4 RETURNS FROM LANDSCAPE RESTORATION

A systemic and practical approach to restore degraded landscapes

COMMONLAND PUBLICATION

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SUMMARY

Why is it so important to restore degraded landscapes? It's actually very simple. We rely on healthy ecosystems to provide us with our food, water, clean air, climate stability, social and economic wealth; even our happiness and well-being. We only have to look at history to see the devastating consequences of not valuing or understanding ecosystems: whole civilizations have vanished after overexploiting their natural resources.

Fortunately however, there are also civilizations who have learned to develop a symbiotic relationship with nature – and thrived – by restoring instead of destroying. Rapid global population growth in the last two centuries has caused the depletion of one quarter of the land surface on Earth as its natural resources have been used to support the unprecedented demand for sustaining human life and advances in technology. However, the scale and speed at which change has been inflicted on the environment since the 1950s is the most profound in the history of humankind; a phenomenon leading scientists call the Great Acceleration.

Many of the services nature provides humankind – so-called ecosystem services – are free of charge and therefore form no part of our current economy that is based on manufactured capital. This comes at the price of: the massive loss of biodiversity, soil erosion and degraded landscapes. As shown historically, human life depends on ecosystems services. As business and ecosystems are inextricably linked, landscape conservation and restoration should be key to our economy. Yet interventions to date focus only on impact reduction. It's time for a new approach.

Slowly but surely the world's leaders are beginning to realize that restoring ecosystem functions restores the economy. In fact, restoration is vital to reversing the depletion of natural capital: an approach that has thus far been underutilized and underfunded. However, we urgently need the power of the private sector in order to scale-up and accelerate landscape restoration. We need new business models and operations, and a shift to long-term thinking if this industry is to become a viable investment proposition.

The science is in place, the technology available, and financial resources accessible: the time is ripe to create a landscape restoration industry. But for it to succeed, there must be greater involvement by business and investors, an orchestrator for all the different stakeholders – and a realistic long-term approach. Commonland aims to build trust and connections, create engagement, and keep key partners inspired to harvest the results of their investments over the long-term.

“I recognize the right and duty of this generation to develop and use the natural resources of our land; but I do not recognize the right to waste them, or to rob, by wasteful use, the generations that come after us. I ask nothing of the nation except that it so behaves as each farmer here behaves with reference to his own children. That farmer is a poor creature who skins the land and leaves it worthless to his children. The farmer is a good farmer who, having enabled the land to support himself and to provide for the education of his children, leaves it to them a little better than he found it himself. I believe the same thing of a nation.”

— THEODORE ROOSEVELT IN THE NEW NATIONALISM SPEECH, 1910

01 INTRODUCTION: ECOSYSTEMS

The missing link in our economy

Throughout history, societies have struggled with environmental constraints. The sharp increase in human population triggered by the industrial revolution also increased the scale of human impact on Earth and created a negative by-product: large-scale landscape degradation, caused by an economy that does not properly restock its key assets: the ecosystem functions it depends upon. The question is: how to make the restoration of ecosystem functions and biodiversity a flourishing part of our economy and move from the current degradation economy to a restoration economy.

1.1 LAND DEGRADATION IN ANCIENT SOCIETIES

Most of the millions of tourists visiting the ancient Maya ruins in the Yucatán Peninsula of Mexico and Central America probably don't realize that they are visiting historical land degradation sites (Figure 1). Over a thousand years ago, the highly developed civilization almost vanished, one reason being that agriculture failed to meet the growing demand for food. This forced farmers to start cultivating steeper slopes resulting in deforestation and hillside erosion, which caused a further decrease in useable farmland at a time when more farmland was needed. Food shortages in combination with droughts triggered civil conflicts between various Maya cities. The region had seen droughts before, but at earlier times there were still uninhabited parts where people could relocate to. The Maya kings and nobles governing the region apparently failed to recognize and solve these seemingly obvious problems undermining their society. Their civilization nearly disappeared around 900 AD and was taken over by the jungle only to be rediscovered in 1839.

FIGURE 1
THE RUINS OF THE MAYAN TEMPLES ARE ALL THAT REMAIN OF A SOCIETY THAT COLLAPSED DUE TO OVEREXPLOITATION OF THE NATURAL SYSTEM.

"We cannot choose between (economic) growth and sustainability – we must have both."

— PAUL POLMAN, CEO UNILEVER

EASTER ISLAND (RAPA NUI)

Easter Island (Rapa Nui) in the Pacific Ocean with its iconic four-meter-high statues provides another example of historic land degradation (Figure 2). Organizing the carving, transport and erection of these statues required a complex, populous society – and an environment rich enough to support it. One, according to archealogists, that could provide the necessary materials to do this, such as timber and rope. Yet when the first Europeans visited the island in 1722, the population was between 2,000-3,000 people and the island was barren. Human impact on the fragile island ecosystem at the highest risk of degradation brought an end to the transport and erection of the statues. Although not all scientists agree, the 'communis opinio' is that deforestation, in combination with invasive species like the Polynesian rat which competed for food, had immediate consequences for the islanders: the loss of raw materials and wild-caught foods, a decreased crop yield, and an induced lack of large timber and rope. The people could not move away: the nearest lands to Easter Island are the coast of Chile (2,300 miles to the east) and the Pitcairn Islands (1,300 miles to the west). It is widely believed that this isolation makes Easter Island a very obvious example of a society that was destroyed by invasive species, imported diseases and overexploiting its own resources.

There are societies that have utilized their natural resources more effectively. Paradoxically, the almost completely deforested arctic island of Iceland is an example of how people can reverse degradation by changing to a more effective land management system. At the time the Vikings settled on Iceland circa 870 AD, one quarter of the island was forested. The settlers quickly cleared the trees for pastures, wood, timber and charcoal. About 80% was cleared within the first few decades, leaving only 1% forested today. Particularly attractive for creating pastures were Iceland's highlands above the treeline, supporting natural grasslands on fertile shallow soils.

FIGURE 2
ORGANIZING THE CARVING, TRANSPORT AND ERECTION OF THE FAMOUS EASTER ISLAND STATUES REQUIRED A SOCIETY MORE COMPLEX AND AN ENVIRONMENT MUCH RICHER THAN THE FEW THOUSAND PEOPLE ON THE BARREN ISLAND THE FIRST EUROPEANS ENCOUNTERED IN 1722.

But the highlands were fragile. About six centuries ago, the Icelanders realized that overgrazing on their grass-covered highlands was leading to extensive erosion of the inherently thin soils. Rather than lose the grasslands and face economic decline, farmers joined together to determine how many sheep the highlands could sustain and then allocated quotas among themselves, thus preserving their grasslands.

Their wool production and woolen goods industry continue to thrive today. Deforestation was eventually replaced by reforestation. Since 1955, forestry laws have banned clear-cutting of the low-growing native forests, and land reclamation and afforestation programs have led to the establishment of new woodlands (BOX 1).

BOX 1

REFORESTATION OF ICELAND

Iceland's last remaining forestlands started to increase again in the first two decades of the 20th century. It were mainly groups of intellectuals and businessmen that took the initiative. The government did not really become involved until the 1950s, when it became much more active in terms of legislation, research and financial support. By adding a forest tax to cigarettes during the 1960s and part of the 1970s, the government was able to support the tree-planting activities of both the private forest societies and farmers.

In the 1980s and 1990s government activities expanded rapidly, with erosion control and recreation as the main objectives. From 1980 to 1996, the Icelandic state budget for forestry increased with a factor 5 to from USD 880,000 to USD 4,227,000, mainly because of support to farmers' forestation programs.

In addition, private investors, local communities, forest societies and other entities spent approximately USD 4 million on forestation in 1996. The increase in woodlands has not occurred without conflict with livestock farmers. More and more of the former grazing lands have been fenced up, allowing both natural regeneration of birch and plantations of this and other species.

Such stories can be found all over the world. Humanity has struggled with environmental constraints throughout history. But no matter how disruptive the land degradation was for the Maya and Rapa Nui civilizations, the impact was limited to their regions or islands only. The same goes for other historic civilizations; for example, the Sumerians in Mesopotamia whose decline for a great part is explained by the degradation of agricultural soils due to salinization. The water supplied by their irrigation system left salts behind in the soils, reducing yields over time. As land productivity declined, so did the civilization.

Land degradation has generally increased with human population. But as long as the human population stayed relatively low on a global scale, the overall impact on the Earth also remained small.

"Most floods are caused by man, not weather; deforestation, levee construction, erosion, and overgrazing all result in the loss of ecosystem services."

— PAUL HAWKEN, AUTHOR THE ECOLOGY OF COMMERCE

The larger parts of the globe were unimpacted, leaving room for degraded sites to restore. This resulted in what we can call a global mosaic landscape: large parts of natural unimpacted lands and smaller inclusions of lands in various phases of degradation due to mismanagement of its inhabitants (BOX 2).

BOX 2

FROM HUNTING AND GATHERING TO SLASH AND BURN AGRICULTURE

About 12,000 years ago the very first farmers started to grow crops in the river valleys of Mesopotamia and Egypt. Some of them could easily plant their crops in open fields along river valleys, but others had forests, blocking their farming land. They cut down the vegetation, set fire to the remaining foliage, and used the ashes as fertilizer for their crops. The cleared area is used for a relatively short period of time, and then left alone for a longer period of time so that vegetation can grow again. For this reason, this type of agriculture is also known as shifting cultivation. Today, between 200 and 500 million people, or up to 7% of the world's population, use slash and burn agriculture. These regions include central Africa, northern South America, and Southeast Asia, and typically within grasslands and rainforests. But in the 21st century there is less space to move around therefore slash and burn agriculture contributes to deforestation, erosion, nutrient loss and biodiversity loss. With good knowledge of the ecosystem of the area and better agricultural skills the impact can be reduced as in slash and char agriculture. This is the practice of charring the biomass resulting from the slashing, instead of burning it as in the slash and burn practice.

1.2 THE NINE BOUNDARIES OF OUR PLANET

Since 1800, the global population has risen from roughly one billion to seven billion in 2011; and a projected nine billion by 2050. Scientists consider that population growth is a result of the Industrial Revolution, availability of cheap energy (oil, coal), an increase in agricultural production due to the development of chemical fertilizers and pesticides, and the increase of medicines and medical health care.

These combined supplied the power, technology and food to feed those extra mouths. In the 20th century, this accelerated; a phenomenon sometimes called the Great Acceleration, referring to the sharp increase in human population, economic activity, resource use, transport, communication, knowledge, science and technology that was triggered in many parts of the world (BOX 3).

BOX 3

THE GREAT ACCELERATION OF INDUSTRY, HEALTH CARE AND AGRICULTURE

In the second half of the 20th century the growth in population, consumption and the availability of cheap energy and liberalized economies accelerated. The International Geosphere Biosphere Program (IGBP) simplified the complex data collected in numerous studies to a dashboard of 24 graphs with socio-economic and Earth System trends from 1750 to present. They all showed a hockey stick curve.

The synchronous acceleration of these indicators from the 1950s to the present day is known as the Great Acceleration. The Great Acceleration graphs have now been updated to 2010. The dominant feature of the socio-economic trends is that the economic activity of the human enterprise continues to grow at a rapid rate. In this way the Earth System is crossing thresholds as presented in a similarly concised way by the Planetary Boundaries Concept that was published by the Stockholm Resilience Centre in 2009. The planetary boundaries identify nine global priorities relating to human-induced changes to the environment. Science shows that these nine processes and systems regulate the stability and resilience of the Earth System (see BOX 6).

The rate of degradation has increased dramatically with the growth of the human population and technology. More land was converted to cropland in the 30 years after 1950 than in the 150 years between 1700 and 1850. The increase in scale and impact is apparent by the Dust Bowl that hit the great plains of the United States in the 1930s, leading to the famous statement of President Franklin Delano Roosevelt made in 1937: "A nation that destroys its soil, destroys itself" (BOX 4).

BOX 4

THE DUST BOWL IN THE UNITED STATES

Stimulated by the government to cultivate marginal lands, waves of European settlers arrived in the American Great Plains in the beginning of the 20th century. The combined effects of the Russian revolution and World War I increased the price, encouraging farmers to dramatically increase cultivation without sufficient understanding of the ecology of the plains. Extensive deep ploughing of the virgin topsoil displaced the native, deep-rooted grasses that normally trapped soil and moisture even during periods of drought and high winds. The rapid mechanization of farm equipment accelerated this process.

As the droughts of the early 1930s deepened, the farmers kept ploughing and planting but nothing would grow while huge dust storms emerged. Only in the fall of 1939, after nearly a decade of dirt and dust, the drought ended when regular rainfall finally returned to the region. 400,000 km^2 in mainly Texas and Oklahoma was affected. In this period soil conservation measures were introduced as part of president Roosevelt's New Deal. Since the 1940s production went up again, relying heavily on irrigation. But droughts are persistent and are expected to intensify in the foreseeable future. Climate change has brought less rain as well as hotter temperatures that increase evaporation—forcing farmers to use even more water for irrigation. Techniques such as dry-land farming, rotating crops and using waste as biofuel are of increasing importance, as are other sounder management and development policies.

Toward the end of the 20th century, there were signs that the Great Acceleration could not continue in its present form without increasing the risk of crossing thresholds and triggering abrupt changes. Many of the services nature is providing mankind (often called: ecosystem services) are free of charge and form no part of our economy.

