. This territory should have a public park of adequate size, design and connectivity to guarantee the presence of functional populations of keystone species that need ample territory to thrive, for example, apex predators already mentioned. In addition, through rewilding activities, populations of extinct or scarce species are restored in the territory resulting in abundant observable wildlife, generating the necessary value added to promote these types of nature tourism activities.

certain conditions must be met.

over-regulated.

For this park to be sustained over time, in addition to achieving an ecosystem with restored wildlife, it is of prime importance that the local communities benefit from the income generated by the development of a solid economic activity based on nature tourism. For this to happen,

First, the existence of a public park that promotes and facilitates visitor access is essential and it must also allow lower-income visitors to participate in wildlife observation. Visitors are the key to local people having their own businesses. Without visitors, local people will have to resign themselves to being employees of a private property whereas if they become entrepreneurs, income distribution will be more equitable. It is also ideal, and in fact, indispensable that private property owners join the economy of nature model, but the state must guarantee the public access to much of the territory. In comparison with African, European or North American countries, in Argentina the development of public-use activities in nature parks is low, which has a chilling effect on entrepreneurship among the local population. This is because park administrators view public use as a threat more than an ally to conservation and therefore public use is restricted and

> A thriving economic activity based on puma observation has developed in Torres del Paine National Park and in surrounding private properties. In the National Park, puma observation is led by entrepreneurs who do not own the land but who are permitted to engage in this activity. Puma observation is becoming more and more popular in Patagonia Park, Santa Cruz province, Argentina. PHOTO: PUMA OBSERVATION IN LAGUNA AMARGA, A PRIVATE PROPERTY THAT ABUTS TORRES DEL PAINE NATIONAL PARK IN CHILE, JORGE CAZENAVE / CRAWFORD WILLIAMS FOUNDATION.

> Nature tourism activities based on wildlife observation not only promote entrepreneurship: they also generate more employment for women and youth as compared to primary production activities. Horse-drawn canoe trip in Portal Carambola, Iberá Park. PHOTO: BETH WALD.

Secondly, it is important that nature tourism based on wildlife observation has a high experiential component, which is why it should be associated with long walks, horseback riding and canoe and kayak trips. These activities allow the visitor to experience nature more intimately, in addition to increasing the likelihood of observing a large number of animal species, including more elusive ones. And in the context of in this type of experience local people can provide added value, via their knowledge of the terrain and stories about nearby nature and culture that they share with tourists. Finally, this type of tourism is carried out in small groups, thereby avoiding overcrowding and consequently, strengthening the connection with nature and feelings of satisfaction for the tourist. People from the area will not only provide wildlife observation guide services, but will also earn income by offering lodging in family homes, local gastronomy and handicraft sales.

Returning to the examples cited above of landscape and wildlife observation from viewpoints, they are not associated with experiential activities, are large-scale and require less of people from the area, who if they participate in the activity, do so as employees. State policies conceived from our proposal of wildlife observation tourism can help local people to be a central part of this type of activity. For example, in Colonia Pellegrini (Iberá) buildings cannot be taller than one floor (4.5 meters in height) and lodging cannot have more than five rooms, which promotes family enterprises and avoids the arrival of large chain hotels. Likewise, wildlife observation activities in the Iberá lagoon have a fixed number of boats and tourists per boat, and guides must prove that they have been residents of the town for at least two years.

When the beneficiaries of the economy of nature model are the people who live nearby, there will be interest in the creation of a park and the implementation of rewilding projects, which will translate into political and social support for these to take place. The economy of nature must create genuine, dignified and sustainable employment for the local population, also incorporating women and young people. This is the case in South Africa, where an area that switched to an "economy of nature" park generates 2.7 times more employment than if it were used for livestock production.

If nature tourism is only based on spectacular landscapes there will be interest in creating parks, but probably ones that are smaller, maintaining and even further entrenching the current scenario of defaunated environments since economic activity does not develop interest in restoring native wildlife. This moreover leaves aside one of the great assets of rewilding projects: the life stories of those individuals who pioneered the recovery of their species. These stories act as a powerful magnet to attract tourists and contribute to positioning tourism destinations, as has occurred with Qaramta the last jaguar of El Impenetrable, and Tania the captive jaguar whose offspring, once released, will claim their rightful place in Iberá and El Impenetrable. They are examples of the powerful effect these individuals can have in attracting tourists and driving interest in a destination.

Nature tourism based on wildlife observation should have a high experiential component, and be associated with long walks, horseback rides and canoe and kayaking trips. Locals can provide valuable assets for these types of activities, with their knowledge of the terrain and stories about the nature and culture of the place, which they can share with tourists. Photos: a member of the group Cocineros del Iberá prepares traditional dishes for tourists at the Lechuza Cua Refuge; a wildlife observation guide accompanies a group of tourists on a puma observation outing at Patagonia Park, Argentina. PHOTOS: MATÍAS REBAK, CANOA FILMS.

REWILDING AND PEOPLE

CHAPTER 13

REWILDING

AND THE WELL-BEING OF LOCAL COMMUNITIES

"A civilization which destroys what little remains of the wild, the spare, the original, is cutting itself off from its origins and betraying the principle of civilization itself".

Edward Abbey

As mentioned in Chapter 5, the economy of nature holds many competitive advantages over agriculture and livestock economies, particularly in those regions that are unsuitable for the development of those traditional activities. These regions are frequently referred to as marginal, a moniker that affects their communities and stigmatizes the territory, leaving it at the mercy of having its environment destroyed, with the installation of extractive industries such as petroleum, gas and mega-mining.

This negative association can be erased by rewilding projects, since the economy of nature model recognizes these areas not as marginal, but as central to generating a restorative, sustainable development..

The implementation of rewilding projects aims to restore native species and the ecosystems where they live. As explained in Chapter 12, native species should become the main support for an economy sustained by nature tourism whose main attraction is wildlife observation. Tourists that visit these regions generate employment and income while they enjoy nature and local culture.

Local horseback riding guide in Iberá. People traditionally ride horses barefoot, due to the very wet environment. PHOTO: MARTÍN BIANCHI.

As mentioned in Chapter 12, local people play a central role in the development of this type of tourism, given that they become the hosts that allow visitors get to know and value the territory through their own experience as locals, which also generates a positive change in the perception and valuation of the territory on the part of the local communities. These changes cause a series of economic and non-economic benefits including social ones that foster the recovery of traditions and certain values that may have been abandoned and that have strong implications for culture and identity and in recovering a sense of pride.

For example, the presence of tourists has led to the revival of recipes for local dishes in Iberá and as a consequence, cooks emerged in each town to meet this demand and created an organization called Cocineros del Iberá (Cooks of Iberá). Currently, the cooks not only prepare food for visitors but they also travel to other localities in Corrientes to offer the traditional dishes. A similar scenario began to take place in El Impenetrable.

This pattern is also seen with artisans, where people with different skills in woodworking, tannery, ceramics and knitting have emerged, and come together to form Artesanos del Iberá (Artisans of Iberá), to meet the tourist demand for these products. Similarly, in El Impenetrable we have helped to form the Emprendedores por Naturaleza (a play on words that translates to Entrepreneurs by/ for Nature), which has revitalized trades such as textile weaving. Here, training has been provided so that native plants are once again used in the dyeing of wool and the motifs of the fabrics are inspired by local wildlife, such as the jaguar's dappled fur and tapir calves' spots and stripes.

Nature tourism based on wildlife observation has changed locals' view of other aspects of their culture, such as clothing, dance, music and language. For example some chamamé (a genre of folk music) singer-songwriters from Corrientes have composed songs with lyrics related to the disappearance and return of the jaguar in Iberá and have even dedicated songs to one of the more emblematic individuals, Tobuna, the first female to arrive at the reintroduction center. At the same time Iberá entrepreneurs have reclaimed Guaraní (many of their main language), and then even speak it in front of visitors, leaving as a distant memory when using it was considered shame-worthy, and led them to be called guarangos, a word later used to mean rude or vulgar.

Incorporating local people in nature activities based on wildlife observation has a series of economic and social benefits that promote the reviving of traditions and values that may have been abandoned, and that have strong implications for culture, identity and reviving a local sense of pride. Photos: dance and performance of traditional chamamé music in Iberá; crafting of wood and ceramic items for sale in El Impenetrable. PHOTOS: NICOLÁS HEREDIA, MATÍAS REBAK, RAFAEL ABUÍN AIDO.

Complete and functional ecosystems, which are healthy and diverse, are a source of inspiration for local people and help to revive cultural traits unique to the region. Moreover, they foster a connection with nature from childhood, educating future defenders on the intrinsic value of all species. PHOTOS: LOOM WITH TEXTILE WITH JAGUAR SPOTS IN EL IMPENETRABLE, NICOLÁS HEREDIA; WOOD CARVING OF A STRANGE-TAILED TYRANT IN IBERÁ, BELY GUEVARA; CLOTH GUANACOS IN PATAGONIA PARK, ARGENTINA, LUCÍA GODOY AND AGUSTÍN GOTLIB; CERAMIC RED BROCKETS (A KIND OF DEER) IN EL IMPENETRABLE, MAIKE FRIEDRICH; SHELTER MADE FROM PIRÍ (*Cyperus giganteus*) IN IBERÁ, NICOLÁS HEREDIA AND A GIRL FROM CAMARONES EXPLORING MARINE LIFE IN THE INTERTIDAL ZONE OF PATAGONIA AZUL, BETH WALD. Generally speaking, the communities that develop in Iberá have begun to take pride in their history, which is intimately intertwined with nature. For example, one of the towns located at the edge of Iberá Park now much more frequently uses its full name which is Concepción de Yaguareté Corá, the second part of which means "jaguar corral." Their full name had fallen out of use and now it is proudly exhibited at the front gate of the locality together with photos of the great feline that is returning to these regions. Another illustrative example is in Colonia Carlos Pellegrini where the streets are named for native wildlife species, many of them reintroduced through rewilding projects. A kind of domino effect has taken place, in that the rediscovery of native wildlife has spread from Iberá, reflected in the fact that many visitors have created murals in their own towns and cities depicting local wildlife.

Strengthening the economies of the towns where we carry out rewilding projects has contributed to the resurgence of local cultures, reinvigorating the sense of pride of belonging to a territory with thriving nature and a rich culture.

This has also contributed to fostering a sense feeling deeply rooted, and in some cases has reversed flight from the communities, as happened with Colonia Pelligrini whose population had decreased from 2000 to 500 inhabitants as the market for wild animals' pelts and skins disappeared and there was a decline in traditional productive activities. With the development of an economy of nature model, with activities that employ women and young people and which have been key to promoting a feeling of connection and reversing emigration, the town is starting to recover and now counts 1000 residents.

In summary, nature restoration initiatives empower local residents. Entrepreneurs increase their earnings, and through a combination of personal development and the positioning of the tourist destination, begin to demand more from local and provincial governments, such as strengthening public works that better position the destination and improve quality of life for them and their neighbors. A clear example is the infrastructure works that the government of Corrientes has carried out in the Iberá region in recent years, with federal funds. The ongoing Iberá Investment Plans involve funding for public works which totalled 2.03 billion Argentine pesos, (equivalent to \$120 million dollars at the time) for this region, which will strengthen it as a tourist destination.

