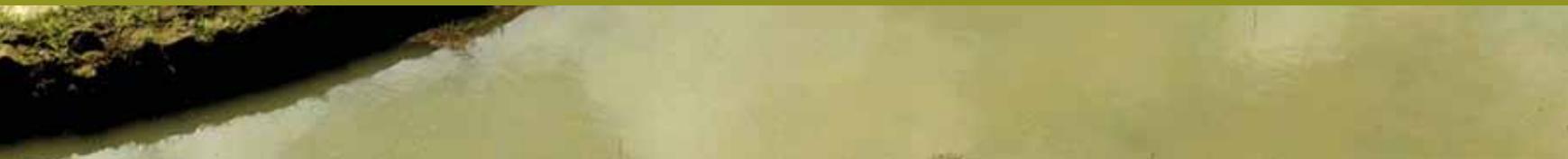
LAND-BASED ADAPTATION AND RESILIENCE

POWERED BY NATURE



FOREWORD

A threat to productive land is a threat to our survival and to the lives and livelihoods of our citizens. We all live on the land and feed our families from its bounty. Yet today, more than half of all agricultural land is degraded. Climate change is amplifying the forces that degrade the land – drought, floods and landslides in particular - and is a major risk for future peace and security.

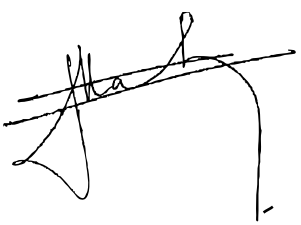
The poor and most vulnerable are already feeling the twin effects of climate change and degradation. Across Africa, for instance, more than half a billion people depend on rain fed agriculture. In my region, the Sahel, seasonal temperatures are now higher than normal. Rainfall is no longer as predictable. Dry spells are longer, more frequent and emerging in new areas. Families are finding it more and more difficult to survive and thrive. It is only a matter of time before these effects are felt in all corners of the globe.

What, in life, is of higher value than being able to feed your children? Too many people are unable to do so and are living from one day to the next. The strain this is putting on families, economies and, yes, even governance systems, is unbearable. Forced migration, internal displacement and resource-related conflicts are on the rise. Communities are disintegrating as they are forced to make hard choices, no matter how radical or extreme.

I cannot emphasize enough how vital it is that climate change does not damage our limited productive land, irreparably. Desertification is still a problem in dry places like the Sahel, but with most of the land degradation happening outside these areas, our common future looks bleak.

We need national and international measures to help us recover degrading land and ensure that the productive land under our care can withstand future climate change-related stresses. Land-based adaptation is a practical and affordable path towards that goal. It will surprise you how cost-effective it is.

Mitigation is a difficult but necessary road to avoid a climate catastrophe. But land-based adaptation is now indispensable for all communities. It only takes a few hours to erode an inch of soil but many years to recover it once it is gone. Let us act now on adaptation and resilience to avoid unspeakable losses in the future.



Macky Sall
President of Senegal
Chairperson of the NEPAD Heads of State and Government Orientation Committee

THINGS CANNOT STAY THE SAME

Following the drought in Sahel in the 1970s, Yacouba Sawadogo, a local farmer in Burkina Faso, reformed a traditional farming technique known as Zaï to restore fertility on his badly degraded land. He succeeded and has inspired thousands of families to use the practice. The knowledge has spread by word of mouth into neighbouring Mali and Niger. By 2003, farmers had rehabilitated more than 5 million hectares of land. It costs less than US$70 per hectare to rehabilitate land in this region today, but it took them twenty years with minimal input from outside. Sawadogo is one of the 2.5 billion small-scale farmers ensuring we have enough food on the table today, and every day. Can they do so into the future? Or will they slide back and join the over 1.5 billion people depending on degrading land?

You may not have contributed to climate change or you may be a polluter. Whatever your story, will you and your family adapt easily to climate change? Can your family, community or country absorb the extra stresses expected from climate change in the next few years?

In the first two decades of this Century, every region of the world has dealt with extreme climatic events; droughts, floods, snowfall, glaciers, heatwaves or wildfires. We have seen their effects in the loss of lives, homes and incomes. Food, water and energy shortages are becoming common-place. Families and entire communities are being displaced or are forced to migrate to survive.

Why? Land is the foundation of our lifestyles, economies and social structures. We mark our national borders in terms of the land. Every home and business sits on a piece of land. Our food and fresh water come from the land. Degrading land is a threat to each and every one of us.