However, those services upon which human wellbeing depends are degrading, with possible rapid changes when thresholds are crossed. In 2002, the Nobel Prize-winning atmospheric chemist Paul Crutzen proposed the concept of the Anthropocene, instead of the present geological time period in which we are living (the Holocene), to denote the current interval of time on Earth in which many key processes are dominated by human influence.

The word quickly entered scientific literature as an expression of the degree of environmental change on Earth caused by humans (BOX 5).

"The success of an intervention depends on the interior condition of the intervenor."

— WILLIAM O'BRIEN, FORMER CEO HANOVER INSURANCE GROUP

BOX 5

MANKIND ENTERED A NEW ERA: THE ANTHROPOCENE

Since the industrial revolution in 1750 humans have grown into a global force to be reckoned with. The notion that we have entered a new epoch that should be known as the Anthropocene was first suggested in 2000 by Nobel prize winner Paul Crutzen and Eugene Stoermer of International Geosphere Biosphere Program (IGBP). They argued that Earth had recently crossed a threshold into a new epoch, the Anthropocene.

Their arguments include:

- In the last 150 years humankind has exhausted 40% of the known oil reserves that took several hundred million years to generate;
- Nearly 50% of the land surface has been transformed by direct human action, with significant consequences for biodiversity, nutrient cycling, soil structure, soil biology, and climate;
- More nitrogen is now fixed synthetically for fertilizers and through fossil fuel combustion than is fixed naturally in all terrestrial ecosystems;
- More than half of all accessible freshwater is appropriated for human purposes, and underground water resources are being depleted rapidly in many areas.

Scientists at the Stockholm Resilience Centre have defined the thresholds for ecosystem services to still be functional as the nine planetary boundaries. The planetary boundaries framework scientifically defines a safe operating space for humanity.

This concept serves to provide us with a physical and biological basis for understanding how the world's different global environmental threats interconnect. The relationship between the environmental ceiling of each of the nine planetary boundaries, as well as the eleven dimensions of human wellbeing as identified on the governments' priorities at the United Nations Conference on Sustainable Development in Rio de Janeiro in 2012 (Rio+20), is shown in Figure 3.

The conclusion we can draw from this is: given the interconnectedness of global environmental issues, one issue cannot be resolved without at least some understanding of how it interacts with the other issues.

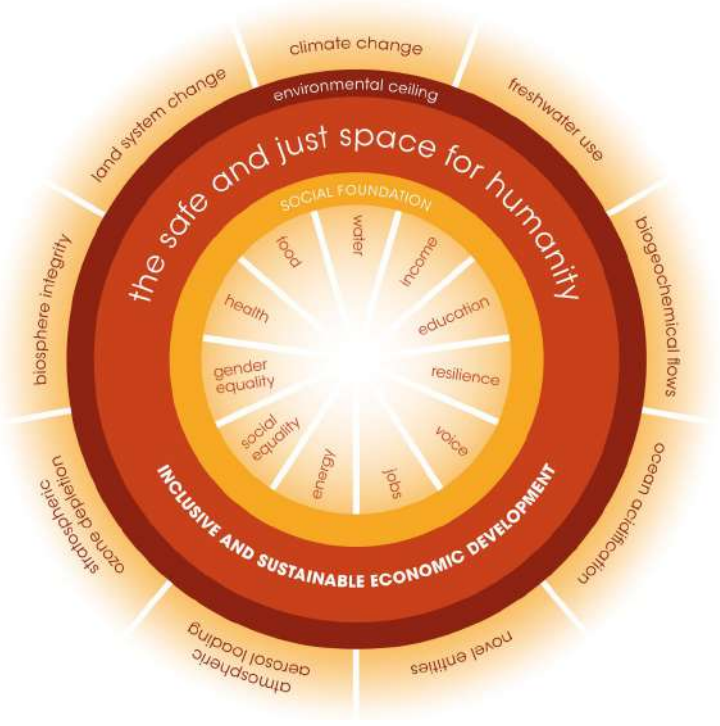


FIGURE 3
THE PLANETARY BOUNDARIES FRAMEWORK SCIENTIFICALLY DEFINES A SAFE OPERATING SPACE FOR HUMANITY ACCORDING TO THE STOCKHOLM RESILIENCE CENTRE AND OXFAM. WE HAVE ALREADY CROSSED THE BOUNDARIES OF BIOSPHERE INTEGRITY (GENETIC LEVEL) AND BIOCHEMICAL FLOWS.

“The most meaningful indicator for the health of the land, and the long-term wealth of a nation, is whether soil is being formed or lost. If soil is being lost, so too is the economic and ecological foundation on which production and conservation are based.”

— CHRISTINE JONES, AUSTRALIAN SOIL SCIENTIST (IN CREATING TOPSOIL, 2006)

1.3 THE ECONOMY OF ECOSYSTEMS AND BIODIVERSITY

The economic success of man creates a negative by-product: the massive loss of species (biodiversity) in a degraded landscape. But as in historic times, our wellbeing still depends—to a large extent—on the availability of natural capital: the ecosystem services providing the natural resources to our economy.

They form the basis of all wealth creation. These primary assets should not be destroyed as has happened in the Mayan and Easter Island civilizations. As taught by the Icelanders, who prevented a collapse of their economy by deciding to manage their cattle differently, conserving and restoring ecosystem functions is a key economic activity. In our approach, we consider restoring ecosystem functions a component of landscape restoration; the holistic term used to describe the process of restoring the ecological functions of a landscape and revitalizing the social and economic functions.

Both of which result in increased commitment and inspiration. The term ecosystem restoration is more limited to the recovery of the biotic and abiotic processes in the ecosystem (BOX 6 and BOX 7).

BOX 6

LANDSCAPES AND ECOSYSTEMS

Landscape restoration and ecosystem restoration are often used as synonyms. A most cited definition of the International Union for Nature Conservation (IUCN) and the Global Partnership on Forest and Landscape Restoration (GPFLR) is: "Turning barren or degraded areas of land into healthy, fertile, working landscapes where local communities, ecosystems and other stakeholders can cohabit, sustainably" (UCN, GPFLR, 2013). We regard landscape restoration as a holistic term. It describes the process to restore the ecological functions of a landscape and revitalize the social and economic functions. This results in increased commitment and inspiration. The term ecosystem restoration is more limited to recovery of the biotic and abiotic processes in the ecosystem.

Other key terms are:
Landscape: Geographical construct that includes not only the biophysical components of an area but also social, political, psychological and other components of that system (Sayer et al, 2007:2679).
Land degradation: The reduction in the capacity of the land to provide ecosystem goods and services and assure its functions over a period of time for the beneficiaries of these (Food and Agriculture Organization of the United Nations).
Mosaic landscape: Multifunctional landscapes consisting of different components which together form a patchwork. This concept reflects the complexity and dynamics as well as the uniqueness of each landscape (McCracken and Gilmour, 2008).
Landscape approach: Managing complex landscapes in an integrated fashion, in a holistic fashion, incorporating all the different land uses within those landscapes in a single management process (Center for International Forestry Research).
Ecosystem functions: The physical, chemical, and biological processes or attributes that contribute to the self-maintenance of the ecosystem; in other words, what the ecosystem does. Some examples of ecosystem functions are wildlife habitat, carbon cycling, or trapping nutrients (Ecosystemvaluation.org).
Ecosystem services: The beneficial outcomes, for the natural environment, or for people, that result from ecosystem functions. Some examples of ecosystem services are support of the food chain, harvesting of animals or plants, clean water, or scenic views. In order for an ecosystem to provide services to humans, some interaction with, or at least some appreciation by, humans is required (Ecosystemvaluation.org).

"To halt the decline of an ecosystem, it is necessary to think like an ecosystem."

— DOUGLAS P. WHEELER, LAWYER

BOX 7

RESTORATION TERMS

Afforestation: Artificial establishment of forest on lands that were not historically forest (Intergovernmental Panel on Climate Change, 2000).

Reforestation: Artificial establishment of forest on lands that were historically forest (Intergovernmental Panel on Climate Change, 2000).

Reclamation: Replacing the natural vegetation with adapted vegetation types (Bradshaw, 1987).

Regeneration: The act of renewing tree cover by establishing young trees naturally or artificially. Regeneration usually maintains the same forest type and is done promptly after the previous stand or forest was removed (Dictionary of forestry).

Rehabilitation: The action of restoring a thing to a previous condition or status (Bradshaw, 1996).

Given this premise: it makes no sense to degrade and destroy your primary asset in an effort to make money in the short-term. Logically speaking, one would do everything possible to either save or conserve the asset's value or improve its condition; subsequent worth; and continued productivity.

To provide an analogy, one would assume a factory owner would frown upon the suggestion that a sound business decision would be to sacrifice his or her production equipment for the sake of the product being made. But this is precisely what is occurring with our current management of ecosystems: natural capital stocks are being sacrificed for the sake of what they produce.

Among most scientists, and increasingly among members of the business community, it is widely accepted that healthy ecosystems form the basis of a sound and sustainable economy.

Recent global initiatives such as The Economics of Ecosystems and Biodiversity (TEEB, BOX 8) and the Economics of Land Degradation (ELD) of the German International Cooperation (GIZ) are drawing attention to the costs of sustainable land use and the economic benefits of biodiversity—including the growing cost of biodiversity loss and ecosystem degradation. These costs are difficult to assess but huge. Hundreds of scientists and business people who participated in the TEEB studies estimated this loss to be between USD 21-72 trillion per year. Put into context: that's about 25-85% of the Gross World Product in 2008 (USD 84.97 trillion).

BOX 8

THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY CREATED BUSINESS AWARENESS

The Economics of Ecosystems and Biodiversity (TEEB) is a global initiative with the objective to highlight the growing cost of biodiversity loss and ecosystem degradation. In 2010 TEEB reports were published showing the fundamental aspects and how policy makers and business can make biodiversity and ecosystem inclusive decisions. Follow up studies are being published for relevant economic sectors and at specific country levels. The TEEB studies were instrumental for business people and economists to understand the impact of ecosystem degradation on the economy. Today many national TEEB studies are executed.

Another 2014 study by leading ecological economist Robert Costanza and his co-researchers estimates that USD 4.3-20.2 trillion is lost annually due to the conversion of ecosystems; about 5-25% of the Gross World Product. The variation in these estimates shows the difficulty in producing hard figures. But the overall trend is clear.

TEEB concludes that the restoration and conservation of ecosystems is no longer an issue to be tackled solely by scientists, Non-Governmental Organizations (NGOs) and other charitable organizations—or by donor-funded development projects (the so-called Public-Private Partnerships).

Restoring and conserving ecosystem functionality forms the core of the global economy and is one of the most important issues to be addressed in the 21st century.

1.4 ENVIRONMENTAL POLICIES LIMITED TO REDUCING IMPACTS

To date, landscape restoration has been too marginal an activity. The focus of roughly half-a-century of environmental policy has been on reducing impacts. Moreover, legislation has seen the light; setting aside an increasing number of protected areas on land and in the sea.

In a growing number of countries, the compulsory Environmental Impact Assessment obliges land developers to limit and compensate for ecosystem damage. The Clean Water Act from the USA dates back to 1972 and introduced no net loss principles for wetlands: wetlands destroyed at one place should be compensated for by restoring them at another place. A known example is habitat banking (BOX 9).

BOX 9

HABITAT BANKING

Habitat banking is based on the same philosophy as carbon trading. In habitat banking landowners are encouraged to restore degraded land or protect natural lands. They receive credits in return. The amount depends on the size and biodiversity value of the area. The landowner is permitted to sell these credits to companies or developers that have destroyed natural lands. In habitat banking laws they have a legal requirement to compensate the environmental impacts of their development projects in the region or elsewhere. They can do this through buying credits, enabling the restoration in other places. This leads to zero sum degradation developments. Although big in the US, habitat banking's global reach is nowhere near the size of carbon offsets. Potential for schemes is particularly high in Central and South America, although concerns remain over monitoring and proving how effective projects really are.

On a global scale, the United Nations Convention to Combat Desertification (UNCCD) in 1992 was an important milestone—as are the inspiring examples set by countries like Rwanda (BOX 10), El Salvador (BOX 11) and Ethiopia (BOX 12). The leaders of these countries increasingly understand that restoring ecosystem functions restores the economy.

BOX 10

RWANDA: RESTORING WETLANDS AND HYDROPOWER

Rwanda has pledged to restore two million hectares, or 75% of its total surface area, in an attempt to contribute to the Bonn Challenge. A major driver for this pledge was the electricity (and as a result, economic) crisis in 2003-2004. This crisis was triggered by a steep decline in power generation at the Ntaruka and Mukungwa hydropower stations, which in turn was caused by the degradation of an extensive highland wetland by the name of Rugezi. Progressive conversion into agrarian fields affected the wetland's water buffering function and together with reduced rainfall in recent years and poor maintenance of the plants, this resulted in a significant drop in the depth of Lake Bulera, the water reservoir for both hydropower stations.

In response to the energy crisis, the Rwandan government decided to reclaim the ecological function of the Rugezi wetland and to halt the on-going degradation and drainage of the area. Terraces were built and agro-intensification measures introduced in order to compensate the farmers. Along with extensive erosion control measures and the introduction of new plant species this meant that the livelihoods of adjacent farmers were secured, or even slightly improved, while the ecological function of the wetland was restored simultaneously. Both hydropower stations went back to full operation capacity in 2008. Today, Rwanda sees functional wetlands as a determining factor for the country's future development, having one of the most progressive legislation and countrywide restoration plans in place.