Entrepreneurs achieve more based on their own personal effort and the positioning of the tourism destination. This empowers them to make more demands of the local governing body, seeking to strengthen public works which even better position the destination to improve quality of life for the community. At the same time, the political leaders of municipalities near the different projects note the growing interest on the part of their communities to work in the economy of nature model and promote conservation actions as a consequence of this new economic opportunity. PHOTOS: IN IBERÁ, NEIGHBORS AND POLITICAL LEADERS OF COLONIA CARLOS PELLEGRINI ON THE ACCESS BRIDGE TO THE TOWN AND PEDESTRIAN WALKWAY USED AS PUBLIC SPACE FOR TOURISTS AND LOCALS, RAFAEL ABUÍN AIDO.

REWILDING AND PEOPLE

CHAPTER 14

REWILDING PROJECTS

Karai y Porã, the first two jaguar cubs released together with Mariua, their mother, in January 2021. PHOTO: MATÍAS REBAK.

COMMUNICATION

"The environmental movement up till now has necessarily been reactive. We have been clear about what we don't like, but we also need to say what we would like. We need to show where hope lies. Ecological restoration is a work of hope."

George Monbiot

We communicate our rewilding projects similarly to how we implement conservation actions: with a proactive approach to problems.

Of all of the environmental crises that plague the planet, species extinction is one of the most serious, due to its effects, and because if it spreads globally, it is irreversible. Fundación Rewilding Argentina undertakes projects to stop and reverse this crisis, which is why our message is not limited to stating the problem but communicates how we will solve it in different territories, through the reintroduction of missing or scarce species, the recovery of degraded ecosystems, the rebirth of cultures and the generation of new and prosperous local economies.

For example, when we communicate that the jaguar has become extinct in Iberá and talk about the need for its return, it is because we have decided to put in place a project for its return to this region. In this way our communication addresses the cause of the extinction of the species, so that it does not happen again with another species, and we talk about the consequences of its disappearance to explain what we face if we do not act. In addition, we describe the strategies and actions that we will carry out so that this big cat once again inhabits Corrientes' soil.

Rewilding projects are first and foremost proactive, and this is expressed in our message; we generate optimism and hope in the face of a situation that is, at first glance, discouraging, such as the extinction of a species. Starting with positivity, a chain of events develops: optimism and hope are in turn, key to promoting interest and involvement with rewilding projects and at the same and engaging political representatives, making rewilding part of a positive political agenda, that not only identifies the problem but also aims to solve it with concrete actions.

Due to their complexity, rewilding projects require the support of the community and its representatives for their implementation, so both must become partners to carry them out. This is achieved in large part, through communication. The Corrientes Vuelve a Ser Corrientes (Corrientes Becomes Corrientes Again) campaign was carried out to gain social and political support for the creation of Iberá National Park and for the return of several extinct species. This campaign highlighted the actions that would be implemented to recover natural, cultural and social values that had deteriorated or been lost in Iberá, and would be carried out largely by the people of Corrientes themselves.

A second characteristic of rewilding communication is that its message is transparent and honest regarding the progress and setbacks of the projects; in this way, the public learns about the issue, trusts those who implement it and experiences the projects, all of which reinforces their involvement. In this particular case, social media and the information presented there play a fundamental role. We aim to tell stories that have a scientific basis and draw on data published in scientific journals. In addition, we make an effort to communicate our work through scientific articles and presentations at congresses and conferences. This leads to beneficial interaction with the scientific community which improves the quality of our projects.

A third characteristic of the communication of our rewilding projects is the leading role that some individuals of the reintroduced species play. Although the ultimate goal of our work is to recover the ecological roles that each species plays in an ecosystem, the projects generally begin with translocated specimens that have to overcome many obstacles before living in the wild. People empathize with these epic stories of rising to a challenge even when they do not have a happy ending, which is why we communicate the key messages of rewilding through the life stories of these individuals, identified by name. These stories are endless sources of communication content, but they are not limited to a simple anecdote; each action carried out by one of these animals serves to communicate key messages clearly and precisely.

Finally, communication about rewilding makes local communities proud; they see that where they reside, the nature that envelops them and their culture are known and admired by "outsiders," by "the whole world." Their place, their home is in the news. They are visited and associated with a story of hope and commitment to the future. This generates a positive feeling in the local communities towards the rewilding projects, which reaffirms the communities' commitment to restore nature.

Our communication about the rewilding projects demonstrate a proactive attitude towards the environmental problem we seek to solve. When we communicate that the jaguar was extinct in Iberá, and call for the need for its return, it is because we have decided to implement a project to bring it back to this region. PHOTO: TANIA THE JAGUAR WITH HER NEWBORN CUBS, ARAMI AND MBARETE, CAMERA TRAP / FUNDACIÓN REWILDING ARGENTINA

The proactive nature of the rewilding projects generates optimism and hope in the face of a situation that is at first glance, discouraging, such as the extinction of a species. But our message of hope awakens interest and involvement among private citizens and political representatives, which is reflected in regional, national and international media. IMAGES: LA NACIÓN NEWSPAPER FRONT PAGE, ÉPOCA NEWSPAPER FRONT PAGE.

Fernández habló con Macri e hizo un guiño a las últimas medidas

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Hay que retroceder más de cien años para ver una bajante similar del Paraná

Ayer, en el puerto di Corrientes, el rio apenas alcanzó los 18 centimetro Podría aparecer flora que dificulte la potabilización

La vacunación contra el COVID-19 cumplió un año en Corrientes

El 29 de diciembre de 2020 comenzó la inmunización contra el coronavirus en nuestra provincia. En aquel momento, uno de cada tres pacientes con el mal pandémico estaba internado en el Hospital de Campaña. Hoy, es uno de cada treinta.

Balam, la nueva esperanza

Llegó el primero de los ocelotes con los que se prevé repoblar e Iberá. Se trata de un felino considerado "vulnerable a la exterción" la extinción". El método de reintroducción será similar al utilizado con k vaquaretés

Cortes de cintas de Valdés en Virasoro y Apipé

\$2 mil millones de Nación en rutas correntinas

The complexity of rewilding projects makes it impossible to implement them without public and political support, which is why we must ensure that the public and politicians become partners to the projects. This is achieved, to a large extent, through communication and community involvement in public events in the territory. Music and theater about the reintroduced species in Iberá and the communication campaign "Corrientes Vuelve a Ser Corrientes" (Corrientes Becomes Corrientes Again) aimed at achieving social and political support to bring back extinct species in Iberá. Images: poster and celebration of Arami and Mbarete's birthday, two jaguars born in 2018, in the locality of San Miguel. PHOTOS: ALAN BERRY RHYS, FUNDACIÓN REWILDING ARGENTINA, MATÍAS REBAK.

Communication is key to construct a nature tourism destination for wildlife observation that is recognized nationally and internationally. Photos: different forms of communication used to position Patagonia Park in Santa Cruz, Argentina, and Iberá in Corrientes. PHOTOS: FLORIAN VON DER FECHT, FUNDACIÓN REWILDING ARGENTINA, MATÍAS REBAK.

Communication of rewilding projects includes preparing scientific articles to be published in specialized journals and presentations at congresses and conferences. These are important elements to educate the scientific community about rewilding projects and help them to develop. PHOTOS: FRANCO BUCCI.

leonardodicaprio A Jaguar, named Mariua and her two cubs, Karai and Porå, were reintroduced to the Iberá wetlands in January. They are the first Jaguars to live in the will there in 70 years. Conservationists with @rewilding_argentina and @tomplins_conservation are monitoring the spotted felines with GPS collars. They hope the family trio will soon be joined by at least six other Jaguars, creating a new genetically diverse population in Iberá that will rewild the landscape. The Iberá wetlands are a sprawling

The Iberá wetlands are a sprawling maze of marshes and lakes, lagoons and bogs and watercourses that command the horizon as far as the eye

Some individuals of the species that are being introduced, and more importantly their stories of overcoming obstacles play a key role in rewilding projects communication. These stories generate empathy and are an inexhaustible source of content, and should not be limited to a simple anecdote, but rather communicate our key messages with clarity and precision. The "romance" between Qaramta and Tania was the source for many pieces in different media across genres, and we used these pieces to convey the urgency of acting to protect Qaramta, one of the last jaguars in the Argentine Chaco, and his descendants, Nalá and Takajay. PHOTO: CAMERA TRAP / FUNDACIÓN REWILDING ARGENTINA.

Communication on rewilding generates pride in local communities that see that their homes, the nature that surrounds them and their culture are known, admired and associated with a story of hope and commitment to the future. Image: a post by actor Leonardo DiCaprio highlights Iberá and the jaguar reintroduction project that is being carried out in this great wetland.

REWILDING AND PEOPLE

CHAPTER 15

REWILDING ON PUBLIC AND PRIVATE LANDS

About 90% of continental Argentina's area is privately held, so it is essential to incorporate these landowners in conservation initiatives in general and in rewilding in particular. Private reserves contribute to some extent, but their territorial impact is low as they constitute less than 0.3% of the country's land area. PHOTO: A GROUP OF GUANACOS ON PRIVATE LAND IN PATAGONIA, FRANCO BUCCI.

"Rewilding has already demonstrated its capacity to inspire people about wild nature and hence has the potential to help re-engage people with conservation."

Fundación Rewilding Argentina works by first acquiring private properties where we implement rewilding projects, and then donating them to the national or provincial governments for the creation of parks, thus incorporating land to conserve natural ecosystems into the public system. To achieve a greater impact on the restoration of ecosystems and species through rewilding, this strategy should be extended to a larger area, which includes rewilding in preexisting natural parks but above all creating new ones, as well as incorporating private lands into conservation.

In Argentina public lands are scarce: protected areas under national jurisdiction that occupy public lands, such as national parks, represent just 1.4% of the area of continental Argentina. This percentage rises to 1.5% if we consider areas protected under national jurisdiction that are on private property, such as national reserves.

When compared to other countries, including more populous and industrialized nations, these numbers show how little protection Argentina's natural environments are afforded. For example, if we consider the continental areas under the federal system, Australia protects 4% of its area, the United States 4.5%, Italy 5%, the United Kingdom 8% and France protects 9.5%. In comparison to neighboring countries, Brazil protects 9% of its surface area, Chile 17.5%, Bolivia 16.6% and Paraguay 3%. Only Uruguay with 1.3% has less of its surface area protected under the category of national parks than Argentina.

Increasing the continental area protected by national parks in Argentina is complex, because the Argentine state has very little fiscal land on which to expand the park system. In fact, it controls only 4.6% of continental Argentina's area. In addition, this domain is in fact categorized as private, which means that the land can be sold or leased, and much of it is currently leased to third parties. The provinces are in a similar position, as the fiscal lands they own represent around 2.1% of the surface area of the country and are mostly privately owned, and on occasion, there are claims of ownership and demands that the land be returned. In contrast, most countries have a much higher percentage of land in state hands, as in the case with the United States, with 26% and in Brazil with up to 47%. In Argentina, 90% of the continental territory is in private hands which hints at the actions necessary to increase the area of the country with conservation objectives.

In this context, one strategy to expand the system of protected areas in Argentina is to acquire private lands and make them public, as we do at Fundación Rewilding Argentina, but this must be complemented with the incorporation of properties that become private reserves. This legal entity exists and private reserves constitute an excellent conservation tool in Argentina, however it is important to remember that in Argentina they cover less than 0.3% of the territory, and in general are not large enough to conserve ecological processes. This analysis reveals that the conservation of natural environments requires new tools to involve the private sector, particularly for large landowners.