Land is sensitive to two things in particular – human and climatic activity. We have inflicted a lot of damage on the land in the last two Centuries through conversion of land for human activity. The scope of water scarcity worldwide signals that land degradation may be even worse than presumed. The increase in climate variations and extreme events is accelerating the damage. We will lose a lot more land to degradation as the climatic events most damaging to the land increase in power, frequency and extent.

Things cannot stay the same when the land is changing so rapidly. 169 countries have declared themselves as being affected by desertification under UNCCD. A land-based approach to climate change adaptation and resilience is now necessary and inevitable. It requires action in the negotiations for a 2015 climate change agreement. We cannot wait another 20 years to act. The costs of inaction on land degradation will be too high

WORLDWIDE IMPACTS: NO IMMUNITY

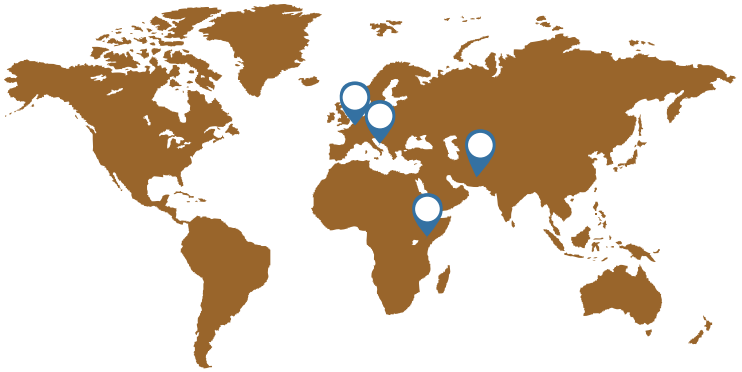
The Earth warmed up between 1901 and 2012. And the warming since 1960 has changed the water cycle dramatically. The precipitation from rainfall, snowfall, melting snow or receding glaciers are excessive or inadequate to sustain families. The changes are uneven as dry regions get drier and the wet areas, wetter, but no region is immune to the impacts of climate change.

EXPERIENCE

Europe: In 2011, France suffered its driest year in 50 years, and 93 regions were placed under the national drought watch. It disrupted agriculture and hydropower production dropped by over 20%. Italy has suffered six droughts in the last 10 years, including northern Italy, which has some of the highest rates of annual water availability in Europe, largely due to underground supply from the Alps. The entire country is projected to undergo a substantial drying as the impacts of climate change become more pronounced.

Eastern Africa: In 2011, the Horn of Africa in Eastern Africa suffered one of its worst droughts. It claimed 50,000 lives and affected 13 million people, including 4.5 million in Ethiopia and 4 million in Kenya. The cost to Kenya is estimated at about 17% of its Gross Domestic Product.

Tajikistan: The Central Asian country of Tajikistan experienced an unusually severe winter at the end of 2007, which led to electricity, water and heating shortages and food losses. These impacts coincided with drought, which led to a dramatic rise in food prices and food insecurity.



LAND DEGRADATION AND CLIMATE CHANGE TWINNING: DOUBLE TROUBLE

- 52% of all agricultural land is degraded
- 80% of deforestation is driven by agriculture
- Between 1985 and 2005, the world's croplands and pastures expanded by 154 million hectares
- In the last two centuries, 70% of the world's grasslands, 50% of the savannah, 45% of the temperate deciduous forest, and 27% of the tropical forest biome has been converted to farming and grazing areas

The twinning of Land degradation and climate change causes double trouble as they drive each other in a cyclical downward spiral. They are eroding the fertile topsoil and depleting the fresh water sources – rivers, lakes, glaciers and aquifers – that sustain life.

More than half of all agricultural land is already degraded. Every decade, we are losing at least 120 million hectares of land, an area the size of South Africa, to desertification and drought alone. But 78% of degrading land now is in the humid regions – outside areas normally prone to drought. This is adding greenhouse gases into the air. Soil formation requires carbon. A lot of it is stored in the soil and the vegetation that grows in the soil. But we are releasing more and more carbon as we clear vegetation, especially for agriculture. Carbon is then trapped in the air as carbon dioxide, with nowhere to go, because degraded land loses its ability to capture carbon back into the soil. In this way, land degradation fuels climate change. Some of the 25% of greenhouse gases emissions from agriculture have come about in this way.

Land degradation was a global challenge long before climate change. But global warming is enabling land degradation.