BOX 11

EL SALVADOR: RESTORATION TO MITIGATE CLIMATE CHANGE

El Salvador committed to restore one million hectares – half the country's territory. This is a serious and desperate response to a changing climate that earned El Salvador the first and fourth places in Germanwatch´s Global Climate Risk Index in 2009 and 2011, respectively. Landscape restoration may be seen as a mitigation strategy to reduce human emissions of green house gases (GHG). Mitigation may also be achieved by increasing the capacity of carbon sinks e.g. through reforestation. For El Salvador, restoration is essential to reduce the escalating climate related losses and damages. However the question is how the government wants to achieve this, how business and farmers are involved and who is paying for it.

"Ecological restoration is a growth industry and the work of the future: since we humans have degraded so much of the planet, we have almost endless opportunities to return ecosystems to health."

— DOUG TOMPKINS, FOUNDER ESPRIT, THE NORTH FACE, TOMPKINS CONSERVATION

BOX 12

ETHIOPIA LEADER IN RESTORATION

Ethiopia set a target to restore 15 million hectares of degraded and deforested land into productivity by 2025 – that's one-sixth of the country's total land area. A growing population – and with that, an increased demand for land for food production – led to the loss of nearly 97% of Ethiopia's native forests. Economic losses caused by soil degradation are estimated to be greater than USD 1 billion in the 1980s, the widespread loss of trees and soil, compounded by drought, led to the disastrous famine of 1984-1985, which killed nearly one million people. Over the past 30 years Ethiopia began rehabilitating these extremely degraded lands.

Tigray is one example of how restoration can improve lands and livelihoods in Ethiopia. For more than 10 years, villagers of Tigray contributed up to 40 days per year of voluntary labour to dig infiltration pits or construct terraces, stonewalls, and other conservation works. Severely degraded land was set aside for tree planting and to allow natural regeneration to occur. The systemic ecosystem management helped recharge groundwater levels in the valleys below. The area under irrigation increased with a factor six from almost 5,000 hectares in 2000 to 30,000 hectares in 2008. This helped expand agricultural production even in drought years, providing food security and steady incomes.

All these initiatives are mostly instigated by NGOs; turned in to legislation by governments; and funded by governments and charities. Only in the last few decades has business started to take leadership. Good initiatives abound in direct investment projects and through the introduction of environmentally and socially-friendly production processes.

They include those that embrace new certification schemes and introduce participatory processes with all relevant stakeholders. This has resulted in many certification initiatives based on supply chains, such as the organic farming certification; the Forest Stewardship Council (FSC) label for timber; Marine Stewardship Council (MSC) for fish, soy and palm oil roundtables; UTZ Certified; Rainforest Alliance (coffee, cocoa); and ISO 26000.

However, one problem is that monitoring costs of these schemes is relatively high in relation to the income of the local farmers. But these intervention models, motivated by the reduction of environmental impact, do not sufficiently counteract the degradation of the ecosystem fundaments that provide the natural resources to our economy. Scientists and visionary leaders have concluded that our economy has led to what we call here: the degradation industry, or the industrial processes that accelerate the degradation of landscapes through delivering maximization of financial returns per hectare. Almost all of these schemes are related to commodities for the international markets, with consumers paying a premium. And although certification schemes are an important tool in increasing sustainable supply chains, it is only a step towards the creation of a restoration industry.

The degradation industry has brought us a lot but is now a severe threat to human well-being, the global economy, trade, and society. New business models have to move beyond certification and Environmental Impact Assessment. Restoration is an important approach to reversing the depletion of natural capital: an approach that has been underutilized and underfunded thus far. We urgently need the power of the private sector in order to scale-up.

Companies should not only work on reducing their negative impacts, they should also move towards no net loss strategies, eventually creating positive impact. This positive impact means restoration of their primary economic assets—ecosystem services—as a result of well-functioning ecosystems. The challenge is how to convince companies to take action: not only is it ethical and about being prepared for future legislation, it is core business and addresses the enormous challenges of sustaining business operations including supply chain, reputation, social stability, engagement, positioning, jobs, maintaining happy consumers, and new market developments.

“Economics start with photosynthesis.”

— ABE COLLINS, CATTLE GRAZIER VERMONT, USA

1.5 BREAKDOWN OF SILO THINKING REQUIRED

Restocking our economy’s natural capital requires more than just business involvement, however. Business will need to learn from nature. Nature as usual is about connectivity: maximizing the interaction between species and biomass provides us with the basis of food, water, carbon, oxygen, environmental security and sustainable energy. Whereas business as usual is about disconnectivity: maximizing the return on investment per hectare creates deforestation, desertification, biodiversity loss, and climate change.

In other words: this century, single-issue solutions are no longer sustainable. As the problems surrounding landscape degradation are interconnected, the solutions must also be interconnected. They require the integration of knowledge and experiences of participants with different backgrounds: technicians, policymakers, business and above all people living and working in degraded landscapes themselves. Barriers and institutional silos need to be broken down and we need to accept our interdependence and interconnectedness with each other and ecosystem functions. We are all in it together.

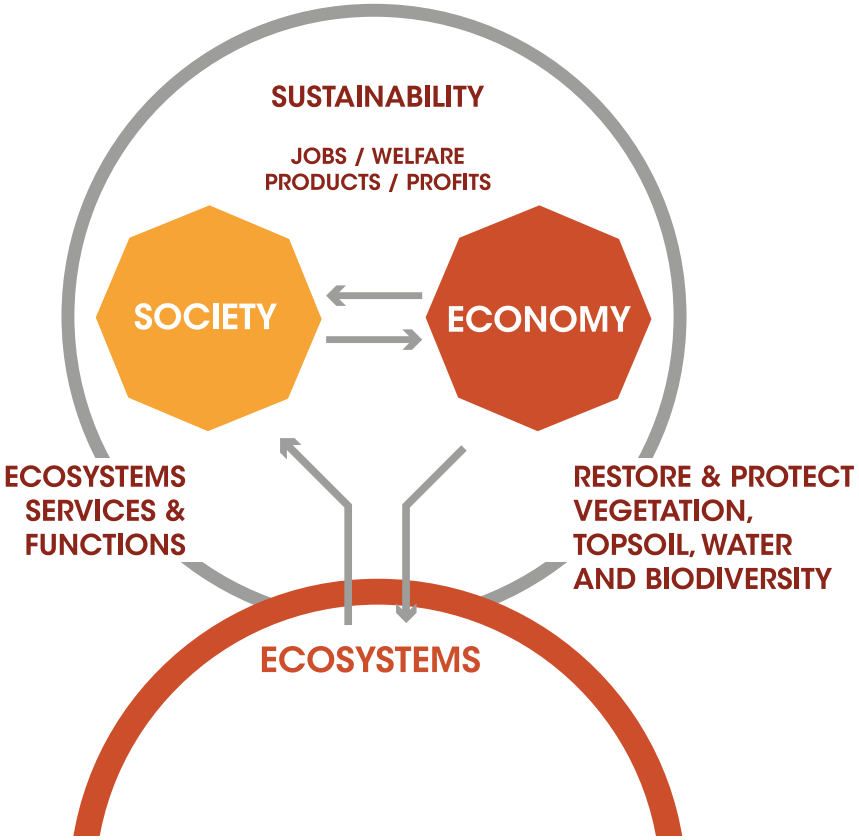
In economic terms, this requires us to shift from a linear understanding of finance and business activity to one that is holistic, systemic and cyclical. But what does this mean? In a linear approach, sustainable use is defined as creating the balance between three different components: economic, ecologic and social needs. In a cyclical model, these three components are interdependent. There are feedback loops: ecosystem services provided by healthy functional ecosystems provide the natural resources that enable our economy to create the products and profits.

This results in a Gross Global Product, generating jobs and welfare to society. To ensure the continuous supply of resources to economy and society, part of the profits created need to be invested in maintenance: restoration and protection of the supply sources. These are the ecosystem functions that economy and society depends upon: vegetation cover, topsoil building, fresh water recourses. And the basis of this all, an abundance of species interaction: biodiversity.

If these investments are sufficient for restocking, the model is resilient. If not, resilience is diminished, putting human well-being, our way of living and our global economy at risk: exactly what happened historically in local societies that collapsed. As suggested in Figure 4 (page 22), the value of resources retracted, measured in Gross Global Product, is a factor 3 higher than the investments in maintenance.

We are at risk. We must make the restoration of ecosystem functions a logical part of our economy. The question is how to move from a degradation economy to a restoration economy.

FIGURE 4
RETHINKING SUSTAINABILITY.



“The visionaries have seen it and have told us it’s coming. There’s not a single scientific, peer-reviewed paper published in the last 25 years that would contradict this scenario: every living system of Earth is in decline, every life support system of Earth is in decline, and these together constitute the biosphere, the biosphere that supports and nurtures all of life, and not just our life but perhaps 30 million other species that share this planet with us.”

— RAY ANDERSON, CEO AND FOUNDER OF INTERFACE (IN THE CORPORATION)

02 VISION: LONG-LASTING LANDSCAPE RESTORATION

Partnerships piece together the jigsaw

Landscape conservation and restoration must be a key element of our economy—but is not. The growth of human population has induced the degradation of one quarter of the land surface on Earth. Interventions to date focus on impact reduction. But an increasing number of people and organizations are building up the momentum for landscape restoration and conservation.

To take this to scale, the obstacles for business engagement must be cleared by putting in place an orchestrating mechanism to align stakeholders in long-lasting landscape restoration partnerships that develop landscape restoration business cases as a new investment class for investors.

2.1 LAND DEGRADATION AT GLOBAL SCALE

Land degradation is no longer limited to smaller inclusions of lands on Earth mismanaged by its inhabitants. It is a worldwide phenomenon. One quarter of the world's land mass is either highly degraded or undergoing high rates of degradation (Figure 5). This equals two billion hectares, an area roughly the size of China and the United States combined (BOX 13). About 1.5 billion people depend directly on degrading areas, both in developed and developing countries. Global assessment indicate that the degrading areas are mainly in Africa, south of the equator; South East Asia and Southern China; North and Central Australia; the Pampas in Latin America; and temperate and boreal forests in Siberia and North America. It is estimated that two-thirds of African land is already degraded to some degree and that land degradation affects at least 485 million Africans: 65% of the entire African population. The problems are similarly severe in the Mediterranean Basin: UNCCD estimates that ten million hectares in Spain alone are degraded—one fifth of the country's territory.

BOX 13

AN AREA THE SIZE OF...

- A football field: 0.6 hectares
- Central Park New York City: 341 hectares
- The Netherlands: 4 million hectares
- Lake Victoria (Africa): 18 million hectares
- Spain: 50 million hectares
- South Africa: 122 million hectares
- India: 329 million hectares
- China: 960 million hectares
- USA: 983 million hectares
- Russia: 1,707 million hectares

The causes of land degradation haven't changed much over time. On a global basis, it is caused primarily by overgrazing (35%); agricultural activities (28%); deforestation (30%) and overexploitation of land to produce fuelwood (7%); and industrialization (4%).
The economic reasons for these processes are complex and are linked to the particular characteristics of each region. Degradation of land includes deforestation, biodiversity loss, soil erosion, salinization, nutrient depletion and desertification.

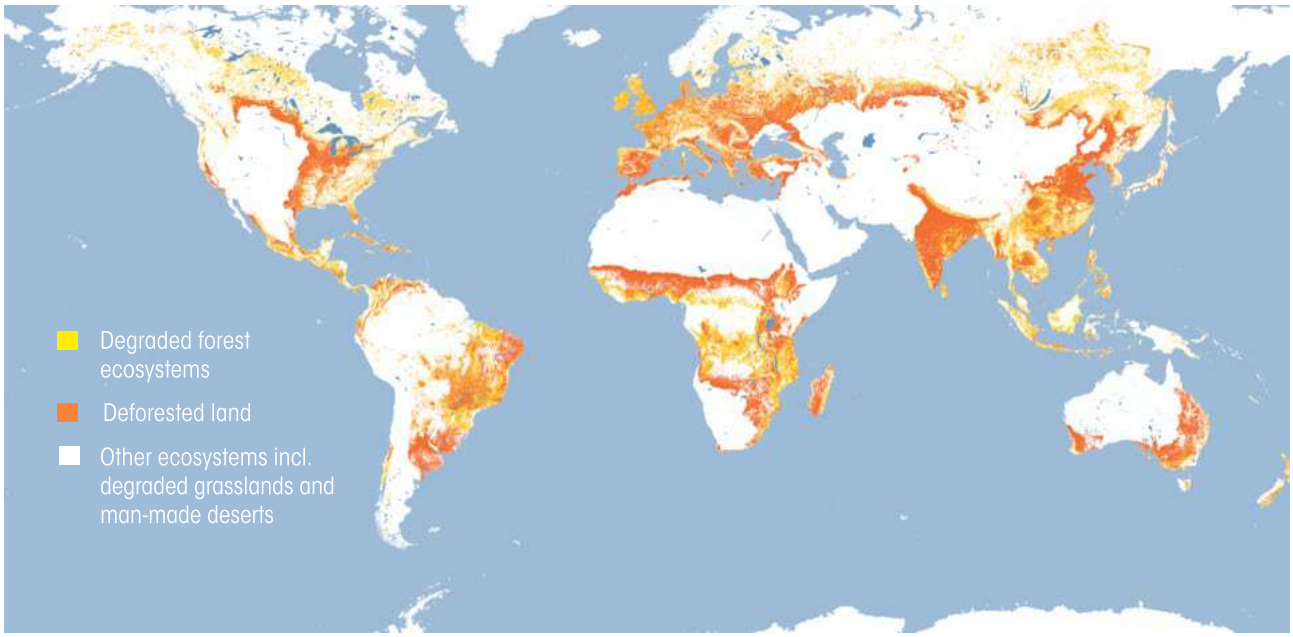


FIGURE 5
LAND DEGRADED BY HUMAN ACTIVITY (SOURCE: WORLD RESOURCES INSTITUTE).