One of these tools could be the Ley Nacional de Presupuestos Mínimos para la Protección de Bosques Nativos (National Law of Minimum Budgets for the Protection of Native Forests). Tracts of forest under provincial jurisdiction and protected by this law in the "red" category (strict protection that does not permit clearing or extractive uses) occupy nearly 4% of Argentine territory. But because many of these forests are already in provincial protected areas, the incorporation of forests under strict protection introduced by this law is actually lower than the aforementioned 4%. Further, the law only covers woodlands, and not grasslands, steppes or wetlands. Other limitations include that it only establishes budgets for the conservation of forest stands, but not for the keystone species that are from these forestry law are generally not the same as those that manage wildlife. All of these elements weaken the potential of forests on private lands that could be protected by this law, or where rewilding projects can be implemented, and in this way lead to complete, functional forest ecosystems rather than impoverished ones.

The participation of private landowners in rewilding projects in Argentina is almost nil. However, there are some initiatives such as the reintroduction of the giant anteater on land owned by the establishment Don Pablo, located near the city of Goya (Corrientes) where the sixth population nucleus in Corrientes and the southernmost distribution of the species thrives, and Don Luis Reserve, a private property in the north of Iberá is home to nest boxes to facilitate red-and-green macaw breeding. PHOTOS: CLT / FUNDACIÓN REWILDING ARGENTINA, MATÍAS REBAK.

of rewilding.

The participation of private and community properties in wildlife conservation through the economy of nature model in conservancies has resulted in extraordinary increases of protected areas and species. In Namibia 25% of the territory is dedicated to this type of project and in South Africa conservancies on private and community properties total nearly 16 million hectares, which is equal to 13% of the country's area and almost five times the area protected by national parks in Argentina. In addition, there are cases where conservancies are implemented in the areas surrounding national parks, substantially increasing their conservation impact.

In Argentina there are other tools that can be explored, such as conservancies—which are popular in some African nations—as well as conservation easements as used in the United States. These possibilities, unknown in Latin America, can promote private participation in conservation and especially in the necessary regeneration of complete and functional ecosystems using the strategy

The definition of the term conservancy varies among countries, but in general it is understood as a legal accord among several neighboring property owners (of private or community properties) that agree to reserve a continuous territory for conservation and wildlife management in a coordinated manner and under certain conditions. The ultimate goal of conservancies is to engage in rewilding through the economy of nature model, benefitting the ecosystem and all of the species that inhabit it as well as the landowners. The economic benefits that come from the economy of nature derive mainly from wildlife observation tourism but can also come from sport hunting and, to a lesser extent from the production of bushmeat. As the conservancies generally involve properties with different owners, it is possible to cover extensive areas and thereby protect animals with large territorial requirements such as elephants, lions, wildebeest, leopards and wild dogs. Several of these species are keystone species, necessary for the proper functioning of natural ecosystems in addition to being some of the most appealing for nature tourism.

> The legal entity of conservancy that exists in several African nations is an interesting way to involve private landholders in rewilding activities using the economy of nature model. A conservancy is a legal accord between neighboring property owners (whether private or community) that agree to set aside a continuous territory for wildlife conservation and management under certain regulations. The Phinda Conservancy in South Africa was established on land owned by a travel company and an indigenous community and has reintroduced almost all of the large carnivore and herbivore species of the African savannah (such as the white rhino), generating high profits through wildlife observation tourism. PHOTO: @andBeyond.com

Conservancies can also be formed from private and public lands, as is the case of Sabi Sands, in South Africa, which consists of several private properties bordering Kruger National Park which joined together in a conservancy to allow the park's area to be expanded by 60,000 hectares. Conservancies in South Africa cover a landmass that is five times that of Argentina's national park system. PHOTO: SABI SANDS GAME RESERVE / WWW.SABI-SANDS.COM

In a number of countries, rewilding initiatives are relatively common on private property as is the case of the American bison on several properties in the Central US. PHOTO: AMERICAN PRAIRIE RESERVE.

One such example is the Sabi Sands conservancy which was established beginning with private properties bordering Kruger National Park. This park was surrounded by chain link fencing and the development of Sabi Sands allowed the fences to be relocated further out, on the property line, increasing the effective protection of the property by 65 thousand hectares. As a benefit, the private holders that joined the conservancy have wildlife species on their land that would not thrive on each individual property, and which are central to wildlife observation tourism that generate significant income.

The conservancies have also made major contributions to the conservation of keystone species. In Kenya's Masai Mara National Park a group of 15 community-owned conservancies have donated nearly 200 thousand hectares of land that is key to the great Serengeti wildebeest migration and the lion population has doubled there in the past decade. Here the 3000 landowning families receive income of more than four million dollars a year from wildlife observation tourism, which highlights the significant economic potential on private and community lands that are dedicated to conservation.

Conservancies involve contractual agreements among private landowners that are legally recognized in many countries, and receive support from the state. This collaboration involves seeking forms of governance that enrich the management of these lands dedicated to rewilding through the economy of nature model. Sometimes these agreements establish that the conservancy is maintained even if the private property domain is transferred, thereby guaranteeing the conservation of these properties over the long term. On the other hand, in many countries, part of the success of conservancies is due to the fact that the private owner can also become the owner of some of the animals that are on their property, which depends on the kind of perimeter fence constructed, which in turn defines which species are contained within the property. This gives them the right to translocate animals for reintroduction and supplementation, and the state can supervise and regulate these movements but does not have the discretion to impede them as could happen under Argentine legislation.

Conservation easements, which exist in the United States are another legal status that allows private properties to be involved in conservation activities. They consist of a legal agreement between a private property holder (the donor) and a qualified conservation organization (the holder), public or private, whereby the landowner voluntarily agrees to restrict the type and degree of development on their property. The duration of conservation easements is in perpetuity, the restrictions are transferred with ownership (when the property is sold) and there are tax benefits. Conservation easements are established to protect specific natural attributes of a property but without there necessarily being an incentive to protect or restore keystone species and therefore complete and functional ecosystems, so from a rewilding perspective, they are less attractive than conservancies. In the United States there are more than 190 thousand conservation easements that total 13.3 million hectares.

In Argentina an attempt was made to introduce a status similar to conservation easements in 2001 called a servidumbre ambiental (environmental easement). It was based on the servidumbre de paso (right of way), acknowledged in the Argentine Constitution, and which obliges a landowner to allow the use of a road located on their property if that is the only way to access another landowner's property. The environmental easement also consists of an agreement between property owners and is registered on both property titles, but it introduces restrictions on the type of exploitation that can be carried out on one of the properties. The only existing case of conservation easement is in the northwest of the province of Neuquén, in Epu Lauquen. In this case a property (called a serviente, similar to the donor in the United States) voluntarily restricts certain activities so as to not affect the environment of another property called a dominante (which is similar to the holder), which exercises control of the easement. However, since in Argentina there is no specific legislation, the right of control is lost if not exercised and it is difficult to transfer it with ownership so it is not guaranteed in perpetuity. Beyond this example, the status has not been extended to other private properties.

with regards to implementation.

Rewilding initiatives on private properties in Argentina are rare. In the southwest of the province of Corrientes, near the locality of Goya, Fundación Rewilding Argentina has reintroduced the giant anteater in the area owned by the company Don Pablo. There, the sixth population nucleus of anteaters in the province of Corrientes flourishes and it is the southernmost distribution of this species. Also in Corrientes we have placed nesting boxes for the red-and-green macaw on private properties such as Reserva Privada Don Luis, in the north of Iberá, to facilitate the macaw's reproduction.

With approximately 90% of its territory in private hands, conservation in general and rewilding in particular cannot take place in Argentina without involving private landowners. A substantial increase of the land area dedicated to conservation would permit us to scale up rewilding projects, leading to increased benefits in the environmental and economic spheres. The traditional steps taken in our country to incorporate the private sector in the restoration of complete and functional ecosystems have clearly been insufficient, so we must seek out innovative models that allow large private extensions to convert to the economy of nature model. The African conservancies set a good example.

In Brazil there are different types of legal entities that promote conservation on private lands. For example, the Brazilian forestry code incorporates the status of Legal Reserve through which a percentage of private properties cannot be cleared. These percentages vary according to the country's biomes, but the minimum is 20% and in Amazonas the legal reserves occupy 80% of the area of each property. Also in Brazil they have also instituted the status of Private Natural Heritage Reserves, participation in which is voluntary but is in perpetuity. The owner receives tax incentives and can only carry out educational, scientific or ecotourism activities. In some biomes the incidence of private reserves is high, for example in the Pantanal, where they account for 2% of the region. This entity is similar to the private reserves of Argentina but with notable improvements

THE FUTURE OF REWILDING IN ARGENTINA

CHAPTER 16

REWILDING IN THE JAGUAR CORRIDOR

Just like all of the forests and jungles of northern Argentina, the forests of the dry Chaco that are crossed by the Bermejo River in El Impenetrable National Park are largely defaunated. The pampas deer, marsh deer and guanaco are completely extinct, while only one male jaguar and one male giant river otter survive in the entire national park. PHOTO: DOUGLAS TOMPKINS.

"For millennia, humans have been removing top predators from the natural world. That impulse has simplified our world, because top predators tend to be the glue that keeps ecosystems together."

Enric Sala

Northern Argentina has experienced a catastrophic process of defaunation as a result of three activities: deforestation, hunting and cattle farming. This area was blanketed by a continuous subtropical forest with enormous biological diversity that extended from the mountain jungles (in Salta, Jujuy, Tucumán and Catamarca) to the forests of the Chaco Seco and Chaco Húmedo (dry and wet Chaco, respectively) of the provinces of Chaco, Formosa, Santiago del Estero and Corrientes, reaching the Paraná Forest or the Atlantic Forest of Misiones. We refer to this area as the Jaguar Corridor.

Nowadays, only a few degraded and impoverished slivers of this great extension of forest persist. They are continually being infringed on and their fauna decimated, in particular in the Chaco region, which faces deforestation at a faster pace than in any place else in the world. The total or local extinction of keystone species—in particular large mammals and birds—is the direct result of damage caused by humans in this region.

The jaguar, a top predator in this ecosystem, was abundant in northern Argentina and many travelers have left testimony of its presence. One of the most extraordinary accounts is that of the Leach brothers, who mention having "seen no fewer than 27 tigers in three days" in 1899, while navigating the Bermejo River near current-day El Impenetrable National Park.
Today in Argentina some 200 to 250 jaguares subsist on the land, and of these, between 80 and 100 are in the Atlantic Forest of Misiones. This subpopulation, which is intensely monitored, has grown in number in recent years thanks to conservation efforts on the part of the Government of Misiones, the National Parks Administration and NGOs such as Proyecto Yaguareté (Jaguar Project) and Red Yaguareté (Jaguar Network). Another 100 to 120 individuals live in the Salta jungle and Jujuy though their population trend is unknown. Lastly, a series of monitoring campaigns suggest that the jaguar is almost extinct in the Chaco region, with fewer than 20 individuals in the entire territory. Connectivity between these subpopulations with populations in neighboring countries is partially compromised, most markedly for the significantly isolated Misiones subpopulation, which has experienced notable genetic structuring, (loss of genetic diversity due to human causes, see Chapter 7.5). In contrast, the Yungas subpopulation is still connected with the Bolivian populations and the Chaco subpopulation may be connected to the north with Paraguay and to the west with the Yungas population.