Since 1951, temperatures have risen by 0.6-0.7 degrees Celsius. With warming, many regions are receiving less or excess water. New areas are being degraded. Floods and droughts, are destroying the ability of the land to drain water efficiently, and eroding fertile soil. Compared to 1986 to 2005, it could get warmer by a further 0.3-0.7 degrees Celsius between 2016 and 2035, and by 1.5 degrees by the end of the Century, compared to the warming that took place between 1850 and 1900. Climate change is making a bad situation worse. The consequences may be unbearable, mostly because they may occur in parallel and overtax existing social, political and economic structures.

(IN)SECURITY: UNSPEAKABLE LOSSES AND SPIRALLING COSTS

Land has many uses. It provides water, food and energy. It is used to create wealth and employment and grow economies. And it provides other, often less obvious and tangible, services such as conserving biodiversity, storing carbon, purifying and storing water. It even regulates the Earth's climate, for instance, by absorbing the heat from the sun. All of its uses are undermined and destroyed when land is degraded. Degrading the land disrupts these functions and leads to severe food, water and energy shortages. Even if we stop emitting greenhouse gases today, we still need to take action to minimize the spiralling cost of historical land degradation and emissions damage.

FOOD INSECURITY: FALLING YIELDS, SHIFTING CROPS

Three significant changes that are taking place in parallel will make food security a bigger challenge than ever before. First, crop yields are falling in all regions of the world, and for a wide range of plants, because of extreme and erratic weather and the migration of crop-growing zones due to global warming. The small gains made for a few crops in the coldest regions will not help. Maize and wheat, two of the crops with highest demand in the world, are particularly negatively affected. Second, demand for food, water, energy and housing is growing. Many poor people will soon demand a consumer middle class lifestyle. Fierce competition over productive land for different uses will undermine food security. Third, a large number of people like Sawadogo who depend on the land or produce food for others may not be able to keep up their production due to climate change. In addition, more than 1.5 billion people are already relying on degrading land. This includes 42% of the very poor and 32% of the moderately poor, compared to 15% of the non-poor. Climate change will increase this number, if we fail to take the necessary adaptation measures.

Meeting demand will be a mammoth task under these conditions. Growing food insecurity will be a trigger for political instability. We have few options. It is time to switch to more sustainable land use practices to recover degrading land, boost production on all lands and adapt the agricultural sector to climate change.

- The annual cost of land degradation in Europe is estimated at USD 52 billion (EUR 38 billion)
- The economic losses from deforestation and land degradation are estimated at USD2-4.7 trillion (EUR 1.5-3.4 trillion) for 2008, equal to 3.3-7.5% of global GDP for that year
- Food shortages led to food riots in more than 30 countries in the first half of 2008
- Nearly 1 billion people are hungry today
- By 2020 - in just six years – an estimated 49 million more people could face hunger
- 2 billion people will be added to the global population by 2040
- 3 billion consumers will join the middle-class by 2030, thus food demand is projected to increase by 50% by 2030
- 2.5 billion small-scale agricultural producers manage most of the world's estimated 500 million small-scale farms and rely on rain fed agriculture and provide over 80 per cent of the food consumed in a large part of the developing world
- Median crop yields will fall by 2% every 10 years for the rest of the Century

- Only 3% of all water is fresh water and 70% of this fresh water is used to produce food, including in practices that degrade the land
- 31 countries, with less than 8% of the world's population, face chronic freshwater shortages
- More than 2.8 billion people in 48 countries will face water scarcity or stress conditions and 2.4 billion people may be living in areas subject to periods of intense water scarcity by 2025
- Up to 54 countries, with a combined population of 4 billion people, which is about 40 per cent of the projected global population, could face water stress or scarcity by 2050

EXPERIENCE

United States: The 2012 drought in the United States affected the corn harvest. If the world keeps warming, US farm production could drop by a modest 4 to 13% by 2030. And average crop yields in existing US farm regions could decline by as much as 63 to 82% by the end of the century under especially rapid warming.

WATER INSECURITY: RUNNING DRY

Water scarcity is growing and water quality is declining worldwide. Water shortages are already driving inter-ethnic and other conflicts as competition for access to sufficient useable water accelerates. Demand is expected to grow by 30% in the 15 years to 2030. We cannot sustain the current levels of water withdrawal in future, without improving the land. Only when we improve the land will ground water supplies of fresh water to wells, lakes and rivers recover. There is no shortcut to recharging and improving ground water. Switching from land use practices that strip the land, pollute the soil and destroy its drainage to practices that increase soil cover, enhance soil formation and improve soil drainage can help reverse the trend and improve our chances of meeting existing and growing demand for water.