Although much emphasis has been on the loss of the world's forests, the decrease in grasslands has been just as dramatic. For every 100 hectare of grassland, 70 hectares has been converted to farming and grazing areas. In North America, agriculture has been responsible for 66% of soil loss—as shown in the example of the Great Plains of the United States.

The patterns are different in the various regions. In Africa, overgrazing is responsible for about half of the soil degradation. Half of the savannas have disappeared, along with 45% of the temperate forests and 27% of the tropical forests, including mangroves and coastal forests.

Land-use change and degradation has also had a strong impact on climate change and is responsible for about 20% of carbon emissions globally. In fact, due to unsustainable agricultural practices, half of all agricultural land is degraded, while approximately 100 million hectares of extra land is required to supply the 9 billion generally more wealthy people living on Earth by 2050.

2.2 COSTS OF LAND DEGRADATION

This continuing land degradation is the outcome of an economy investing in the reduction of its increasing impact, rather than restoring the ecosystem functions it depends upon. This comes at a cost. The basic inputs, such as land, water, fertilizer and energy, are

predicted to become more expensive. According to a McKinsey & Company study, climate-smart agriculture that requires less of these inputs and saves land through sustainable land management and restoration will be advantaged. For the restoration of a hectare of degraded land, TEEB estimates the mean investment to be about USD 2,390. For the restoration of two billion hectares, the sum needed is USD 4.78 trillion. Compared with the USD 4.3-20.2 trillion per year—that according to the Constanza study has been lost due to the conversion of ecosystems—restoration seems to be a promising option.

Researchers from Wageningen University in the Netherlands acknowledge the potential high benefit-cost ratio, but costs and benefits are dived amongst stakeholders; are different for each; and may even be negative for some of them. They stress that the business case for conservation is difficult to find.

But approached from an entrepreneurial viewpoint, this is an opportunity: two billion hectares of degraded land worldwide that has the potential for land rehabilitation and forest restoration. That is a land mass of China and USA put together. An analysis by the IUCN, announced at the global Rio+20 meeting in 2012, shows that once restored, 150 million hectares would pump more than USD 80 billion into national and global economies. This is an area three times the size of Spain.

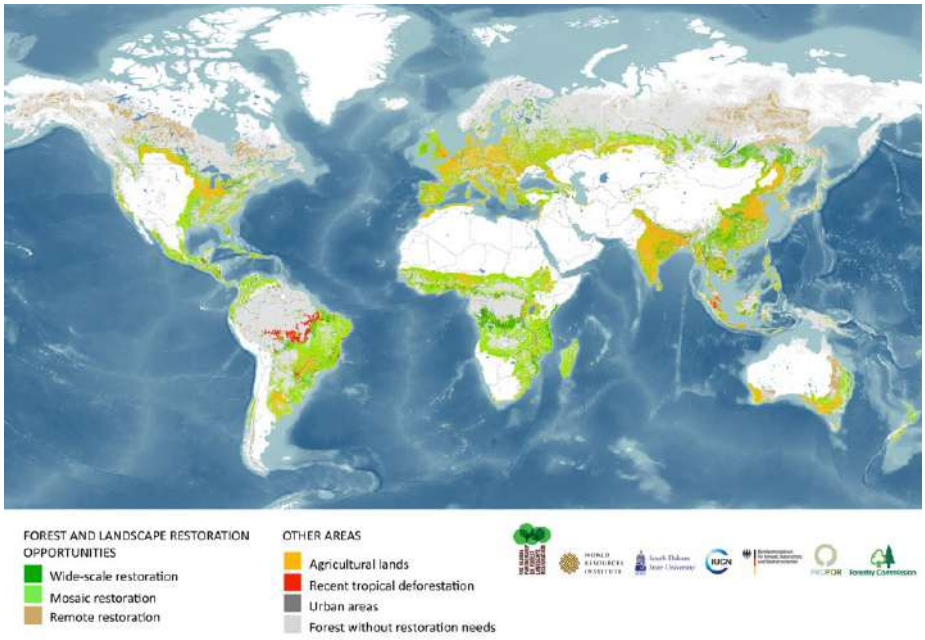
Scaling up sustainable land management and accelerating restoration initiatives is a pathway to greater resilience; to increasing healthy productive lands; and to ecological security in terms of avoiding natural disasters. Furthermore, it would help us to avoid degrading new areas simply by strengthening the recovery of the degraded areas.

In this way, the amount of healthy and productive land and water resources needed to support vital ecosystem services remain stable or increase in a given time and space. That would take us towards a land-degradation neutral planet.

2.3 RESPONSE: GLOBAL TRENDS IN LANDSCAPE RESTORATION

Several governmental and non-governmental initiatives to halt degradation and increase restoration already exist. The Bonn Challenge is a global effort anticipating this. Its goal is to restore 150 million hectares of the world's degraded and deforested lands by 2020 (Figure 6).

FIGURE 6
FOREST AND LANDSCAPE RESTORATION OPPORTUNITIES (SOURCE: WORLD RESOURCES INSTITUTE).



This initiative, addressing a restoration agenda was well received at its launch at a ministerial conference in Bonn in September 2011. In a poll circulated before the Rio+20 conference in 2012, over a million global citizens voted for Bonn Challenge to be the most important forestry issue upon which heads of state should act—the second most important issue overall after sustainable energy. Nearly a dozen countries and institutions have made land restoration pledges to the Bonn Challenge or are in the process of preparing them (BOX 14).

BOX 14

THE BONN CHALLENGE TARGETS: 150 MILLION HECTARES

The Bonn Challenge is a global aspiration to restore 150 million hectares of the world's deforested and degraded lands by 2020. Countries, companies, communities, institutions and others pledge to restore degraded lands they own or have the rights to manage. They begin to restore, often with technical support from members of the Global Partnership on Forest and Landscape Restoration. To date, more than 50 million hectares of degraded lands have been pledged for restoration, over one third of the total goal. Major pledges are from:

- The US Forest Service, with 15 million hectares;
- Ethiopia, with 15 million hectares;
- The Democratic Republic of Congo, with 8 million hectares;
- Guatemala, with 3.9 million hectares;
- Uganda, with 2.5 million hectares;
- Rwanda, with 2 million hectares;
- The Brazil Mata Atlantica Restoration Pact, with 1 million hectares;
- El Salvador, with 1 million hectares;
- Costa Rica, with 1 million hectares;
- Colombia, with 1 million hectares;
- Niger, with 1 million hectares.

However impressive and hopeful, the proof of the pudding is in the eating. So far the appetite to turn the pledges into areas restored land on the ground has been limited. The real challenge is to realize concrete investments in landscape restoration.

In 2011, Rwanda announced its intention to reverse degradation of soil, water, land, and forest resources by 2035—and to use landscape restoration as a way to create jobs. In fact, there are an increasing number of positive and visionary initiatives of various scales taking place in different countries.

In Brazil, 17 states established the Atlantic Forest Restoration Pact with the aim of restoring 15 million hectares of the forest by 2050. Several countries have also confirmed their commitment to restoring millions of hectares of degraded land, including El Salvador, Burkina Faso, Niger (BOX 15) and China (BOX 16).

BOX 15

REGREENING NIGER

Simple low-costs techniques have led to what has been called a re-greening in Niger. Native tree and shrub management could produce continuous harvests of trees for fuel, building materials, food, medicine, and fodder. The approach is called farmer-managed natural regeneration (FMNR) and soil and water conservation. This approach has been adopted almost universally by farmers in the district Zinder. Benefits to ecosystems and people have been significant: 200 million trees are protected and managed, amounting to a 10- to 20-fold increase over 30 years (1975-2005). With improved yields, people eat better and have more food security in drought years, and families and communities have been able to diversify their livelihoods. Not only are fuel wood and fodder more readily available, but also households are able to sell surplus products in the local market. The most important catalyst for restoration was the regulatory revision under the Niger Rural Code to transfer tree ownership to farmers. Signed in 1993 and fully implemented in 2004, it provided the needed confidence for farmers to invest in tree management without fear of breaking the law.

BOX 16

CHINA: RESTORING THE LOESS PLATEAU

The Loess Plateau Watershed Restoration Project starting in 1995 had a total investment volume of USD 500 million, jointly financed by the World Bank and the Chinese government.

The primary objective of the project was to increase agricultural production and incomes on 35,000 square kilometers of land in nine tributary watersheds of the Yellow River in the Loess Plateau, an area roughly the size of Belgium. Of the 39 counties in the project, 19 were officially classified as belonging to the poorest in China. It is argued that the project directly benefited 2.5 million people, while the average investment per area unit was just under USD 143 per hectare.

Beyond significantly reducing the rate of poverty in the intervention areas from 59% down to 27% at the end of project implementation in 2008, the initiative also achieved substantial results in the ecological recovery of the plateau.

Bans on grazing and tree cutting as well as the replanting of grasses and trees has allowed the perennial vegetation cover to increase from 17% to 34%. Now, the area covered with new vegetation potentially absorbs 1.48 million tons of carbon dioxide each year. Flows of sediments into the Yellow River have been reduced by more than 100 million tons per year, arguably justifying the entire intervention due to the reduction in costs for sediment removal downstream.

The lessons from The Loess Plateau Watershed Restoration Project (1994 – 2005) have been brought to places beyond the initial intervention areas. Today, more than 150,000 square kilometers of eroded land is controlled by various conservation measures and a total ban on grazing and tree cutting has been adopted throughout the entire 640,000 km^2 of the plateau, altering an area 15 times larger than the original project area.

Documentaries from the Chinese-American filmmaker John D. Liu (Commonland, EEMP) attracted worldwide attention, inspiring many far beyond the boarders of China across the world.

As of 2013, over 20 million hectares of land had been pledged for restoration. In the Global Partnership on Forest and Landscape Restoration, countries and experts are building up experience and sharing knowledge. Successful restoration is not guaranteed, given the complexities of ecosystems, past land-use, and ongoing degradation. Restoration practitioners are faced with a multitude of critical decisions about how to implement their projects.

Given that about 30% of restoration projects fail, and another 35% do not achieve complete recovery, these decisions can make or break a restoration project (BOXES 17,18,19).

BOX 17

SINGLE SPECIES APPROACH IN VIETNAM

Large-scale reforestation has been executed to restore the Vietnam Highlands. Fast-growing exotic species such as eucalypts have been used widely on the degraded and infertile sites. Local people opposed this. The types of trees planted by the government were not the ones that they needed or could use. Although these species have restored forest cover successfully, their financial benefits to farmers have sometimes been disappointing. As plantations have matured, large volumes of eucalypt timber have come on the market and prices paid to small growers have declined. By reducing the heterogeneity of the landscape, the restoration program has increased the risks not only of future market problems but also of possible outbreaks of pests and diseases. As a general principle, landscape restoration should increase, not reduce, the heterogeneity of the landscape.

"Look deep into nature, and then you will understand everything better."

— ALBERT EINSTEIN

BOX 18

MISTAKES IN RESTORING TSUNAMI-HIT COASTS

After the Tsunami disaster on December 26, 2004 in Aceh Indonesia, both government and NGOs initiated a variety of environmental restoration activities, in particular the planting of mangrove and other coastal vegetation. Only a small fraction has been successful. This can be seen simply from the low survival rate of plants in the field. Reasons given for the failures include: mistakes in the selection of planting sites, unsuitable choice of plants, insufficient preparation, inadequate guidance, no tending of the plants, and the low capacity of human resources. Another weakness found in the field was the very limited amount of community involvement. Local people tended to be included only as workers, not as partners involved actively and continuously. Moreover, coordination and information sharing among the stakeholders concerned with the rehabilitation activity were very poor. A mistaken perception among the implementers was that rehabilitation activity ended once the seedlings had been planted in the field. The result as they saw it was the number of seedlings planted, not the number that survived after planting.

BOX 19

RESTORATION BEYOND CARBON IN UGANDA

In Mount Elgon National Park, eastern Uganda, an early reforestation program financed through carbon credits had a problematic start. Initiated in 1994, the project has reforested 8,500 hectares of Mount Elgon to date. The early phases of the project focused exclusively on the goals of the two partners, namely, carbon sequestration and biodiversity conservation. Other benefits that forest restoration might bring were not considered relevant. When community needs for subsistence forest resources conflicted with the project goals, people were banned from harvesting firewood, thatching grass and other subsistence resources on the grounds. This would reduce the total carbon accumulation on the site. This approach brought the authorities into conflict with local people, and tree seedlings were destroyed in a number of cases. Concerns over the long-term security of the reforested areas led the authorities to review their policy of excluding local people. With the assistance of IUCN, Uganda Wildlife Authority tested collaborative management approaches with local communities on Mount Elgon. People are now able to enter into formal written agreements with the authorities to harvest a wide variety of resources. The change in policy has reduced conflict between the authority and the local people and has improved local attitudes to conservation.