To recover connectivity between the jaguars that live in the Atlantic Forest with Yungas, intermediate populations must be restored in the Chaco region. To this end, the projects that we undertake with this species in Iberá and El Impenetrable have been conceived and could be extended to other national parks including El Rey in Salta or Copo in Santiago del Estero, and in provincial parks like Loro Hablador and Fuerte Esperanza in Chaco. It is important to point out, however, that the current number of protected areas in the Jaguar Corridor is insufficient to ensure the connectivity between subpopulations, creating large new national and provincial parks in which to introduce core populations of jaguars is urgently needed. These new areas could be implemented in the Dulce River wetlands in Santiago del Estero (which extend into Córdoba) or the Quirquincho wetlands of Salta.

While progress is being made with the creation of new areas to restore the presence of the jaguar, work must continue so the four current subpopulations in the Atlantic Forest, Iberá (in progress), Chaco and Yungas are connected through river corridors along large rivers such as the Bermejo, Pilcomayo, Paraguay and Paraná. For this to be possible, it is essential to extend riverbank protection to avoid deforestation. Deforestation is currently prohibited by the Ley de Protección de Bosques Nativos (Native Forest Protection Law), but only for a narrow strip measuring 100 meters on each riverbank. Today it is almost impossible for the four existing jaguar subpopulations

The last remaining jaguar populations in Argentina are in the far north of the country, diminished in number and generally isolated. For these populations to maintain and increase in number, translocations must be carried out so they can be reintroduced (as in Iberá), supplemented (as in El Impenetrable) or for the purposes of increasing genetic variability (as in the jungle of Misiones). Photos: Nalá, one of Qaramta's cubs in El Impenetrable, Chaco; Mariua and one of her released cubs in Iberá Park, Corrientes. Mbarete, anesthetized for her satellite collar deployment at the Jaguar Reintroduction Center at Iberá Park. PHOTOS: GERARDO CERÓN, MAGALÍ LONGO, NICOLÁS GUASTAVINO.





reintroduced in specific sites.

to exchange individuals due to the great distances by which they are separated and because their corridors are fractured—as mentioned in several chapters—by impassable barriers such as cities, dams, roads and large tracts cleared for agriculture and cattle ranching. Since natural dispersal does not take place, it is necessary to replace it with translocations to reintroduce (as in Iberá) and supplement populations (as in El Impenetrable), as well as to increase genetic variability (as in the Atlantic Forest in Misiones) when necessary. Rebuilding the large population of jaguars that historically inhabited northern Argentina is a major challenge that can be addressed by applying the tools and strategies described in these pages.

The status of the giant otter-the apex predator of the freshwater systems associated with the northern Argentine forests—is even more worrisome than that of the jaguar. This species, which was historically abundant in many waterways and larger bodies of water in the La Plata River basin, is now extinct in Argentina. The last family groups of the species were registered in Misiones, in the area of the Uruguaí Stream in the 1980s. Within the La Plata basin, the giant otter survives only in the Pantanal region, and as with the jaguar, we have proposed to reintroduce this species in Iberá and El Impenetrable. The Bermejo, Paraguay and Paraná rivers are important corridors for the giant otter, as corroborated by the appearance of a male individual in 2021 in the Bermejo River sector of El Impenetrable National Park. These aquatic corridors could play a fundamental role in favoring the recolonization of Northern Argentina by this species, based on family groups

In addition to recovering large predators species whose ecological functions are related to predation of small vertebrates, insectivory, herbivory, nutrient dynamics, carbon sequestration and the dispersal and predation of fruits and seeds also must be recovered. Therefore we are also working on the reintroduction and supplementation of species such as the ocelot, giant anteater, marsh deer, pampas deer, guanaco, collared peccary, the red-and-green macaw, bare-faced curassow and red-footed turtle. Recovery of these species is already underway in Iberá and El Impenetrable but it should be extended to other territories of this region of northern Argentina. Likewise, other species for which rewilding initiatives are still lacking are the giant armadillo, the white lipped and Chacoan peccary, the tapir, north Andean deer, maned wolf, spectacled bear, harpy eagle, the jacutinga (black-fronted piping guan), the Brazilian merganser and the blue-winged macaw.

The only chance that the giant river otter, the apex predator of the aquatic environments of Argentina has to return to our country is through rewilding projects in sites such as Iberá or El Impenetrable and by improving connectivity of river corridors that link those sites with others that the giant river otter could inhabit in the future. PHOTO: MARISI LÓPEZ.

Many of the rewilding projects already underway in Iberá or El Impenetrable should be extended to other territories in order to recover these species over a greater area. In addition, it is necessary to add other species to the rewilding initiatives. Images: harpy eagle, white-lipped peccary, bare-faced curassow, marsh deer, guanaco and giant armadillo. PHOTOS: GERARDO CERÓN, MATÍAS REBAK, DANTE APAZA, YAMIL DI BLANCO.

The reintroduction of all of these species is not enough. It must be accompanied by actions that eliminate the activities that spurred their extinction. While it is apparent that in national and provincial parks, deforestation and hunting are unacceptable, cattle farming is not held to the same scrutiny. Much of the time illegal entry of cattle is tolerated and necessary attention is not paid to maintaining simple but essential barriers around the perimeter of the park, such as barbed wire which would keep them out. This must be urgently resolved, since cattle illegally enter many parks and rangers are not aware of the negative impact this generates. These include but are not limited to ecosystem destruction, the use of dogs and hunting linked to cattle, the displacement of native herbivores and the potential for conflict between cattle and predators in the interior of the park, which is something that should take place only at its perimeter.

The Jaguar Corridor in northern Argentina needs to be refaunated through the reintroduction and supplementation of species, especially those considered to be keystone species. This will contribute to improving the health of natural ecosystems that still exist, and mitigate environmental crises at the same time as they encourage the development of local economies, the well-being of the communities and the recovery of local culture.















CHAPTER 17

REWILDING

Guanaco migrations still occur in some parts of Patagonia. These movements are an amazing spectacle and a key ecological process that keeps soil and vegetation healthy. PHOTO: FRANCO BUCCI.

IN THE WESTERN PATAGONIAN CORRIDOR

"Without our tolerance of large and dangerous carnivores, they would not exist, period. We decide their fate. That's more responsibility than we probably deserve, but that's how it is."

While Patagonian wildlife, particularly that which lives in the west of the region, did not experience the catastrophic defaunation observed in the north of the country (see Chapter 16), it did suffer the effects of the expansion of the agricultural frontier. In western Patagonia, native wildlife was affected by the severe degradation of its habitats due to clearcutting, pine plantations that replaced native environments and overgrazing by sheep that destroyed the mallines (wetland meadows) that characterize the transition between forests and steppes, in addition to irreversibly eroding vegetation and soil, particularly in the steppe.

These impacts were compounded by the persecution of species considered detrimental to livestock, such as the gray fox, Geoffroy's cat (a small wildcat), the puma, guanaco and even the Andean condor. As a result, Patagonian wildlife populations suffered severe declines in numbers and distribution, with some species even disappearing at the local and regional level.

Historically, western Patagonia had populous herds of large herbivores that resembled the eye-catching spectacles observed on the African savannah. Among these herbivores the guanaco stood out with many millions of individuals, distributed throughout almost the entire territory at the time of the arrival of the first European settlers. Another large herbivore of the region is the huemul, a species of deer whose distribution covered the Andean-Patagonian forests to the west, and the steppe and canyon areas to the east, as described in great detail by John Bell Hatcher (see Chapter 7.3), Hesketh Prichard and Joseph Lively. Even Francisco Moreno and Antonia de Viedma observed them in Santa Cruz on the Atlantic coast. The third large herbivore is the lesser rhea, a flightless bird related to the greater rhea and ostrich which was distributed over the great expanse of the open Patagonian steppe. It is believed that these three herbivores were the main prey of the puma and at least to northern Patagonia, also of the jaguar.

These interactions between apex predators and large herbivores possibly sustained part of the biodiversity and ecological integrity of the Patagonian ecosystems. In addition, these herbivores, in particular the guanaco, were fundamental to the indigenous peoples, whose development, culture and survival were strongly linked to the use of these species. In fact, evidence of a close relationship between humans and native herbivores has been observed in a number of archeological sites such as the spectacular Cueva de las Manos (Cave of the Hands) designated a UNESCO World Heritage Site and located in a ravine of the Pinturas River some 100 kilometers to the south of the city of Perito Moreno.

In addition to fulfilling their ecological role as prey for apex predators (a category which includes humans), guanacos and huemuls exhibited migratory behavior that allowed them to sustain large populations without significantly damaging the vegetation. Animal migrations are movements that involve seasonal travel over long distances. They are also characterized by a certain loyalty to places of arrival and departure, known as their wintering and summering areas, which are used generation after generation. One of the benefits of this behavior is that they alternate grazing areas, permitting the vegetation to recover until the following season and thus avoiding land erosion.

The movement of guanacos has been documented by archaeologists according to the information provided by the first settlers of Patagonia who followed their migrations, while their "immense herds" were mentioned by the first travelers like George Chaworth Musters who, between 1869 and 1870 accompanied the indigenous Tehuelches on their route from southern to northern Patagonia, determined, in part, by the guanacos. Apparently huemuls also migrated, moving—as did the guanacos—between higher and lower areas to make the most of the productivity of the pastures and avoid deep snow at higher altitudes in the winter.

The relationships between predators and large herbivores and between the latter and plants have been forged over the course of at least a million years of evolution, which is why native herbivores that inhabited Patagonia were vast in number yet did not negatively affect the vegetation. In fact the state of conservation of grasslands and Patagonian steppe was so firm that it allowed for the establishment of sheep farming which grew to 22 million head. This excessive number of sheep overgrazed the native vegetation and led to the desertification of Patagonia, leaving 34% of the surface severely eroded. In addition to the damage caused by the sheep, there are now a large number of (in large part wild) horses roaming Patagonia, as well as cattle, particularly in damp areas, which negatively affect the scarce wetlands and dry out the streams.

Guanaco migrations have been documented by archaeologists from records from the first settlers to Patagonia, who followed their movements. The guanaco is also an important figure in archaeological sites such as the Cueva de las Manos (Cave of the Hands). PHOTO: FLORIAN VON DER FECHT.

Many factors such as using wire fences to delineate fields represent barriers to wildlife and have caused the disappearance of most the migratory routes of guanacos in Patagonia. We are analyzing the spatial ecology of this species here to understand and conserve the remaining migratory movements. PHOTO: FRANCO BUCCI.





In this context, competition for fodder with cattle, the introduction of diseases, hunting and the construction of fences decimated native herbivores. Guanacos and huemuls suffered a steep decline in population sizes and severe reductions in distribution. The decline of the huemul was already mentioned by the indigenous people at the beginning of the 20th century and today it is the most endangered deer in the Americas. It is speculated that there are only 400 adult huemuls remaining in all of Argentina. At the same time, the migratory movements typical of both species began to be lost and today are restricted to just a few guanaco populations. Likewise, as the number of large herbivores collapsed, predators—such as the puma—began to feed on domestic animals, which resulted in clashes with ranchers.

the initial stages.

as the Andean condor.