EXPERIENCE

North Africa: North Africa is the world's second most vulnerable region to emerging climate-related risks. Between 2010–2030, Alexandria, Casablanca, and Tunis individually could suffer cumulative economic losses of US$1 billion from floods, earthquakes, coastal erosion, ground instability, marine inundation, tsunamis and water scarcity. The increased frequency of extreme climate events could expose up to 25 million urban dwellers to floods and droughts. These same climate change effects could lead to a 30–50% drop in water availability, exacerbating the existing severe water scarcity.

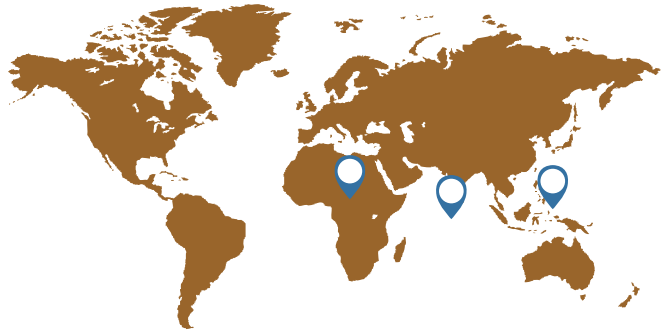
ECONOMIC INSECURITY: SLIDING BACKWARDS

A wide range of economic activities – from mining and urbanization to food and energy production – are degrading the land. Many economies are relying on these activities to grow and to create employment. For many poor countries, agriculture and livestock production are the main economic activities and primary source of rural employment. As land degradation worsens with climate change, unemployment is growing in poor rural areas, particularly in the drylands of Africa. Food supplies are diminishing, the provision of basic social services like education is declining and the response to disasters is falling short. Like Sawadogo before them, families are facing hard choices to survive. Communities are breaking up and governance is failing. Unemployed and under-employed youth are becoming the targets of extremism or victims of radicalization. Thriving economies and strong civil societies are the foundation of peace and prosperity. For agriculture-based economies, in particular, land-based adaptation can tackle and reverse land degradation and put society back on the path to sustainability.

- In Africa, the land sector employs about 70% of the population
- Agricultural yields may fall by up to 50% if the food production practices stay the same in Africa
- Economic simulations show that agricultural gross domestic product losses could be as high as 30% in Mali and 20% in Burkina Faso, up to 4% for India and between 8-14% in 14 Latin American countries

- The sea-level will rise about half a meter by the turn of the Century, affecting 70% of the world's coastlines
- Only 4.2% of the total humanitarian aid in 2009 went to disaster prevention and preparedness
- Only US$0.62 went to preparedness for every US$100.00 of humanitarian assistance spent by the top 20 humanitarian recipients in the last five years

EXPERIENCE



Africa: More than 650 million people in Africa depend on rain-fed agriculture, including people that live in areas already stressed by water scarcity and land degradation. If water stress and degradation persist, two-thirds of the region's arable land could be lost by 2025, and with it, the livelihoods of millions of smallholder farmers.

Small Island Developing States: Agriculture has been a driver of economic growth in the Small Island Developing States, but 76% the SIDS have declared they are affected by desertification. Due to their size, the loss of one hectare of land is a significant economic loss. The Maldives and Palau have lost part of their coastline. In the Barbados, sea water is seeping into underground wells. Soil erosion into the ocean is affecting the coral and fish are retreating deeper into the ocean. Many of these countries cannot afford the construction of heavy infrastructure to secure their land resource.

HUMAN INSECURITY: MISSING TARGETS

As land degradation worsens and food production declines, new lifestyles and new forms of conflict and migration patterns are emerging. From South Sudan to Syria, India to Brazil, seasonal and temporary migration was a coping mechanism for families and communities facing tough conditions and extreme weather. Not anymore. Intolerance is growing as temporary migrants become permanent residents, turning a coping mechanism into a form of land encroachment. With food producing areas declining, more and more land-dependent families are constantly on the move in search of food, water or pasture – including communities that were once sedentary. These changes are creating tension and new forms of conflict, internal displacement and forced migration.