An increasing number of new initiatives are being launched in the international arena. The New York Declaration on Forests was signed in September 2014, three years after the Bonn challenge. 130 signatories from government, civil society, indigenous peoples and companies, set a global target to restore 350 million hectares of deforested and degraded forest landscapes by 2030. Nearly USD three billion has been made available to reward good performance of tropical forest countries through the United Nations Collaboration Programme on Reducing Emissions from Deforestation and Forest Degradation (UN-REDD) and other mechanisms (BOX 20). Brazil and Indonesia are already receiving these UN funds and many more have the opportunity to do so through the World Bank-managed Carbon Fund.

The same day, Ethiopia, Colombia, Uganda, the Democratic Republic of Congo, Guatemala and Chile committed to contribute 28 million hectares toward the new target, building on 20 million hectares pledged earlier. In 2014, Ethiopia made one of the most significant pledges: the country set a target to restore 15 million hectares of degraded and deforested land to productivity by 2025—one-sixth of the country's total land mass.

BOX 20

REDD AND REDD+

Reducing Emissions from Deforestation and Forest Degradation (REDD) is an effort to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. REDD+ goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks, which equals to restoration.

Likewise, new legislation in the Latin American countries of Mexico, Argentina, and Colombia aims to promote sustainable development, reduce climate change, and alleviate poverty. These contributions make it more likely that countries will commit domestic resources and that international funding sources will support their efforts; building momentum for a global restoration movement. But much about implementation is still unclear. A much larger effort is needed to turn pledges on paper into practices on the ground. It requires the engagement of more partners to move from the Challenge of Restoration to the Age of Restoration.

2.4 LACK OF BUSINESS ENGAGEMENT

So far, the business community has mostly been absent in this movement. Not one global initiative or consortium has succeeded in involving the business sector in large-scale restoration of degraded lands. This is particularly serious given the urgent need to scale-up and accelerate landscape restoration. The business community has many of the essential capabilities required, such as a hands-on approach, the ability to mobilize local communities, and the resources to finance on-the-ground projects.

Business is shifting from a reducing impact to no net loss focus. It is well engaged in recent zero-deforestation initiatives. In 2010, the Consumer Goods Forum (CGF) announced a commitment to help achieve zero-net deforestation by 2020. The more than 400 retailers and manufacturers from 70 countries, with combined sales of USD 3.1 trillion, committed to develop sustainable sourcing for the four commodities that drive most tropical deforestation: palm oil, soya, beef and paper and pulp. At the Rio+20 conference, momentum gathered further with the announcement of the Tropical Forests Alliance (TFA), a joint initiative between the Consumer Goods Forum and the US government. The governments, NGOs and companies working together in the Alliance forged a private-public partnership to mobilize key private sector, governmental and civil society entities in order to help achieve zero-net deforestation in tropical forest countries by 2020.

Still, engagement in restoration efforts seems to be a bridge too far for most business. In-depth studies like those by TEEB conclude that creating value through restoration is beneficial to business. So do conferences including the 2014 World Conference on Ecological Restoration in Mexico. And reports like 2014 one by FAO: The State of the World's Land and Water Resources for Food and Agriculture. But these pledges are from the NGO and science world—thus, outside the business sector.

2.5 EARLY MOVERS IN THE PRIVATE SECTOR

Action 2020 (BOX 21), launched in 2013 by the World Business Council on Sustainable Development with 200 multinationals as members, is one of the few business-led initiatives that specifically addresses landscape restoration. It acknowledges that business and ecosystem are linked.

All businesses affect ecosystems and rely on critical provisioning services (fresh water, fiber, food) and regulatory services (climate regulation, flood control, water purification, waste treatment).

BOX 21

ACTION 2020

The World Business Council for Sustainable Development (WBCSD) has designed a road map for business to achieve sustainability goals: Action 2020. The roadmap distinguishes societal from planetary goals and sets targets to realize the long-term perspective of Vision 2050. Commonland is one of the implementation partners of Action 2020.

Companies must transform business models and operations if they are to avoid major economic losses caused by the current degradation of ecosystems and the vital services they provide. One of the voluntary goals that business and other stakeholders can—and need—to achieve together by 2020 in order to reach WBCSD's Vision 2050 is: reduce the loss of natural ecosystems and restore degraded ones so that biodiversity and ecosystem services are maintained. One of the solutions presented is to invest in natural infrastructure, restore degraded land, and to include land-use criteria in supply chain management.

Motivation and awareness within the private sector is building up. Several companies increasingly realize that investing in environmental sustainability can be highly profitable in the medium and long-term due to lower costs and higher revenues. At a strategic level, the issue of land degradation has been addressed at platforms including the World Economic Forum in Davos where its Global Risk Report 2015 ranked biodiversity loss and ecosystem collapse in the Top 10 of risks with the highest global impact. At an operational level, it resonates in innovative landscape projects. For example, Unilever invests in the restoration of the Mau Forest in Kenya to safeguard the neighboring sourcing of water. (BOX 22). Or in reforestation projects as announced by the Indonesian Pulp and Paper company (APP) that pledged in 2015 to restore and support the conservation of one million hectares of rainforest across Indonesia. Some companies are legally obliged to restore land they have degraded over time: mining companies such as Rio Tinto, RWE and Holcim, along with some energy companies (coal mining), already have experience in this.

BOX 22

KENYA – FOREST RESTORATION TO INCREASE TEA PRODUCTION

The Mau Forests Complex in Kenya provides critical ecological services fundamental to support key economic sectors. The area supports the production of several agricultural commodities, such as tea and rice and is of particular importance for the tea industry and power generation companies. However, over the last decades over 25% of the area has been settled and cleared, posing a threat to water resources, biodiversity and livelihoods. The Kenyan government aims to tackle the forest degradation. The tea industry acknowledged the importance of forests, neighbouring their productive lands. They joined the Sustainable Land and Water Program initiated by the Sustainable Trade Initiative. The aim of this program is to bring governments, industries and local stakeholder together to restore the degraded Mau lands and sustainably manage the production lands at landscape scale.

A body of knowledge on how to achieve landscape restoration is accumulating. The experiences from on-going or completed projects have already created a toolbox. These tools include several promising technical solutions with social- and stakeholder-management tools that are equally, or even more, important to achieve success in restoration (BOX 23).

Also management tools like the Company Ecosystem Service Review developed by World Resource Institute (WRI), World Business Council on Sustainable Development (WBCSD) and International Union for the Conservation of Nature (IUCN) assist businesses in evaluating their impact and dependency on ecosystems and determining the risks along with the opportunities of their current operations. Many mechanisms are now in place for the private sector to contribute to landscape restoration. Projects are available for scaling-up and companies have begun to take this so-called no net loss of biodiversity into consideration.

BOX 23

LOW-TECH SOLUTIONS

A range of inspirational examples demonstrates that it is technically possible to re-green eroded areas. Low-tech solutions are creating biomass in dry, degraded lands through permaculture techniques. Examples of these techniques include water storage systems such as the 'waterboxx' and 'cocoon' to plant trees without irrigation; Biochar that converts agricultural waste into a soil enhancer that can hold carbon and increase water absorption, boosting food security. Many of them are in the process of being scientifically tested and analysed, but the results so far are promising. They are often the result of citizens' initiatives, an entrepreneur's inspiration or result from an individual or collective sense of responsibility. They are indicators of local common sense and our ability to restore what once was lost, in an attempt to regain lives and livelihoods.

2.6 OBSTACLES FOR LANDSCAPE RESTORATION AT SCALE

But despite the steady influx of new project initiatives to re-green the planet and restore natural capital, the net positive impact business action on ecosystems remains almost absent or very scarce. This lack of engagement is largely due to the significant barriers that exist between businesses and those organizations and communities involved in ecological initiatives.

These barriers range from a lack of networking across groups, high risks due to the many different stakeholders, and the long-term span to differences in the use of language, and a lack of trust. None of the existing valuation tools are very easily applicable by the business community: often they are complex and presented in a manner using a language that is not immediately relevant to decision-making in the private sector. Major initiatives, such as the Bonn Challenge or the inspiring restoration cases in China, Ethiopia and El Salvador are government-led with support from NGOs and knowledge institutes.

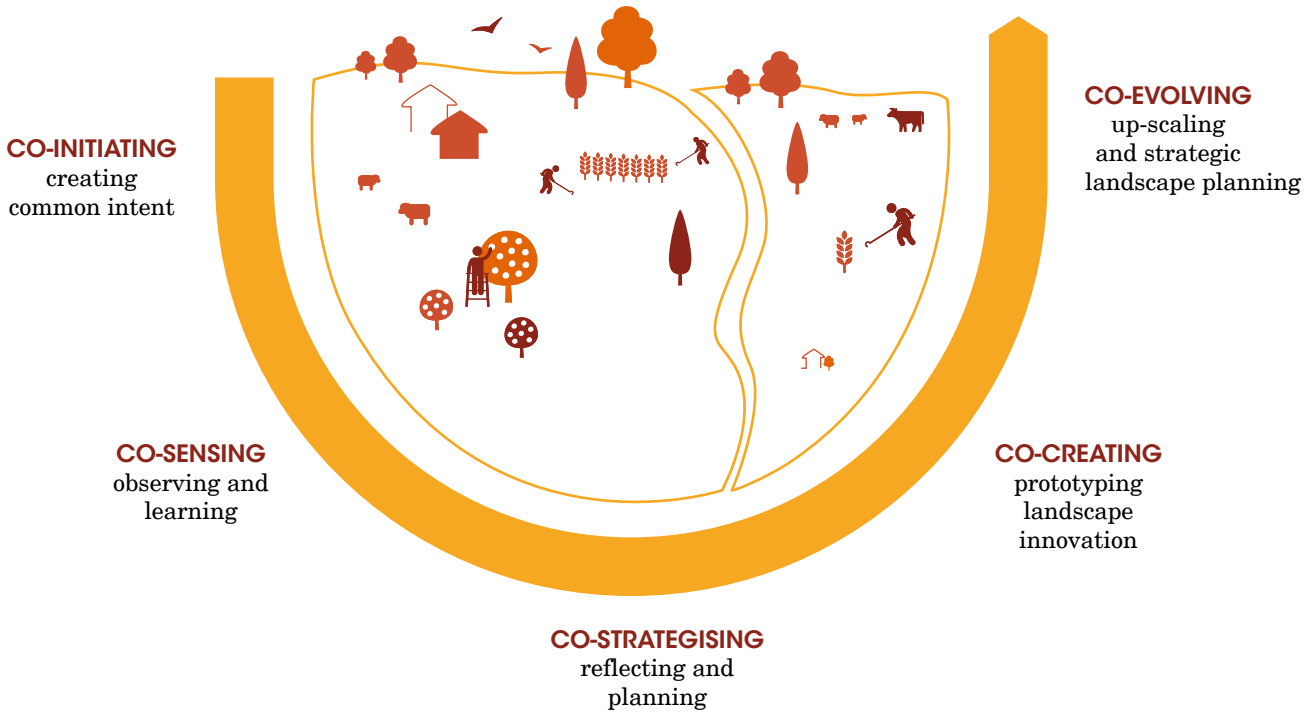
Business is mostly in the wait and see mode but is about to take more leadership, as has happened with zero deforestation commitments. Greater involvement from business and investors requires removal of the barriers that exist between local communities, NGOs, farmers, businesses, business schools, ecologists, economists and policymakers.

As defined by the IUCN in 2013, landscape restoration is to 'turn barren or degraded areas of land into healthy, fertile, working landscapes where local communities, ecosystems and other stakeholders can cohabit, sustainably'. For restoration of a landscape to happen, alliances between these different stakeholders must be forged based on common understandings of what must and can be done. Money is not the problem; the tools exist; the science is known; and land is available. The key critical element is: stakeholder engagement.

The stakeholder process is complex. Stakeholders need to be aligned to understand long-term intergenerational projects instead of focusing on short-term activities that achieve no real impact in terms of sustainability. In many small NGO projects, which are often government-led and charity-funded, short-term planning often occurs. So how can we address the problem of focusing on long-term goals in large-scale projects? One large-scale, silo-breaking project is the Chinese Loess Plateau Watershed Rehabilitation Project, a practical example of a fairly successful—and massive—landscape-rehabilitation project (BOX 16).

Over the last ten years, we have seen an increasingly larger group of participants from the business, finance, scientific and civil society spheres come together and pave the way for designing and implementing practical solutions. These solutions will only be successful if stakeholders collectively take accountability and understand that we have created a negative by-product of economic success: degraded landscapes. Meeting these challenges requires updating our economic logic and operating system from an obsolete 'ego-system'—focused entirely on the well-being of oneself—to an eco-system awareness that emphasizes the well-being of the whole. A theoretical and practical social perspective for this process can be found in the Theory U (Figure 7).