Faced with this scenario, Fundación Rewilding Argentina created a three-pronged approach. The first prong is to restore species in serious danger of extinction like the huemul. This species must be recovered both in the forested areas where it still exists, and also in the steppe where it has disappeared. The latter requires implementing a reintroduction project, which is currently in

The second prong focuses on the reduction of conflict between species such as the guanaco and puma and productive activities such as sheep farming. To this end we are implementing a research project which is unprecedented in Latin America on the spatial and trophic ecology of pumas and in order to quantify the real impact that they have on livestock. Similarly we are analyzing the spatial ecology of the guanaco to understand and conserve its migratory movements and evaluate how these animals use protected areas and the nearby productive areas. In addition, we are working with rural producers to implement damage prevention strategies for the herds with the use of guard dogs. These projects are necessary because it is clear that the indiscriminate (and often illegal) elimination of individuals, through poisoning, for example, have not resolved the conflict and in fact has aggravated it, affecting other species that require conservation, such

> The huemul is the most endangered deer in the Americas. This species must recover both in the heavily forested areas of the cordillera where it remains and in the steppe environment from which it has disappeared. We are currently developing the initial stage of a reintroduction project designed for this environment. PHOTO: FRANCO BUCCI.

> In Patagonia we are reintroducing species that have gone locally extinct, with a particular emphasis on those that live in naturally fragmented areas or those with limited surface area. This is the case of the Wolffsohn's viscacha, which lives on vertical rock faces in discontiguous areas of the Patagonian steppe. PHOTO: FRANCO BUCCI.

The third prong involves the reintroduction of species that are locally extinct with special emphasis on those that live naturally limited in area or fragmented environments. This is the case of the austral rail (a small rush-dwelling bird) and of the coypu (an aquatic rodent) that live in the scarce wetlands of the Patagonian Steppe and the Wolffsohn's viscacha that lives in the sheer cliffs that crop up in the flat steppe like islands. We have reintroduced Wolffson's viscacha in the Caracoles Canyon and coypu in aquatic environments at the same time as we are restoring marshlands that the austral rail still inhabits, thus increasing the available area and improving its conservation status in order to use these sites as a source of individuals for future translocations.

Lastly, we believe that, unlike other regions of the country, in Patagonia it is still possible to significantly increase the area occupied by protected areas starting with public lands, declaring them of public utility to form natural parks under provincial or national jurisdiction, thus protecting them in perpetuity. This territorial contribution would provide land to increase rewilding projects and strengthen biological corridors. For example, in the province of Santa Cruz, there are more than a million hectares belonging to the state, among which are the lands adjacent to the Zeballos Glacier on the Lago Buenos Aires Plateau, which is part of the Cardiel and Strobel plateaus, the headwaters of the Jeinimeni and Zeballos rivers and the forests of the Mayo and Nansen river basins. In Chubut, affected lands include the Shoonem Municipal Reserve in Lago La Plata and the basin of Lago General Vintter. We must take advantage of the potential of this territory to reestablish the iconic Patagonian landscapes, its charismatic fauna and an alternative economy based on nature tourism.

In this scenario, the economy of nature model can support and diversify the local productive sector in an environment that is appealing for nature tourism based on wildlife observation. The development of this model would entail implementing damage control for the herds, and would allow for the coexistence of livestock and wildlife, thus providing good solutions for producers, who could combine agricultural activities with nature tourism. We believe that this strategy will result in recovering the lost splendor of the wildlife of western Patagonia and in the restoration or a significant area of its ecosystems, which are currently mostly degraded. It is possible and desirable to generate initiatives so that wildlife is not seen as a conflict that must be eradicated, but rather as an opportunity for economic development.

In Patagonia it is necessary and possible to implement nature tourism initiatives that present native wildlife as an opportunity for growth and not a problem to be eradicated. The Patagonian Steppe and the puma hold great appeal for the development of wildlife observation tourism. PHOTO: HERNÁN POVEDANO.

In Patagonia we are working with rural producers to implement strategies to prevent puma damage to herds through the use of guard dogs. This is necessary because it has been demonstrated that the use of indiscriminate carnivore elimination, such as with poisoning (which is illegal) have not resolved the conflict and have even worsened it. PHOTO: FRANCO BUCCI.





CHAPTER 18

REWILDING PATAGONIAN CORRIDOR

Off the coast of Patagonia Azul we are restoring Gracilaria algae forests to increase the structural complexity of the seafloor-and thereby its diversity-and also to increase the amount of carbon it sequesters from the environment. PHOTO: LAURA BABAHEKIAN.

IN THE MARINE

"One day I realized that all I was doing was just writing the obituary of ocean life. In fact, many of my colleagues and I were rewriting the obituary with more and more precision. I felt like the doctor telling you how you are going to die with excruciating detail, but without offering a cure. That's when I decided to guit academia and dedicate my life to reversing the degradation of the ocean."

Argentina has five thousand kilometers of coastline and maritime territory with an area of approximately one million square kilometers, which is equal to about a third of the continental area of the country. This expanse, in addition to the presence of two marine currents, one cold from the Islas Malvinas (Falkland Islands), and one warm from Brazil, result in remarkably varied marine life. For example, approximately 3100 species of invertebrates live in Argentina's marine environment, of which more than 800 are mollusks (such as snails and octopus) and more than 700 are arthropods (such as crabs). There are also some 300 species of fish, eight species of penguins, eight of albatross, 19 of petrels, nine of whales, 32 of dolphins (and other toothed cetaceans), four species of sea lions and five species of seals. The value of this biodiversity has been historically neglected and the lack of protection and conservation measures have strongly negatively impacted marine ecosystems.

Historically the whaling fleet was the main threat to marine biodiversity. In Argentina this fleet operated intensively in the first half of the 20th century, capturing mainly the southern right whale, which was an easy target and most of the whale could be commercially exploited. It is estimated that in the 18th century this whale's global population was some 70,000 individuals, which was reduced to only 300 by 1920. Since then the species has partially recovered, and in 2009 its population was estimated at 13,600 individuals, a number which although encouraging, is significantly lower than the historic estimate. Despite this, the species is listed,

globally and nationally as being of least concern, showing that the Red Lists suffer from shifting baseline syndrome mentioned previously (see Chapter 7.3). In general large whale populations have experienced a 75% global drop when compared to their historic highs, with the whales of some species—such as the blue whale—showing reductions of 97%.

In Argentina, sea lions, elephant seals and penguins suffered a history of exploitation similar to that of the whales, with drastic declines followed by partial recovery that failed to reach the original population numbers. Even the species considered most common and classified as being of least concern such as the South American sea lion have not completely recovered and today only 40% of the original population inhabits the Argentine Sea.

Currently the main problem for the conservation of marine biodiversity in Argentina is the fishing industry. This industry has caused the collapse of several commercially valuable species such as hake, which has seen a loss of up to 70% of its spawning population and impacted several other species via bycatch. For example, in the Argentine Sea, seabirds such as the Magellanic penguin, the black-browed albatross, the southern giant petrel and also many species of fish, some with serious conservation problems (including some rays and sharks) and others with high commercial value are sometimes accidentally caught. Argentina's shrimp fleet alone catches up to 20 tons of hake per season as bycatch (of which 78% are juveniles) that are later thrown back to sea, where they rot. Beyond the scandalous waste of resources, these large rotting organic masses consume large volumes of oxygen, generating "dead zones" when waste is repeatedly dumped into the same location.

In addition, trawling, one of the most common widely used fishing methods in Argentina destroys the seabed as the net is dragged by the vessel. Worse yet, many of these sea bottoms do not recover because the erosion is so deep that the process of recolonization of organisms is improbable and the area becomes a lifeless desert. Trawling also releases enormous amounts of carbon contained in the sea bed, contributing to the climate change crisis. In addition, the fishing industry generates up to 70% of the mass of plastics measuring over 20 centimeters floating in the oceans.

Fishing predation is especially problematic at the edge of the Zona Económica Exclusiva (Exclusive Economic Zone), with hundreds of boats fishing illegally (many of them for squid). Argentina ranks fourth in the world in the number of piracy events registered in its waters and the exclusion zone established by the British government around the Islas Malvinas contributes to intensifying predation since the state cannot exercise its supervisory role here.

On the islands that are a part of Patagonia Azul, restoration work is focused on the eradication of exotic species such as rats, rabbits, feral cats and pygmy and big hairy armadillos that affect seabird nesting colonies, either by preying on eggs, chicks and adults or by degrading the environment where they nest. PHOTO: MAGELLANIC PENGUIN COLONY IN PATAGONIA AZUL, DIEGO GONZÁLEZ ZEVALLOS.

Isla Rasa (one of Patagonia Azul's more than sixty islands) is home to 60% of the reproductive population of Argentina's South American fur seals. This island and the sea that surround it are endangered by trawling, one of the greatest threats to marine ecosystems in Argentina, and therefore must be protected. PHOTO: MAIKE FRIEDRICH.





In recent years the lack of interest with regard to the conservation of the sea slowly began to reverse: in 2014, Argentina created the system of marine national parks and in 2018 created the first two parks of this system, Yaganes and Namuncurá-Banco Burdwood II with an extension that covers 10.3% of the surface of the Argentine Sea. For the first time here, non-extractive ("no-take") areas were designated, where the extraction of natural resources, including fishing, is prohibited. Throughout the world there are numerous no-take zones that, far from harming the fishing industry, have benefited it, because it has been demonstrated that these areas become sources of fish for the surrounding areas, where the fishery resource and its exploitation increase, without compromising the existing populations. This occurs because in non extractive areas, fish are older and larger, resulting in higher egg production and larval survival which disperse to areas where fishing is permitted. In seven protected marine areas in Europe, analyses have shown that catch per unit effort in the nearby areas gradually increased by 2-4% per year over periods of up to 30 years. Argentina needs more non-extractive areas because its fishing resources are running out as a result of over-exploitation and the gravely eroded seabed environments are unable to recover due to the intensity of trawling. These non-extractive areas are especially indispensable in the coastal waters of provincial jurisdiction that are between miles zero and 12 where they are currently non-existent, because in these areas where sea and land meet, many marine species, including fish, birds and mammals, reproduce and feed.

Non-extractive reserves between the zero and 12 mile zone could be created in the following locations: the mouth of the Río de la Plata and the sea surrounding the islands of the Bahía Blanca estuary in the province of Buenos Aires; Lobos Islet in the province of Río Negro; around the Peninsula Valdés and the northern sector of Golfo San Jorge (La Reserva de Biosfera Patagonia Azul (The Patagonia Azul Biosphere Reserve)) in the province of Chubut; near the Deseado, Coyle, Santa Cruz and Gallegos estuaries' coasts and the San Julián Bay in the province of Santa Cruz; the sea adjacent to Península Mitre and Isla de los Estados and the Islas Malvinas in the province of Tierra del Fuego. Non-extractive areas should also be created beyond the 12 mile line in waters under national jurisdiction such as the area where the Brazil and Malvinas currents meet and the "blue hole" located on the continental slope (in national and international waters), both approximately across from Golfo San Jorge. In this way, thousands of square kilometers of marine reserves would be added to the existing system.

Monitoring of current and future the non-extractive zones could be carried out by incorporating remote monitoring technology such as that used by the Global Fishing Watch platform which conducts satellite tracking of all fishing boats through automatic identification systems (AIS)

> Large concentrations of whales such as the humpback whale and sei whale (pictured) are found in the Patagonia Azul Biosphere Reserve, where they feed. Reclassifying the area as a park would help the populations of these large mammals to recover. PHOTO: MAIKE FRIEDRICH.

or vessel monitoring systems (VMS). The AIS system is open access and it is used by about 50% of vessels that fish beyond the 100 mile line and 80% of vessels fishing in the high seas, and is an effective system for monitoring fishing in offshore areas. The VMS system is operated by governments and access to data is not open, which is not ideal and should be changed. Although these systems should be extended to more vessels and their operation improved (vessels can turn them off under certain conditions), they are a powerful tool for monitoring illegal fishing in non-extractive areas.