FIGURE 7
THEORY U: COLLECTIVE AWARENESS, STRATEGIC APPROACH AND COLLECTIVE ACTION (SOURCE: THE PRESENCING INSTITUTE MIT AND LIVING LANDS).



It offers a set of principles and practices for collectively creating the future those stakeholders want to emerge, following the movements of co-initiating, co-sensing, co-inspiring, co-creating, and co-evolving. The Theory U has already been successfully implemented in several projects, leading to new and long-lasting local stakeholder partnerships and long-term commitment.

2.7 AN ORCHESTRATOR TO ALIGN STAKEHOLDERS AT LANDSCAPE LEVEL

An orchestrator can help to break silos and engage companies in major restoration projects. This orchestrator could be a team that builds the trust and connections between the business community and the diverse stakeholders present in a landscape, such as civil society organizations, governments, and educational institutions. Companies can expect to benefit from these partnerships in a number of ways. Potential returns on investments for companies or investors include an increase in agricultural output; carbon credits and new market development; a marked increase in local products and jobs; the development of sustainable resourcing; being part of a new business-to-business peer group with new business opportunities; becoming a front-runner in new emerging issues; better meeting the demands of consumers/clients; enhancing the company's level of corporate social responsibility and ethics with positive implications for its brand and reputation; and an increase in innovation potential.

Increasing scale may imply increasing complexity, but also provides more clarity as the restoration of the ecological functions will be an easier goal to achieve. To keep this manageable, landscape restoration should not be about controlling complexity, but about distributing complexity among partners. It should be practical and replicable, while actively searching for business cases. Landscape restoration is not in any way a philanthropic endeavor, but a core economic issue. It requires establishing new partnerships between companies and local organizations who can work together on long-term projects that give priority to tailor-made business cases.

Building such partnerships requires system-thinkers and system-doers. These are people in the business community, NGOs, and scientists who are committed to a mission that envisions a new way of achieving socio-economic and ecological sustainability based on holistic or systems thinking. They use every available technology and educate future business leaders in order to influence a new generation of business leaders. In this way, they ensure that economic and business activities protect and restore the good health of ecosystems—and that business models are built to make restoration a viable business and investment proposition.

"Restoring our soil is restoring our soul."

— INDIAN FARMER

2.8 LANDSCAPE RESTORATION: A NEW INVESTMENT CLASS

This proposition opens the door to financiers that are currently not active in landscape restoration, simply because this is not a common (standard) investment: the institutional investors. Restoration doesn't qualify as a potential investment class. First of all, because investors are unfamiliar with restoration as a business opportunity. Furthermore, there is a lack of clarity about the risks: investments pay off only in the long-term and exit strategies are unclear. The time frame of return on investment for business and investors is usually in the range of five to ten years (maximum). Investors also want to have the possibility to easily exit from their participation. However, most of the financial returns on investments in landscape restoration will materialize in the long-term. The same applies for other returns; it takes time, for example, for trees to grow; wetlands to get established; species to return (biodiversity) and recover; or to perceive positive changes in local society. Grant-sponsored projects often have the same short-term commitment and lack sufficient buy-in of local people. There is no ownership. Owing to the short running time of projects, partners are urged to spend much of their precious time from the outset on reporting. For these reasons, landscape restoration partnerships should be at minimum 20 years (one generation), or at least secure a 4-stage (4x5 years) commitment.

While institutional investors like pension funds are not yet likely to commit, the game-changers in a new restoration industry should be sought amongst family-owned companies, their foundations and impact investors. More than others, they have a sense of stewardship and a long-term perspective that allows them to provide patient money that pays back over longer periods of time. They can be game-changers. They can build up a track record and prepare the ground for institutional investors.

Investors, business, governments and local leaders working together in landscape restoration partnerships can be the major drivers of landscape restoration. They will become moral leaders based on a long-term purpose. Commonland's ambition is to establish an international mechanism for ensuring the productive involvement of these leaders in ecological-restoration efforts.

“There are no economies without ecosystems, but there are ecosystems without economies…”

— THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY (2008)

03 APPROACH: INSPIRING INVESTMENTS IN LANDSCAPE

Restoration business cases with 4 returns in 3 zones over 20 years

Commonland and its partners take up the challenge of building trust and connections between stakeholders investing in large-scale landscape restoration. The approach creates engagement, controls complexity, and keeps key partners inspired to harvest the results of their investments over the period of time required for landscapes to recover. With the 4 returns, 3 zones, 20 years approach, Commonland aims to add the missing link in the majority of landscape restoration projects: long-lasting partnerships that include involvement of investors and companies.

3.1 THE REASON FOR COMMONLAND

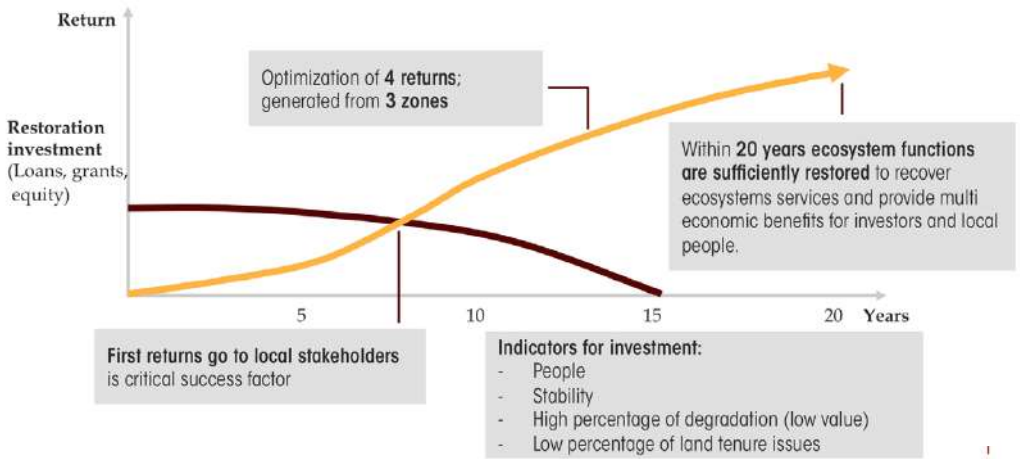
The need for landscape restoration is clearly understood. Next to this, the science is in place, the technology available and the financial resources accessible. So the time is ripe to scale-up the restoration of degraded landscapes. That is why Commonland was founded by both experts and entrepreneurs, and is supported by international organizations.

Commonland's mission is to contribute to a large-scale landscape restoration industry, aligned with international policies and guidelines.

Commonland believes that landscape restoration offers large untapped opportunities for sustainable economic development and to demonstrate this potential, the company develops landscape restoration projects that are based on business cases. Multidisciplinary teams actively involve investors, companies and entrepreneurs in long-term restoration partnerships with farmers and land-users.

Commonland's restoration approach combines and connects natural and economic landscape zones. This holistic approach delivers 4 returns (Figure 8).

FIGURE 8
THE LANDSCAPE RESTORATION BUSINESS CASE: MATCHING THE INTERESTS OF COMPANIES, INVESTORS, PEOPLE AND LOCAL ORGANIZATIONS TO SCALE-UP THE RESTORATION OF DEGRADED ECOSYSTEMS.



Long-lasting partnerships require a common long-term vision. Partners have an eye for each other's interests and the cohesion between several goals and returns. They use existing experiences and know-how to optimize the value of the land and mitigate risks. This enables them to design viable landscape restoration business cases. The return on investment that investors and companies can expect from these depends on the nature of the partnership; the business activities; the duration of the project; and the potential of the local ecosystem.

3.2 CRITICAL SUCCESS FACTORS

Commonland isn't starting from scratch. Its activities are built upon decennia of experience and offer one critical element: brokering between the current restoration community—the stakeholders on the land—and the investors and business community. They take the lessons learned and summarize them in a few critical success factors. Firstly, the approach must be grounded in science, which is why Commonland works in close cooperation with scientific institutions, business schools and experts from civil society organizations, and aligns with existing initiatives such as the Bonn Challenge, Action 2020 of the World Business Council of Sustainable Development, and international agreements of the United Nations. Commonland's well-developed network gives them a license to operate. Secondly, the Commonland team uses a multidisciplinary approach and a common, easy to understand language to connect and engage with all stakeholders. Finally, it is of key importance to develop models that are replicable and work with long-term commitment. There are no quick wins. Landscapes may take a generation to restore.

3.3 FROM 4 LOSSES TO 4 RETURNS

Commonland has synthesized all these insights into one approach that can scale-up current initiatives: the 4 returns, 3 zones, 20 years restoration approach. How does this work? Simply by reversing the trend that everyone can observe in their own environment. Degradation of ecosystems results in job loss, economic loss, biodiversity loss, and the loss of meaningfulness (Figure 9).

FIGURE 9
ECOSYSTEM DEGRADATION LEADS TO 4 LOSSES:

“Companies that are willing to share, to withhold in order to further the growth of the company, willing to try to get a better atmosphere through a demonstration of democratic principles, fairness and cooperation, a better product, those will win in the end.”

— EDWARD OSBORNE WILSON, TWO-TIME PULITZER PRIZE WINNER, AUTHOR, AND ECOLOGIST AT HARVARD UNIVERSITY

Properly designed landscape restoration turns these 4 losses into 4 gains or returns— from meaninglessness to meaningfulness; from losing jobs to creating jobs; from biodiversity losses to biodiversity gains; and from economic losses to economic profits.

These 4 returns are inherent to landscape restoration and is a concept that everyone can understand. And they can further imagine it by picturing the spaces for these returns to materialize on the ground—a natural zone with forest and nature restoration; a combined zone with mixed agriculture and nature; and an economic zone with sustainable production.

By taking this approach, Commonland simplifies the complex issue of landscape restoration and breaks it down into the maximization of 4 returns in 3 landscape zones in 20 years.

RETURN OF INSPIRATION

Giving people hope and a sense of purpose.

RETURN OF SOCIAL CAPITAL

Bringing back jobs, business activity, education and security.

RETURN OF NATURAL CAPITAL

Restoring biodiversity, soil and water quality.

RETURN OF FINANCIAL CAPITAL

Realizing long-term sustainable profit.

These 4 returns will be realized in the 3 zones of the landscape for every landscape restoration project (Figure 10).

FIGURE 10
THE 4 RETURNS OF LANDSCAPE RESTORATION MATERIALIZE IN 3 LANDSCAPE ZONES: A NATURAL ZONE, A COMBINED ZONE AND AN ECONOMIC ZONE.

NATURAL ZONE

Investment

- Restoring vegetation
- Planting native trees and clearing invasive species
- Natural restoration
- Limited maintenance

Return

- CO_2 capture, water, soil
- Restored biodiversity
- Forestry, hunting
- Tourism

COMBINED ZONE

Investment

- Restoring landscape
- Planting usable trees
- Restorating perennial vegetation and soil
- Limited maintenance

Return

- CO_2 capture, water, soil
- Partially restored biodiversity
- Agroforestry, fruit trees, timber
- Tourism

ECONOMIC ZONE

Investment

- Sustainable agriculture, forestry, aquaculture
- Real estate and infrastructure fitting in landscape
- Ventures with positive impact on landscape

Return

- CO_2 capture, water, soil
- Crops and products
- New businesses, new collaborations
- Economic development

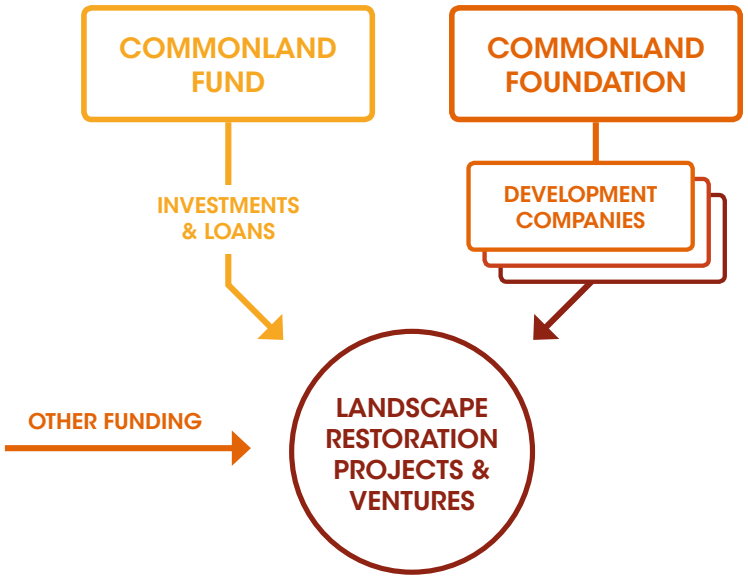
The restoration of such multiple interconnected zones as part of one plan will create landscapes in which an increase of biodiversity and vegetation cover will go hand-in-hand with sustainably managed agricultural lands: mosaic landscapes. In these landscapes, ecological sustainable agricultural and economic zones will co-exist in an ecological balance.

Commonland calls their partnerships '4 returns landscape restoration partnerships'. They require the long timeframe mentioned, combined with the flexibility to constantly develop creative solutions to combat complex stakeholder challenges. Restoration should be based on integrating purpose in a landscape restoration business model designed by the partnership. The approach is tailor-made for each location with the underlying focus being optimization of 4 returns per hectare.