In the Patagonian Marine Corridor, Fundación Rewilding Argentina's work territory is located in the Patagonia Azul Biosphere Reserve, in the marine area off the southern coast of Chubut between Punta Tombo and Bahía Bustamante. Here we are collecting information that demonstrates the need for greater protection of the area to parlay this to decision makers with the goal of establishing non-extractive marine reserves.

In this area there are large concentrations of humpback and sei whales as well as southern right and minke whales, in seemingly lesser numbers. On the more than sixty islands and islets of the region, birds of conservation importance nest, and these include the Chubut steamer duck, Olrog's gull, southern giant petrel and Magellanic penguin. There are also marine mammal species such as the South American fur seal, with 60% of its reproductive population in Argentina on Isla Rasa. These waters are home to threatened fish such as the broadnose sevengill and school sharks, large predatory sharks that frequent the reproductive colonies of marine mammals to feed.

In terms of restoration work, on the islands we have focused on the eradication of exotic species such as rats, rabbits, feral cats, pygmy armadillos and large hairy armadillos that affect seabird nesting colonies, whether that is preying on eggs, chicks and adults or damaging the environment where the nests are located. At sea, the work is aimed at restoring algal meadows to increase the structural complexity of the seabed (and therefore its diversity) to increase the rate of atmospheric carbon sequestration. The target species is the red seaweed Gracilaria which was intensively exploited in the past to obtain agar (a gelatin thickener used for various industrial uses) and which disappeared from large areas of the seabed.

The coasts of Patagonia Azul are among the most biodiverse and have spectacular marine scenery, with magnificent kelp forests and several species of whales, Commerson's and southern dolphins, and a great diversity of birds. For these reasons we believe that its marine area is worthy of strict conservation protection and that the first projects of large-scale active restoration of the Argentine Sea should be carried out in this sector.

The waters of Patagonia Azul are home to endangered fish such as the broadnose sevengill shark (pictured) and the school shark, large predatory sharks that frequent the breeding colonies of birds and mammals. PHOTO: ALEJO IRIGOYEN / PROYECTOARRECIFE - LABORATORIO DE ECOLOGÍA DE PECES (CESIMAR-CONICET).

In Argentina, trawling is one of the most widely-used fishing methods. In trawling, vessels drag nets that destroy large areas of the seabed as they move along, most of which do not recover, creating dead zones. Trawling also releases enormous amounts of carbon contained in the seabed, exacerbating climate change. PHOTO: PACIFIC DRONE / SHUTTERSTOCK.COM





CHAPTER 19

INTERNATIONAL COOPERATION TO ENHANCE **REWILDING PROJECTS**

Chiqui is a male jaguar that joined the Iberá reintroduction project on loan for mating from the Refugio Faunístico Atinguy (Atinguy Wildlife Refuge) in Paraguay and is the father of the first cubs born in this project. PHOTO: RAFAEL ABUÍN AIDO.

"It is important if various countries across boundaries work together. That unites those countries and the boundaries become something unimportant."

Nelson Mandela

Rewilding projects are ambitious, and regardless of who initiates them (state or private organizations), their implementation will require a range of support beyond the institution that leads them. This need for inter-institutional collaboration frequently extends beyond the borders of the country where the rewilding initiative will be carried out. International assistance may take many forms, ranging from technical support to human resources training. However, there is one crucial aspect in these international collaborations: translocations of animals between countries.

Examples of international cooperation to implement rewilding projects include, among others, the world-renowned wolf reintroduction project in Yellowstone National Park in the US, where the first 31 wolves released came from Canada. Similarly, the American bison that revived their species in several reserves in Mexico came from the United States, and international cooperation efforts that allowed for the return of the elephants and wild dogs to Zimave and Gorongosa National parks in Mozambique (South Africa was the donor in both cases). The reintroduction of the Spix's macaw in Brazil will be possible thanks to individuals coming from a private hatchery in Germany, and similarly, the return of the Père David's deer (also called the milu) to China is the result of that country's collaboration with the United Kingdom, whose zoos donated the individuals. These cases highlight the importance of international cooperation to implement rewilding projects with wild or captive-sourced animals.

As is the case with different projects around the world, species reintroduction in Argentina has been supplied in part by animals that come from other countries, such as the Andean condors released by Fundación Bioandina from foreign zoos. In this same vein, several projects implemented by Fundación Rewilding Argentina depend, at times exclusively, on contributions of individuals from foreign institutions, as was the case with the reintroduction of the giant river otter, where individuals were donated by European zoos belonging to EAZA. Other examples are the red-footed tortoise reintroduction project whose individuals came from Paraguay, thanks to the Refugio de Vida Silvestre Urutaú (Urutaú Wildlife Refuge) and the decisive participation by Argentina's Ministerio de Ambiente y Desarrollo Sostenible (Ministry of the Environment and Sustainable Development). In addition, for the jaguar reintroduction project we obtained wild specimens from Brazil thanks to the collaboration of a governmental entity, el Instituto Chico Mendes para la Conservación de la Biodiversidad (The Chico Mendes Institute for the Conservation of Biodiversity), the Criadouro Científico NEX (NEX Scientific Research Center) and Onçafari.

Although the three jaguar individuals here are originally from the wild, they all come from rescue centers: two of them were orphaned and the third who was found in terrible physical condition. So far none of our projects include the capture and translocation of wild animals for rewilding initiatives. This is of particular concern for species that are extinct or nearly extinct in Argentina such as the giant river otter, the red-footed tortoise and the jaguar, but which have large populations in neighboring countries. Having animals of wild origin would reinforce genetic diversity, shorten adaptation times to the new environment, increase survival and reduce project costs, which would allow us to fund more reintroductions and scale up restoration programs. Argentina has not yet sent wild individuals to other countries for conservation projects. Initiating and maintaining this type of exchange, especially with neighboring countries, would make it possible to translocate wild specimens to reintroduce and supplement extinct and threatened species, as well as generating binacional rewilding projects in neighboring territories.

All of the red-footed tortoises for the El Impenetrable reintroduction project come from Paraguay thanks to the collaboration of the Urutaú Wildlife Refuge and the strong support of Uruguay's Ministerio de Ambiente y Desarrollo Sostenible (Ministry of Environment and Sustainable Development). PHOTO: MATÍAS REBAK.

Jatobazinho is a male jaguar from Brazil's Pantanal. He was rescued in poor condition, but was able to recover and be rehabilitated and was then sent to Argentina to be part of the project for the jaguar reintroduction project in Iberá. Brazil agreeing to ship him was a milestone in international cooperation for rewilding projects. The exemplary cooperation of Brazilian governmental and NGOs, such as the Chico Mendes Institute for Biodiversity Conservation and Onçafari made possible the first ever transfer of a released male, thereby beginning the founding population of the species in Iberá. Ideally in the future it will also be possible to capture and translocate healthy wild specimens for rewilding projects. PHOTO: MATÍAS REBAK.





The difficulty in translocating both wild and captive individuals between countries of Latin America traces back to the infrequency and/or short history of rewilding projects in the region. In recent years this trend has slowly begun to change with an increase in the countries who have projects of this type. Several of Argentina's bordering countries are implementing different rewilding projects and thereby setting the stage for future collaborations.

initiatives in Paraguay.

Fundación Rewilding Chile, offspring of Tompkins Conservation, is working on supplementing lesser rheas in Chile's Patagonia National Park in addition to conservation activities with huemuls, pumas and condors to increase their numbers. The released rheas are bred in captivity but working together in the territory occupied by the park and its nearly bordering Argentine counterpart would give the project scale, since wild rheas are plentiful on the Argentine side and individuals could be easily translocated to Chile. In exchange, Chile could contribute huemuls to reestablish the population of this species in Argentina.

Brazil has extensive experience in implementing active wildlife management projects including reintroductions of extinct species and supplementation of threatened species. The Proyecto Mico León Dorado (Golden Lion Monkey Project) has been one of the first in the world to return an extinct species to its natural habitat in a large part of its range. This project, begun in the early 1970s succeeded in increasing the population of the golden lion monkey from 200 to 3200 individuals who today live in the Atlantic Forest. A project involving various species carried out by Red REFAUNA (Refaunating Network) in Tijuca National park near Río de Janeiro reintroduced a species similar to the red-footed tortoise as well as tapir, howler monkey and Azara's agouti. Carnivores such as the jaguar, puma and maned wolf are being successfully rehabilitated and reintroduced by Onçafari in the Brazilian Pantanal and Cerrado. This organization also manages projects promoting coexistence between these predators and cattle ranching activities using nature tourism based on wildlife observation. Onçafari is the organization that rehabilitated and, with permission of the Brazilian government, sent Jatobzinho, the first male jaguar released in Iberá.

In Uruguay, rewilding is just getting started. The organization Bioparque MBopicuá is reintroducing the collared peccary, which became extinct more than 100 years ago in the country. There is also the organization Rewilding Uruguay, a new initiative whose objectives include restoring several extinct species in that country. As far as we are aware, there are no species reintroduction

The lesser rhea has scarce populations in Chile and Fundación Rewilding Chile has a project to supplement them in Chile's Patagonia Park. In Argentina there are abundant populations that could be used to repopulate environments just across the border in Chile. PHOTO: FRANCO BUCCI.

The marsh deer, the maned wolf (pictured), the collared peccary and the giant anteater have disappeared or are extremely scarce in Uruguay. Reintroduction projects could be considered for all of these species in Uruguay by translocating individuals from Argentina. PHOTO: RAFAEL ABUÍN AIDO.

Brazil and Paraguay will be key.

Regardless of the degree of development of rewilding in bordering countries, there is a clear need to scale up international collaboration in order to increase species conservation in the region. A first type of collaboration includes the translocation of individuals to avoid the loss of genetic variability in populations that are becoming isolated. For example, Argentina, Paraguay and Brazil share the Atlantic Forest or Selva Paranaense, a fractioned environment that survives only in small, isolated remnants. Some of these patches of forests are still inhabited by jaguars, but the isolation of these small populations has resulted in a process of genetic erosion. It is therefore necessary to reproduce dispersal movements through translocations of individuals between patches located in different countries. For this project to work, collaboration between Argentina, A second type of collaboration includes the donation of wild individuals between countries for

reintroduction and supplementation projects. The reintroduction and supplementation of the jaguar and the reintroduction of the giant river otter in various regions of Argentina will only have an impact if the institutions and governments of Brazil and Paraguay also participate. However, it is more likely that the maned wolf, the giant anteater and the marsh deer will return to Uruguay with the help of countries like Argentina, and that the nearly extinct population of guanacos in Paraguay's Chaco will thrive with the introduction of guanacos from other countries. The donation of animals for translocations is not the only way that international collaborations can proceed, but it is the least developed aspect. Its scarce development is the result of outdated legislation that must be overcome by the pressing conservation needs we face given the acceleration of the current environmental crisis. It is imperative that the countries of the Southern Cone adapt and develop regulations that facilitate the donation and translocation of animals, thus promoting the implementation of rewilding projects.