3.4 HOW COMMONLAND MAKES IT WORK

Commonland takes leadership when it comes to implementing the 4 returns, 3 zones, 20 years restoration approach and commits to putting in place the necessary organization. This consists of a foundation, a fund and development companies. The foundation develops the restoration approach and works in close cooperation with scientific institutions, business schools and experts from non-governmental organizations. The development companies grow the landscape restoration projects and work on sustainable business cases with different stakeholders in the field, taking all interests into account. To build on present strengths, the development companies partner with existing initiatives. The fund co-invests in landscape restoration projects and businesses. (Figure 11).

FIGURE 11
COMMONLAND ORGANIZATION: ATTRACTING PRIVATE INVESTMENTS FOR VIABLE LANDSCAPE RESTORATION BUSINESS CASES TO SCALE-UP RESTORATION.

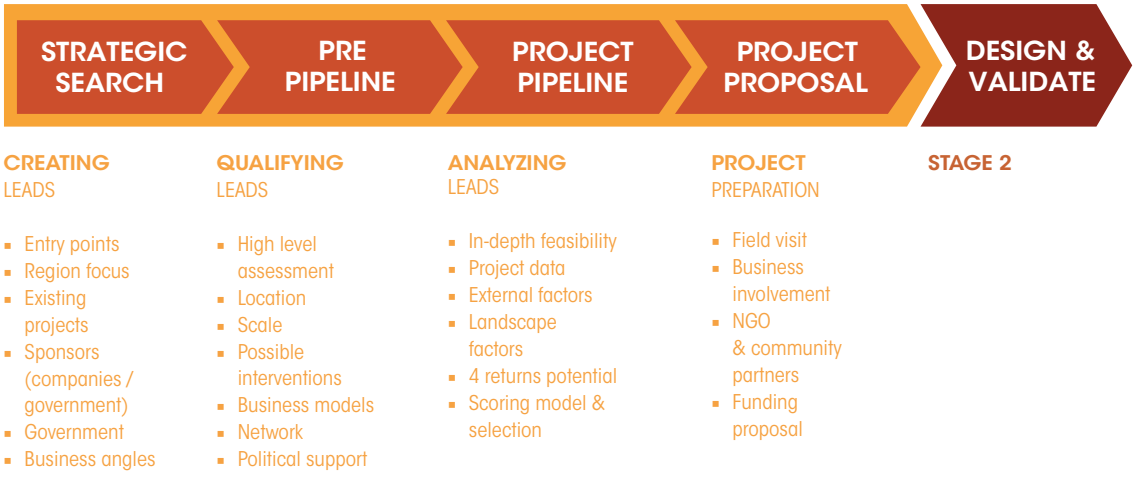


The Commonland foundation has developed a screening mechanism to identify successful initiatives, ready for scaling up. They are scouting restoration projects worldwide by making smart use of the Commonland network. This has resulted in a long list of potential projects worldwide which, by using a selection filter, is being narrowed down to a short list of promising landscapes.

With regards to these promising landscapes, the Commonland foundation is aligning key stakeholders in a 4 returns landscape restoration partnership. This includes decision-makers, local people and the private sector. As a next step, and with the guidance of a 4 returns development company, a local for-profit organization of local business developers will be established. This will drive the development of a co-designed landscape that is based on sustainable business cases for all stakeholders involved. This way, local ventures will be enhanced to integrate landscape restoration in the core of their business model. They will combine the generation of positive commercial returns with a positive impact on soil, biodiversity and water (BOX 24).

BOX 24

THE PROJECT PIPELINE: SCOUTING PROMISING LANDSCAPES



The development of successful restoration projects based on a business case is the proof of the pudding of the foundation. With the input of the partners in the Commonland network, the foundation is creating a long list of projects. Via a quick-scan screening, Commonland will identify to what extent the 4 returns can be maximized—assuming political, legal and other external factors are favorable and if there is a potentially good team on the ground.

"What we plant in the soil of contemplation, we shall reap in the harvest of action."

— MEISTER ECKHART (GERMANY, 1260-1328)

This will result in a pipeline of projects that will be processed using a multi-criteria assessment tool. Promising projects get a 'go' and the Commonland foundation will then create landscape restoration partnerships. Together, these stakeholders will co-develop and implement a landscape restoration plan, based on sound business cases delivering 4 returns in 3 zones. Each partnership is built on a combination of business cases for the different stakeholders involved. Business cases may be based on agriculture, (agro) forestry, real estate, tourism, carbon and water services and other value drivers. A long-term commitment from all stakeholders is fundamental to this approach.

Such companies are inspiring, but often remain small and are poorly known outside their own region, let alone by the financial world. Growth finance is needed to bring these companies to the next level. The Commonland fund will pave the way for this finance to find its way to these companies, and play a catalyzing role. It will enable game-changers to engage with sustainable business development in the landscapes. These are preferably family-owned companies, their foundations, and impact investors with a desire to invest in a new investment class: landscape restoration (BOX 25).

BOX 25

MOBILIZING INVESTMENTS IN RESTORATION

Commonland is following a staged approach for the development of investment funds.

Commonland fund I will be the investor in the initial projects – and will be a separate section of the foundation's balance sheet. In order to best serve landscape restoration, Commonland's funds should be able to make different types of investments, such as nature investments and loans: land, forestry and agro investments; venture capital and private equity investments; infra-structure investments; and project and nature development grants. The risk/return profile of each investment is different. The average financial return of the mix (excluding the grant compartment) is expected to be in the magnitude of 5-7%.

Based on the experience of the initial fund (Commonland fund I), Commonland will design, develop and raise an impact investors fund (Commonland fund II), which will be an independent investment vehicle for impact investors.

After a couple of years of successful operations and a track record built into Commonland fund II, a next vehicle (Common-land fund III), should be the next step. This large-scale vehicle will not only target the traditional impact investors, but in particular also institutional investors like pension funds and insurance companies. Commonland expects the track record and market to be ripe for this step around 2020.

Commonland measures its results and shares knowledge with the learning networks they are part of. In doing so, they actively involve investors, companies and entrepreneurs in landscape restoration in cooperation with their partners.

Lots of work needs to be done. It is why an increasing number of new investment initiatives on landscape restoration are being started. A development that is warmly welcomed.

3.5 THE WAY FORWARD

Commonland is connected with the many organizations currently working on landscape restoration worldwide. The 4 returns, 3 zones, 20 years approach enables local farmers and stakeholders, as well as local authorities, companies and investors to understand the landscape and their role in it.

Commonland's way forward is outlined in a 5-year strategy plan. In close cooperation with their network of experts and their mission partners, being IUCN Commission on Ecosystem Management, the Rotterdam School of Management – Erasmus University, the COmON Foundation, the World Business Council for Sustainable Development, Wageningen University, the Economics of Land Degradation – GIZ, the United Nations Environmental Programme, the United Nations Convention to Combat Desertification and the Global Partnership on Forest and Landscape Restoration, Commonland will further develop and describe their model, develop large-scale landscape restoration areas with viable business ventures in each and establish the investment funds to make them flourish.

"Our strategy is to build bridges between farmers and local landowners, investors, companies and governments. That is our way to restore living and productive landscapes. It is not an easy way, but we believe that our 4 returns approach is the best way to achieve long-term landscape restoration successes."

— WILLEM FERWERDA, COMMONLAND

04 LITERATURE & MAPS

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4.2 MAPS

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Biodiversity Hot Spots Map of the World (Critical Ecosystem Partnership Fund)
http://www.cepf.net/resources/maps/Pages/default.aspx

Ecological Land Units Map of the World (FAO)
http://blogs.esri.com/esri/esri-insider/2014/12/09/the-first-detailed-ecological-land-unitsmap-in-the-world/

Geo Network Maps: world maps on water, agriculture and landuse (FAO)
http://www.fao.org/geonetwork/srv/en/main.home

Global Forest Watch Map (World Resources Institute)
http://www.globalforestwatch.org

Soil Map of the World (FAO/Unesco)
http://www.fao.org/soils-portal/soil-survey/soil-maps-and-databases/faounesco-soil-map-of-the-world/en

World Atlas of Desertification (European Commission)
http://wad.jrc.ec.europa.eu/index.php/atlas-table-of-contents-public

World Population Data sheet (Population Reference Bureau)
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05 APPENDICES

5.1 APPENDIX I: GLOSSARY

A general glossary of terms applied within the fields of landscape restoration, sustainable agriculture and forestry, business development and ecology.

3 Zones: Commonland's proposed way of receiving 4 returns is by designing 3 landscaping zones: a natural zone, a combined zone and an economic zone as developed and used by Commonland (source: Commonland).

4 Returns: Commonland's vision is that sustainable restoration of degraded landscapes, applied over a time frame of one generation (20 years) generates 4 returns:
- Return of inspiration: Giving people hope and a sense of purpose
- Return of social capital: Bringing back jobs, business activity, education and security
- Return of natural capital: Restoring biodiversity, soil and water quality
- Return of financial capital: Realizing long-term sustainable profit

(source: Ferwerda, 2015).

4 Returns Development Company: A landscape development company developing, jointly with local stakeholders, a 3 zones masterplan for the landscape and an investment strategy how to turn the landscape masterplan in 4 returns. The development company is developed by Commonland.

Action 2020: Action program of the World Business Council on Sustainable Development to 2020 and beyond. Ecosystems is one of the nine priority actions within Action 2020 (source: www.action2020.org).

Agro Forestry: An integrated approach of using the interactive benefits from combining trees and shrubs with crops. It combines agricultural and forestry technologies to create more diverse, productive, profitable, healthy, and sustainable land-use systems (Source: www.fao.org).

Afforestation: Artificial establishment of forest on lands that were not historically forest (source: IPCC, 2000).

Alien/Exotic Species: Animals, plants or other organisms that are not native to the particular ecosystem in which they are found (see also invasive species).

Analogue Forestry: A system of planned, managed forests, primarily deployed in tropical or subtropical areas. The forests are designed to mimic the function and ecology of the preexisting climax vegetation for the area, and are also designed to provide economic benefits (source: www.analogueforestry.org).

Asset Management Company: A company that manages investments made out of the pooled funds of investors in line with the investment objectives.

Biodiversity: Derived from biological diversity. It means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (source: UN Convention on Biological Diversity, www.cbd.int).

Bonn Challenge: A global movement launched on September 2, 2011 at a ministerial conference in Bonn to restore 150 million hectares of degraded and deforested land by 2020. The Bonn Challenge calls on countries and other actors to accomplish this as a way to meet several existing international developments, such as the Convention on Biological Diversity Target 15, the REDD+ agreement of the United Nations Framework Convention on Climate Change, and the Millennium Development Goals (source: www.bonnchallenge.org).

Business Case: Captures the core financial elements of a venture, project or task. A positive business case is assumed, when the case adds value for an end-user in such a way that the revenue is higher than the costs and that this results in a 4 returns for the company/ entrepreneur or the investors behind.

Business Model: A business model describes the rationale of how an organization creates, delivers, and captures value (source: Osterwalder, A and Y. Pigneur, 2010).

Business Plan: A formal statement of a set of business goals, a thorough description of the business in all its aspects, the reasons they are believed attainable, and the plan for reaching those goals.

Capacity Development: The process through which individuals, organizations, and societies obtain, strengthen, and maintain the capabilities to set and achieve their own development objectives over time (source: www.undp.org).

Carbon Sequestration: The removal of atmospheric carbon dioxide, either through biological processes (for example, photosynthesis in plants and trees) or geological processes (for example, storage of carbon dioxide in underground reservoirs).

Co-creation: The involvement of groups of people in decision making and value creation through personal engagement.

Collaborative Learning: The collective action and reflection that occurs among different individuals and groups as they work to improve the management of human and environmental interrelations (source: Keen et al., 2005).

Commons: The Commons derives from the traditional English legal term of 'common land'. While common land might have been owned collectively, by a legal entity, the crown or a single person it was subject to different forms of regulated usage, such as grazing of livestock, hunting, lopping of foliage or collecting resins. In distinction, the term commons in modern economic theory has come to refer to the cultural and natural resources accessible to all members of a society, such as air, water, and a habitable earth (source: wikipedia).

Deforestation: Clearance or clearing is the removal of a forest or stand of trees where the land is thereafter converted to a non-forest use (source: dictionary of forestry).

(Land) Degradation: The reduction in the capacity of the land to provide ecosystem goods and services and assure its functions over a period of time for the beneficiaries of these (source: www.fao.org).

Degradation Industry: Industrial processes that accelerate the degradation of landscapes through delivering maximization of financial returns per hectare (source: Ferwerda, 2015).

Eco-agriculture: The protection of wild species and conservation of habitat while increasing agricultural production and farmer incomes (source: www.ecoagriculture.org).

Ecosystem: An ecosystem is a community of living organisms (plants, animals and microbes) in conjunction with the nonliving components of their environment (things like air, water and mineral soil), interacting as a system. These biotic and abiotic components are regarded as linked together through nutrient cycles and energy flows. As ecosystems are defined by the network of interactions among organisms and between organisms and their environment they can be of any size but usually encompass specific limited spaces.

Ecosystem Functions: The physical, chemical, and biological processes or attributes that contribute to the self-maintenance of the ecosystem; in other words, what the ecosystem does. Some examples of ecosystem functions are wildlife habitat, carbon cycling, or trapping nutrients (source: www.ecosystemvaluation.org).

Ecosystem Services: The beneficial outcomes, for the natural environment, or for people, that result from ecosystem functions. Some examples of ecosystem services are support of the food chain, harvesting of animals or plants, clean water, or scenic views. In order for an ecosystem to provide services to humans, some interaction with, or at least some appreciation by, humans is required (source: www.ecosystemvaluation.org).

Enabling Restoration Company: A company that facilitates the process of the large scale 4 returns restoration industry. This could be a restoration-tech, finance, knowledge, training, research & innovation focused company.

Entrepreneurship: A skillset of being able to identifying and starting a business venture, sourcing and organizing the required resources and taking both the risks and rewards associated with the venture (source: wikipedia).

Environmental Impact Assessment (EIA): The process by which the anticipated effects on the environment of a proposed development or project are measured. If the likely effects are unacceptable, design measures or other relevant mitigation measures can be taken to reduce or avoid those effects.

Institutions: The rules, norms and practices which constitute social relations, by which resources are allocated, tasks and responsibilities are assigned, value is given and power is mobilized (DFID, 2002).

Investor: An individual or organization who allocates capital with the expectation of the 4 returns. Different types of investors:

- Institutional (pension funds, insurance companies)
- Development Finance Institutions
- Private Equity and Venture Capital funds
- Professional private investors (family offices, including typical impact investors)
- Retail investors

Investor Ready: Investor ready applies to the status of a (landscape restoration) business case and means that such business case, described in a business plan, is expected to meet the lending and/or investment criteria of banks, professional investors or investment funds.

Investor Ready Venture: The venture has a capable entrepreneur, with a core team, a validated business plan (first revenue proven), partners to launch, scale or exit, four returns indicators defined and a term sheet towards investors (source: Commonland).

Invasive Species: Invasive species are animals, plants or other organisms which are exotic and harmful to the ecosystem in which they are found. Invasive species can increase in population due to a lack of natural enemies in the new habitat.

Land Tenure: The name given, particularly in common law systems, to the legal regime in which land is owned by an individual, who is said to hold the land.

Landscape: Geographical construct that includes not only the biophysical components of an area but also social, political, psychological and other components of that system (Sayer et al, 2007:2679).

Landscape Approach: Managing complex landscapes in an integrated process, incorporating all the different land uses and the needs of the inhabitants within those landscapes in a single management process (source: www.cifor.org).

Landscape Entrepreneur/Venture: A (local) entrepreneur or company that operates in a landscape. The sum of landscape entrepreneurs in a landscape realizes the 4 returns business cases of a landscape. Therefore landscape entrepreneurs collaborate with other entrepreneurs within the landscape and the Development Company of the landscape to create 4 returns (source: Commonland).

Landscape Leadership: Refers to leadership as a capacity, within a spatial context. Landscape leaders are able to influence spatial decision making, negotiate and facilitate restoration process of degraded landscapes, motivate and connect landscape stakeholders to establish sustainable initiatives at landscape level.

Landscape Restoration: According to three experts 1) Turning degraded areas of land into healthy, fertile, working landscapes where local communities, ecosystems and other stakeholders can sustainably cohabit (source: www.iucn.org); 2) Re-establishing the presumed structure, productivity and species diversity that was originally present at a site that has been degraded, damaged or destroyed. In time, the ecological processes and functions of the restored habitat will closely match those of the original habitat (source: FAO 2005); 3) the process of assisting the recovery of the ecosystems within a landscape that have been degraded, damaged, or destroyed (adapted from the Society for Ecological Restoration, www.ser.org).

Landscape Restoration Plan: A master plan for a landscape based on 3 zones where the combined impact of viable businesses or ventures in those 3 zones, jointly with other types of interventions within that landscape, leads to a healthy restoration of the landscape as a whole, with the Four Returns as a measurable result.

Landscape Restoration Partnership: A partnership between (representatives of) the main stakeholders at the landscape level, who have developed a common understanding and vision regarding the sustainable restoration of the landscape.

Livelihood: Comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living (source: Chambers and Conway, 1992).

Reforestation: Artificial establishment of forest on lands that were historically forest (source: IPCC, 2000).

Reclamation: Replacing the natural vegetation with adapted vegetation types (source: Bradshaw, 1987).

Regeneration: The act of renewing tree cover by establishing young trees naturally or artificially. Regeneration usually maintains the same forest type and is done promptly after the previous stand or forest was removed (source: www.dictionaryofforestry.org).

Rehabilitation: To re-establish the productivity and some, but not necessarily all, of the plant and animal species thought to be originally* present at a site. (For ecological or economic reasons the new habitat might also include species not originally present at the site). In time, the protective function and many of the ecological services of the original habitat may be re-established (source: FAO 2005).

Restoration Industry: Industrial processes that contributes to the restoration of degraded landscapes gives four returns per hectare: inspirational, social, natural and financial returns (source: Ferwerda, 2015).

Millennium Development Goals: The eight Millennium Development Goals – which range from halving extreme poverty to halting the spread of HIV/AIDS and providing universal primary education, all by the target date of 2015 – form a blueprint agreed to by all the world's countries and all the world's leading development institutions. They have galvanized unprecedented efforts to meet the needs of the world's poorest. See also Sustainable Development Goals (source: un.org).

Millennium Ecosystem Assessment: The objective of the UN Millennium Ecosystem Assessment was to assess the consequences of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems and their contribution to human well-being. The findings of the more than 1,360 experts involved worldwide contained in five technical volumes and six synthesis reports, provide a state-of-the-art scientific appraisal of the condition and trends in the world's ecosystems and the services they provide (such as clean water, food, forest products, flood control, and natural resources) and the options to restore, conserve or enhance the sustainable use of ecosystems (source: www.millenniumassessment.org).

Monoculture: The agricultural practice of producing or growing one single crop over a wide area. It is widely used in modern industrial agriculture and its implementation has allowed for large harvests from minimal labor. However, monocultures can lead to the quicker spread of diseases, where a uniform crop is susceptible to a pathogen. 'Crop monoculture' is the practice of growing the same crop year after year (source: www.princeton.edu).

Mosaic Landscape: Multifunctional landscapes consisting of different components which together form a patchwork. This concept reflects the complexity and dynamics as well as the uniqueness of each landscape. A mosaic landscape is similar to the three zones model of Commonland (source: Rietbergen-McCracken et al., 2008.

Multi-stakeholder Process: A cooperation arrangement between a variety of actors that jointly engage in a process of dialogue and action to solve a specific problem (source: Van der Molen, I. and N. Stel, 2010).

Mycorrhizae: A symbiotic (generally mutualistic, but occasionally weakly pathogenic) association between a fungus and the roots of a vascular plant. In a mycorrhizal association, the fungus colonizes the host plant's roots, either intracellularly as in arbuscular mycorrhizal fungi or extracellularly as in ectomycorrhizal fungi. They are an important component of soil life and soil chemistry.

Net Present Value (NPV): In finance, the net present value (NPV) or net present worth (NPW) of a time series of cash flows, both incoming and outgoing, is defined as the sum of the present values (PVs) of the individual cash flows of the same entity (source: Wikipedia).

Permaculture: Originally referred to permanent agriculture but was expanded to stand also for permanent culture, as it was seen that social aspects were integral to a truly sustainable system as inspired by the Japanese Masanobu Fukuoka's natural farming philosophy. It now stands for a branch of ecological design, ecological engineering, and environmental design that develops sustainable architecture and self-maintained agricultural systems modeled from natural ecosystems. The term permaculture (as a systematic method) was first coined by Australians Bill Mollison and David Holmgren in 1978 (source: Wikipedia).

Planetary Boundaries: Is the central concept in an Earth system framework proposed by a group of Earth system and environmental scientists led by Johan Rockström from the Stockholm Resilience Centre and Will Steffen from the Australian National University. In 2009, the group proposed a framework of planetary boundaries designed to define a safe operating space for humanity for the international community, including governments at all levels, international organizations, civil society, the scientific community and the private sector, as a precondition for sustainable development (source: www.stockholmresilience.org).

Red List of Threatened Ecosystems: The IUCN Red List of Threatened Ecosystems compiles information on the state of the world's ecosystems at different geographic scales. Its central objective is to assess the risk of ecosystem collapse (source: www.iucnredlistofecosystems.org).

Red List of Threatened Species: The IUCN Red List of Threatened Species exists since 1963 and provides a list of animals, plants and other organisms that are endangered and tells how they are being threatened. It acts as a barometer of biodiversity (source: www.iucnredlist.org).

Reducing Emissions from Deforestation and Forest Degradation (REDD): Is an effort to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. REDD+ goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks (source: www.un-redd.org).

Return on Investment (ROI): The concept of an investment of some resource yielding a financial benefit to the investor. A high ROI means the investment gains compare favorably to investment cost. As a performance measure, ROI is used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments. In purely economic terms, it is one way of considering profits in relation to capital invested (source: Wikipedia).

Restoration Tools: Set of methods, technologies and overall management approaches to bring back ecological functions of a degraded ecosystem.

Sustainable Development Goals: The Sustainable Development Goals (SDGs) are a proposed set of targets relating to future international development. They are to replace the Millennium Development Goals once they expire at the end of 2015. The SDGs were first formally discussed at the United Nations Conference on Sustainable Development held in Rio de Janeiro in June 2012 (Rio+20) (source: www.sustainabledevelopment.un.org).

System (or Holistic / Integrated) Approach: An approach that takes the whole living system i.e. landscape (including social and ecological components) as a basis into account and to derive its specific relationships from within this system perspective. Systems theory looks at the set of interconnected components, relationships, behaviors and interactions within systems. Systems theory within the Systems Approach context recognizes that organizations i.e. land restoration, financial, health and social fields are systems in themselves and operate as components of broader systems (landscape restoration). Change within a systems context must therefore take into account both the context of and impacts on the system (source: www.ccsa.ca).

Topsoil: The upper, outermost layer of soil, usually the top 5 to 20 cm. It has the highest concentration of organic matter and microorganisms and is where most of the Earth's biological soil activity occurs.

Theory U: Theory U is a multi stakeholder innovation approach, developed by the Presencing Institute of Massachusetts Institute of Technology. The theory is applied in organizations and teams to foster bottom-up change and leadership. The theory emphasizes the importance of awareness, attention and consciousness of the participants in the process. The 5 core elements are presented in a U curve (source: www.presencing.com):

- Co-initiating: Build common intent. Stop and listen to others and to what life calls you to do
- Co-sensing: Observe, observe and observe. Go to the places of most potential and listen with your mind and heart wide open
- Co-strategizing: Connect to the source of inspiration and will go to the place of silence and allow the inner knowledge to emerge
- Co-creating: Prototype the new in living examples to explore the future by doing.
- Co-evolving: Embody the new in ecosystems that facilitate seeing and acting from the whole.

The Economics of Ecosystems and Biodiversity (TEEB): Is a global initiative started in 2008 focused on drawing attention to the economic benefits of biodiversity including the growing cost of biodiversity loss and ecosystem degradation. TEEB presents an approach that can help decision-makers recognize, demonstrate and capture the values of ecosystem services & biodiversity (source: www.teebweb.org).

Vegetation cover: A general term for the plant life of a region; it refers to the ground cover provided by plants, and is, by far, the most abundant biotic element of the biosphere.

Up-scaling: To efficiently increase the socioeconomic impact from a small to a large scale of coverage (source: World Bank, 2003).

5.2 APPENDIX II: ABBREVIATIONS

A list of abbreviations of concepts, (international) organizations and policies.

BAU	Business As Usual
CI	Conservation International
CIFOR	Center for International Forestry Research
CoP	Conference of Parties of a UN Convention
CSR	Corporate Social Responsibility
DFI	Development Finance Institutions
DFID	Department for International Development (United Kingdom)
DGIS	Department for International Cooperation (The Netherlands)
EEMPC	Environmental Education Media Project China
EIA	Environmental Impact Assessment
ELD – GIZ	Economics of Land Degradation, an initiative of the German International Cooperation (GIZ)
FAO	Food and Agriculture Organization
FSC	Forest Stewardship Council
GIZ	German International Cooperation
GPFLR	Global Partnership on Forest and Landscape Restoration
HIVOS	International development organization guided by humanist values
ICRAF	International Centre for Research in Agroforestry/World Agroforestry Centre
IDH	Sustainable Trade Initiative (Initiatief Duurzame Handel)
IE	Instituto de Empresa – Madrid
IPPC	Intergovernmental Panel on Climate Change
ISRIC	International Soil Reference and Information Centre - World Soil Information
IUCN	International Union for Conservation of Nature
IUCN CEM	Commission on Ecosystem Management, one of the scientific bodies of IUCN
LPFN	Landscapes for People, Food and Nature Initiative
MA	Millennium Ecosystem Assessment
MDGs	Millennium Development Goals
MIT	Massachusetts Institute of Technology

NMMU	Nelson Mandela Metropolitan University
SDGs	Sustainable Development Goals
NPV	Net Present Value
PA	Protected Area
PES	Payment for Ecosystem Services
REDD	Reducing Emissions from Deforestation and Forest Degradation
ROI	Return on Investment
RSM	Rotterdam School of Management – Erasmus University
SER	Society for Ecological Restoration
TEEB	The Economics of Ecosystems and Biodiversity
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
WBCSD	World Business Council for Sustainable Development
WLT	World Land Trust
WRI	World Resources Institute
WUR	Wageningen Agricultural University
WWF	World Wide Fund for Nature