The European bison was reintroduced in several countries of that continent via translocation from other countries such as Poland. PHOTOS: STAFFAN WIDSTRAND / REWILDING EUROPE, HANS KOSTER / REWILDING EUROPE.

African wild dogs or African painted dogs from South Africa were released in Mozambique's Zimave and Gorongosa national parks as part of a reintroduction project. PHOTO: MATTHEW MOON / AFRICAN PARKS.





CHAPTER 20

TOWARDS A NATIONAL **REWILDING POLICY**

"In Corrientes where the giant anteater has long been a memory, a reintroduction experiment is being carried out [...] which is one of the first attempts to reestablish species lost in a region of the country. Those who leave may sometimes return, and that is an encouraging message."

State or public policies are a set of actions (or omissions) that describe the form of intervention (political, administrative and social) on behalf of the state on certain issues of public interest.

Argentina has been suffering a process of defaunation since historical times (see Chapter 3), which causes the degradation of its natural environments and the consequent worsening of environmental crises of biodiversity loss, climate change and the appearance of pandemics. The defaunation process affects even territories that we consider pristine such as the national parks and other protected areas. Reversing this process requires transparent and solid public policies.

However, despite the magnitude and extent of the defaunation process, public policies have been limited to trying to avoid the intensification of this process, but never to reverse it. Although the current policies should be continued, improved and strengthened, it is essential that the national and provincial governments develop policies that promote environmental restoration through the reintroduction or supplementation of keystone species where they have disappeared or are scarce. All existing initiatives of this type in Argentina, including those carried out by Fundación Rewilding Argentina are isolated and do not extend to a national scale.

Tania, a captive jaguar in an enclosure in El Impenetrable National Park where she was transferred to mate with the wild male Qaramta, thereby beginning the recovery of this species in the Argentine Chaco. Inter-province collaboration ceding animals and facilitating the exchange of breeding individuals is every bit as important as international collaboration. PHOTO: MATÍAS REBAK.

However, in Argentina there are public policies delineated that mention strategies that could include rewilding. General Environmental Law 25.675 stipulates in its second article that the "re-covery and improvement" of natural resources must be ensured; Article 18 the National Parks Law 22.351 speaks of the "restitution" of flora and fauna if necessary to ensure the maintenance of the integrity of the parks; and the National Parks Strategic Guidelines state that "the National Parks Administration (APN for its name in Spanish) must be proactive to restore wild flora and fauna in national parks and areas of influence" and includes among its objectives "to promote the reintroduction and translocation of species" and "to promote ecosystem restoration."

The National Parks Institutional Management Plan mentions that it will "seek the reintroduction of native taxa that have disappeared in historical times as a consequence of human activity." This cutting edge regulation for the Protection and Management of Wild Fauna in the Jurisdiction of the National Parks Administration, passed in 1998, and establishes in Article 8 that "the APN may reintroduce specimens of native species whether through translocation or captive breeding, in order to establish new, or reinforce existing populations that require it. The APN may carry out the aforementioned operations independently or through agreements with third parties, under its direct supervision."

The problem is that none of these declarations require the government to undertake action, and the initiatives for reintroduction of species in protected species under national jurisdiction are limited to isolated initiatives, with the pudú in Nahuel Huapi National Park, the guanaco and viscacha in Quebrada del Condorito National Park and the bare-faced curassow in Chaco National Park.

At the provincial level, Corrientes is developing policies that encourage rewilding and La Pampa has launched the program "El Regreso de los Nuestros" (Rightful Return). We consider these two initiatives to be the best examples of public rewilding policies because they are paired with concrete actions in Iberá (Corrientes) and in Luro and Pichimahuida (La Pampa).

In Corrientes, the government has actively supported reintroduction initiatives for the jaguar, giant otter, ocelot, pampas deer, giant anteater, red-and-green macaw and the bare-faced curassow in Iberá. In La Pampa, guanacos and viscachas have been released in many provincial protected areas and Corrientes proposes to continue with other species that have disappeared, such as the pampas deer.

Despite the magnitude and extent of the defaunation process in Argentina, public conservation policies have been limited to trying to prevent it from worsening but not to reverse it. PHOTOS: CAPTURE AND TAGGING OF GUANACOS IN SANTA CRUZ, FRANCO BUCCI / A FEMALE HUEMUL WITH HER CALF, HERNÁN POVEDANO.





Compiling regional or local red lists would help to highlight the problem of extinction or population decreases of many species in specific territories.

For example, at a national level, the guanaco is categorized as "not threatened" making it neither a priority nor urgent to implement conservation measures for this species. However, it is almost extinct in Buenos Aires, La Pampa, San Luis, Córdoba, Santiago del Estero and extinct in Chaco and Formosa. Using a national red list to address the guanaco conservation problem means that a species will never be considered a priority for population restoration (and consequently its ecological role) despite the fact that the population is 90% depleted and its distribution has shrunk by more than 50%. If red lists were developed on a provincial level, the guanaco would be extinct or in danger of extinction in most of the provinces where it inhabited or currently inhabits, which would indicate the urgent need to implement conservation measures, including reintroduction to recover its ecological role.

But how can proactive policies that result in the implementation of rewilding strategies be generated and implemented? The first step should be to officially recognize that Argentina is a defaunated country throughout its territory, including the vast majority of its protected areas, and one way of codifying this is to compile red lists of threatened species at the regional and local levels, for each province and protected area. The IUCN Red Lists are lists of species of a given region (they are developed globally and for several countries including Argentina), in which each species is assigned a conservation category (e.g. "extinct," "critically endangered," "endangered").

In Argentina there are national red lists of threatened species for almost all vertebrate groups (mammals, birds, reptiles and amphibians). The most complete list, and a good guideline for future such lists is that for mammals, created by the Sociedad Argentina para el Estudio de los Mamíferos (Argentine Society for the Study of Mammals, SAREM for its name in Spanish) and the Ministerio de Ambiente y Desarrollo Sostenible (Ministry of Environment and Sustainable Development). However, this red list of mammals is flawed, in that the distribution maps of each species include the current, but not historical distribution, which does not show the brutal loss of territory suffered by a large number of mammal species in our country. Because of the way it is developed, this red list of mammals emphasizes the conservation of the remaining populations without considering the possibility of recovering those that have been lost.

"One day in those times a large group of pampas deer was running along the plains of the northern Río Negro, when a jaguar yawned wide in the plains of La Rioja. That same day, giant otters swam in the Iberá Wetlands and towards the northwest a glaucous macaw was digging its nest in the Paraná ravines. Moments later in Tucumán, a maned wolf lowered its head to drink water from the Salí, and that night in Córdoba a giant armadillo was digging its cave to the north of Cerro Colorado and a giant anteater was frightened when dirt fell on its face."

Fidel Bascheto

The first step in developing national public policies for restoration is to officially recognize that Argentina is an extensively defaunated country, including in a majority of its protected areas. The Brazilian merganser and the blue-winged macaw are two species that have become extinct in Argentina and for which it would be ideal to develop and implement reintroduction projects. PHOTOS: AGAMI PHOTO AGENCY / SHUTTERSTOCK.COM, DANNY YE / SHUTTERSTOCK.COM

At the provincial level, we are only aware of the red list of vertebrates developed and approved by Neuquén, however this red list does not include extinct species and that must be rectified. It is important that protected areas, under both national and provincial jurisdiction also develop their red lists, because rewilding projects are developed in defined territories. Developing protected area-specific red lists is essential. Developing these lists is not complex and it can be carried out by the administration of each area, at least in the case of vertebrates. To determine the historical presence of a species in each conservation unit, the guidelines set out in Chapter 7.3 will be useful.

At the same time, the Dirección Nacional de Biodiversidad (National Biodiversity Directorate) can establish minimum budgets as required by the General Environmental Law, requiring the creation of red lists in the provinces and national parks and the reintroduction of certain species to these territories. These lists would impose necessary and uniform conditions throughout the national territory to ensure environmental protection, establishing a minimum level of species restoration that the provinces and National Parks Administration (as owners of the domain and wildlife jurisdiction) must reach, with the National Biodiversity Directorate ensuring that this takes place.

Consequently, the national government must enunciate measures that encourage and facilitate rewilding activities and even guarantee funds to the provinces for the implementation of these projects. For example, an initiative called the "Wildlife Recovery Act" introduced in the US Congress establishes minimum national budgets that the states must meet for the recovery of threatened or extinct species. The act establishes a \$1.4 billion fund for project implementation.

Returning to the aforementioned lists, these would constitute a floor established by an enforcement authority that would encourage these activities in accordance with the provision of the General Environmental Law, and never a ceiling that would restrict the restoration of species or environments. The difference may seem subtle, but the implications are vast. The prevailing spirit is that of state control through encouragement rather than restriction.

On the other hand, each jurisdiction can develop guidelines that define the minimum content of rewilding projects, which must be consistent across jurisdictions, as in general they must be approved by more than one jurisdiction. As discussed in Chapter 8, no such guidelines have been developed in any jurisdiction, which significantly complicates the presentation and analysis of projects (the basic contents and how to approach them are presented in Chapters 7 and 11).

One way to promote the development of rewilding strategies is through the creation of red lists of endangered species in specific territories, such as protected areas. This would clearly indicate which species are extinct or very scarce in these areas and are ideal for reintroduction or supplementation activities. For example, the jaguar only has healthy populations in three of Argentina's 23 national parks within its historical distribution, PHOTO: NALÁ AND TAKAJAY, TWO JAGUAR CUBS BORN AT THE REINTRODUCTION CENTER IN EL IMPENETRABLE NATIONAL PARK, PHOTO: MATÍAS REBAK.

The province of Corrientes is developing policies that promote rewilding as an ecological restoration strategy. It also considers the economy of nature model as one of the types of production existing in the province, as seen on this map prepared by the provincial government, which shows Iberá as a "nature production" region using an icon containing the head of a jaguar.



FORESTRY INDUSTRY



As highlighted in Chapter 8, these guidelines, in addition to organizing the presentation of rewilding projects, should be thought of as a stimulus to facilitate them, rather than a set of commandments which are impossible to provide or comply with. The uncertainty inherent in rewilding projects also requires flexible regulations that permit project managers to make executive decisions in the field and then report back justifying their actions, and not the other way around. It would be highly desirable that the various state agencies, particularly those that exercise jurisdiction and/ or control over the territories implement rewilding projects in order to understand the complexity of their execution and thus carry out realistic control when they are presented by third parties.

Despite the lack of specific public rewilding policies, there are regulations related to this activity, as is the case with the transport of animals, regulated by the Ministry of Environment and Sustainable Development through the National Biodiversity Directorate.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) -to which Argentina is a signatory-contemplates the international transit of wildlife specimens for reintroduction and release into the wild. However, the regulations that Argentina issued were developed under a paradigm of non-intervention, that assumes that transporting individuals of wild species threatens their conservation. For example, the import of wild animals into Argentina must be conducted through Ezeiza International Airport due to an allegedly greater capacity to control entry to the country, despite the fact that the National Biodiversity Directorate does not have a delegation at this or any other entry point; in other words, to import an animal or a group of animals from Foz do Iguaçu in Brazil for a conservation project in Iberá (Corrientes), which borders it, (as we have done with bare-faced curassows and tapirs), we would have to transport the animal to Ezeiza, and after completing the import formalities, take it back to Corrientes, which increases the transport distance by thousands of kilometers.

In order to not overly stress the animal, an exception must be requested, the decision on which takes months. Similarly, interprovincial transport and export of endangered species is prohibited, so an exception is also necessary for this. In short, rewilding projects must apply for numerous exceptions for translocation, because the regulations are designed to prevent the active management of wildlife. These regulations and various similar ones should be repealed and replaced by others that facilitate and encourage transportation for conservation purposes.

The Servicio Nacional de Sanidad Animal (National Animal Health Service, SENASA for its name in Spanish) regulates the sanitary aspects of interjurisdictional wildlife transport, and unlike the environmental authority, these regulations for international transport are developed with the idea of regulating, but not prohibiting (as occurs with the sanitary requirements for the importation of jaguars, tapirs or giant otters). Regardless, it would be ideal to change quarantine regulations for the translocation of animals of wild origin, since these norms often require extended confinement in small spaces that are only well tolerated by animals from captivity. Progress could also be made in the analysis of sanitary status of the areas of origin and destination as proposed in Chapter 11.4, as is generally done for domestic livestock, rather than pathogen testing each individual. These analyses can be used in cases where the distribution of the pathogen is unknown.

For those NGOS that plan rewilding activities but who have limited access to financing, perhaps a patronage model for environmental matters—which does not currently exist in Argentina—could be implemented. The current legal vacuum discourages the financing of rewilding projects by individuals and companies, further weakening the development of environmental philanthropy, which is almost non-existent in Argentina.

The lack of public policies and the obsolete regulations governing the movement of wildlife at the national and international level hinder the development of ecological restoration activities, including rewilding, which currently must be carried out by seeking exceptions. Argentina must once again lead the conservation movement in Latin America as it did with the establishment of its first national parks, by now adopting policies that promote the return of ecosystems' keystone species in order to restore them through innovative strategies such as rewilding.

It is also important to define the sanitary requirements for the importation of some species, since not having these impede their importation, as is the case of peccaries or birds of wild origin. In addition, in contrast to the case for international transport, SENASA has not established regulations for interprovincial transport for individuals of wild species. This has resulted in the sanitary management contained in each rewilding project we present becoming the norm to be observed, when ideally SENASA would set out the basic requirements itself. In order to move forward with regulations, it would also be ideal, for the purposes of international transport, to align the sanitary status of the province or origin and destination as mentioned in the previous paragraph.

Public policies should also encourage the involvement of private organizations and NGOs in the implementation of rewilding projects, something that can be achieved through the economy of nature model (see Chapter 5). One concrete example is the province of Corrientes, which presents the economy of nature as one of the money-making activities developed in its territory. Formalizing this recognition is important so that those who participate in it can access lines of credit meant to stimulate production, which are available for other productive activities. For privately-owned properties that are part of the economy of nature model, it would be ideal to find a legal status that encourages and guarantees the long-term development of this type of enterprise, such as the status of conservancy in Africa described in Chapter 15.

"I believe it is not too late to recover a significant proportion of the species that have been lost (in Tucumán). There is little hope of bringing back a controversial species like the jaguar, but vicuñas can be reintroduced in the mountains of the province and the tapir in its jungles. Monkeys can be returned to the forests they inhabited until recently. Similarly, the pampas deer should not be difficult to reintroduce."

Michael Mares

This map shows the areas where some birds and mammals were present in Argentina. Their presence on the map represents history but it can also be our future. Argentina must once again lead the conservation movement in Latin America as we once did with the establishment of national parks, this time pushing public policies that promote the return of keystone species to natural ecosystems through innovative strategies such as rewilding.





EPILOGUE

PHOTO: RAFAEL ABUÍN AIDO

More than 30 years have passed since my husband Doug and I decided to dedicate our lives to conservation and the restoration of nature. In 1990, Doug retired from Esprit, the clothing company that he had co-founded, leaving global capitalism to become a dedicated conservationist. This next mission would be what he called "paying our rent on earth" which included helping the planet to recover, species by species and environment by environment. Shortly thereafter, I myself quit my job as CEO from the company Patagonia to join Doug in the far south of South America.

In the beginning we worked to create large national parks in Chile and Argentina with the mission to save the incredible different regional landscapes of these countries, overflowing with nature. To date, we have helped to protect more than six million hectares of the earth through the creation or expansion of fifteen national parks in these countries, an area greater than the surface of Costa Rica. Over time, we realized that protecting the earth was not sufficient; we learned that ecosystems depended on all of their species being healthy and functional. In some places, as in Iberá wetlands, the number of native species that had disappeared was overwhelming. When we arrived there in 1997, practically no one was aware of these losses, and bringing it to light was a necessary first step to bring back the missing species and make this wetland functional again.

In our case, the commitment to the work of rewilding began in the 1990s with the recognition that we humans are inextricably connected with the entire natural world. When nature prospers, so do we. As recounted in the early chapters of this book, we united with prestigious scientists, who above all, were people with a commitment to social causes and respect for all forms of life. With those scientists and a large group of thinkers, activists and communicators, we formed what would be known as the Wildlands Project. It was a source of pride and joy for Doug, who funded it from the start. It was here that the foundations were laid for the concept of rewilding as a strategy to restore ecosystem functionality, paying special attention to the ecological roles of species higher up the food chain, such as apex predators. This novel concept would allow conservationists and consultants to achieve far more ambitious and strategic goals than those set prior to The Wildlands Projects elucidating its own ideas.

This is how rewilding began to emerge as a strategy aimed at revolutionizing the way we think about nature conservation. Rewilding involves a shift towards more active conservation practices, among which translocation of keystone species for reintroduction or supplementation plays a very important role. We must continue to expand protection in all corners of the globe, but we should go a step further and recover what we have destroyed. In this sense, rewilding puts to the test and improves tools already in existence such the Red List of endangered species, since recovering ecological roles often means recovering species that are not necessarily threatened at a global or national level. Rewilding has also demonstrated that many areas that we consider pristine or in a good state of conservation (including many national parks)

are actually depleted of their keystone species, and therefore are degraded to a lesser or greater degree. Thus, rewilding questions traditional ways of evaluating the effectiveness of protected area management, which focus more on the types of actions that take to manage them than the integrity of their ecosystems. It even questions the much-needed 30x30 movement which seeks to protect 30% of the planet by 2030: do we want that 30% to have legal protection but lack most of the keystone species from their ecosystems? The proactive conservation agenda proposed by rewilding generates hope and inspiration for the conservation movement. Above all, rewilding implies changing the way we relate to nature and learning to coexist with species that require large territories and even compete with us. It forces us to be more dedicated and make more concessions, emphasizing the need to understand that all species have the right to live on this planet. The reconstruction that rewilding proposes not only delegates conservation to public institutions, but also incorporates private landowners or community lands in this conservation strategy, especially through nature tourism activities connected to wildlife observation, helping communities to build a prosperous, long-term future through nature-based economies. Finally, rewilding is a natural solution to address the serious environmental crises of our planet, including the loss of biodiversity, climate change and the emergence of pandemics, all of which are related to ecosystem degradation and the loss of keystone species.

After 30 years of working in conservation, my own motivation remains as strong as ever. I have been fortunate to have first-hand experience of connecting to nature in tangible ways, such as bottle-feeding orphaned giant anteater cubs, in the hope that they become strong enough to join those already released in the Iberá wetlands. They deserve a wild future. Doug and I are very proud to have built local teams like that at Fundación Rewilding Argentina, who are so committed to restoring nature, that continue to build upon our work and values. They are our great legacy. There is no feeling greater than being part of those teams whose daily efforts translate in the return of jaguars and red-and-green macaws to Iberá and to the return of a myriad of species to the diverse ecosystems in which we work in Argentina.

Rewilding is, without a doubt, a necessary change to recover natural and cultural diversity, but also to better our own health. It represents the hope of creating large-scale rewilding initiatives that the world needs more every day. So timely and urgent are Doug's words at the beginning of this book, "Are you ready to do your part? Everyone is capable of taking up their position to use their energy, political influence, financial or other resources and talents of all kinds to be part of a global movement for ecological and cultural health. All will be useful. There is important and meaningful work to be done. To change everything, everyone is needed. All are welcome."

> Kristine Tompkins President and co-founder of Tompkins Conservation, UN Patron of Protected Areas

FUNDACIÓN REWILDING ARGENTINA

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The Foundation's board of directors together with Kris Tompkins in Ventura, California. The Fundación Rewilding Argentina board members are: Sofía Heinonen, Sebastián Di Martino, Laura Fernández, Emiliano Donadio and Lucila Masera.





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Palavecino.





The Proyecto Iberá team during a training day at El Impenetrable, Chaco. PHOTO: RAFA ABUÍN AIDO. Proyecto Iberá's members are: Marisi López, Pascual Pérez, Federico Fernández, Pedro Leiva, Donato Fernández, Juan Aguirre, Talía Zamboni, Gustavo Solís, Juan Pablo Vallejos, Ana Carolina Rosas, Valentina Ellis, Sebastián Navajas, Marcos Etchepareborda, Gabriel Piaggio, Federico Pontón, Hernán Aguirre, Alicia Delgado, Giselda Fernández, Rogelio Fernández, Elena Martín, Bábara Pantanalli, Nicolás Carro, Magalí Longo, Matías Grecco, Pablo Guerra, Pablo Cabrera, Héctor Ortiz, Nino Acevedo, Carlos Pucheta, Víctor Sotelo, Alejandro Welschen, Marianela Masat, Sofía Salazar, Elba Echeverría, Helen Pargeter, Fabián Yablonski, Juan Cruz Minvielle and Augusto Distel.

El Teuco. PHOTO: MATÍAS REBAK. The El Impenetrable team: Pedro Núñez, Gerardo Cerón, Alejandro Serrano, Nicolás Muñoz, Leandro Lencina, Débora Abregú, José Caride, Rogelio Soraire, Darío Soraire, Julio Soraire, Andrés Montes, Chinchi Barrientos, Fátima Hollmann, Constanza Mozzoni, Alejandro Aquino, Guadalupe Molinaro, Zulma Argarañaz and Raúl

Part of the El Impenetrable Project at the Estación de Campo Part of the Patagonia Azul project navigating the waters of Camarones, Chubut. PHOTO: MAIKE FRIEDRICH. The Patagonia Azul Project team: Diana Friedrich, Rodrigo Fracalossi, Alejandro Dumond, Rafael Carinao, Javier Antual, Maike Friedrich, Carolina Pantano, Lucas Beltramino, Matías Di Martino, Gastón Malasecheverría, Julio Malasecheverría and Miriam Policelli.

Sin Azul No Hay Verde (Without Blue There is no Green)'s team: Martina Sasso, Ángeles de la Peña, Maia Gutiérrez Bustamante, Lara Gutiérrez Bustamante, Sofía Pianciola, David López Kats, Ana Gandino and Natalia Milovic.



Part of the Proyecto Patagonia in Tierra de Colores, Portal Cañadón Pinturas. PHOTO: FRANCO BUCCI. The Proyecto Patagonia team: Mauro Prati, Héctor Arreola, Lucas Rodríguez, Emanuel Galetto, Franco Bucci, Federico Castro, Matías Chambón, Rocío Navarro and Matías Serrano Humphreys.



Juliana García and Leandro Vázquez are part of the team of Proyecto Aconquija.



REWILDING IN ARGENTINA

Sebastián Di Martino; Sofía Heinonen; Emiliano Donadío, 2022

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