It is a security threat that cannot be addressed with existing security tools. In countries where a large number of people depend on the land and where there are weak or no safety nets, social or even state collapse is a real possibility. A pragmatic approach to rehabilitate degrading land, to restore collapsing ecosystems and to secure productive land is essential to the restoration of livelihoods, communities and the land. As the climate changes and tensions rise it will be ever more important.

EXPERIENCE

Southern Sudan: Conflicts over water and grazing land in the Darfur region of Sudan were common place before they escalated into a full war in 2003. Tensions had exploded into community conflicts much earlier, in 1987, following a severe drought that led pastoralists to encroach on cultivated areas. Burning of pasture and the destruction of water wells became weapons of war. With little to lose, the landless joined the conflict. Today, 10 years on, more than 1.7 million people live in camps.

ADAPTATION AND RESILIENCE: POWERED BY THE LAND

We might not escape some of these challenges in the short term due to the damage already done to the land. We can, though, change course. If we invest in sustainable land use practices and set up safeguards for the worst times, we can ease the food, water, income and security threats that communities will face. This is the aim of land-based adaptation. If we rebuild our land-based infrastructure and set global targets for success, our social, economic and political systems will be protected from land degradation. This is the purpose of land-based resilience.

FROM THE GROUND UP: GRASSROOTS INITIATIVES AND INVESTMENTS

Investing in sustainable land management practices (SLM) is the fastest and cheapest way to stop land degradation. SLM practices can reduce soil erosion, improve water drainage and increase soil fertility. By targeting that part of the population that depends on the land, like Sawadogo, we can reduce the number of poor people who are vulnerable to climate change by up to 1.2 billion. The adoption of SLM by small-scale producers would, at least, sustain production at current levels for the 2.5 billion small-scale producers. If adaptation is powered by the land, we could even increase production.

Land-dependent people, in particular small-scale producers like Sawadogo are struggling against all odds to find new ways to ensure everyone has enough food. They are motivated to try new techniques to adapt to a changing climate and increase productivity. But success in creating and implementing the right technique can take many years. With the right knowledge and incentives, it could take as little as two years to rehabilitate degraded lands. This would be a low-cost, labour intensive pathway for adaptation, with many positive spin-off benefits. It will create new jobs, reduce the impact of disaster and safeguard the land's future productivity.

SLM practices are not spreading fast enough though. Incentives are generally inadequate. Many regions are still providing incentives for practices that damage the land – things like chemical fertilizers or intensive irrigation practices. In other parts of the world, the real tillers of the land, especially women and the landless, lack the rights that would allow them to invest for the future. We need laws that support land users and promote tenure rights and financing that drives sustainable land management practices and adaptation powered by nature.

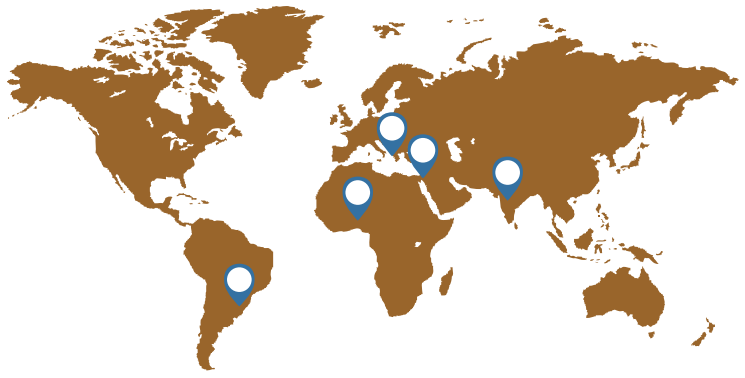
EXPERIENCE

Israel: A study of soil erosion on adjacent farms after a flash flood in Israel showed that the land under sustainable land management practices suffered 90% less erosion than neighbouring plots that were using conventional agricultural practices. To promote SLM adoption, a fund was established in 2010 to compensate farmers for the loss of farm outputs they would incur for switching to SLM practices. Four years later, none of the farmers using the new practices had submitted any claims.

Niger: After 15 years of rehabilitating degraded land using water harvesting techniques in Batodi village, in the Tahoua region of Niger, land productivity improved and the water table rose by 14 meters. Women who used to travel half a day journey to fetch water now draw water from wells that are within 30 minutes of their doorstep. These communities will be in a better position to cope than others living in the region, if droughts or other weather-related events strike.

Albania: Using conservation tillage or mixed cropping, Albania stopped the erosion of 200,000 tons of soil and increased the resilience of the landscape to the impacts of climate change and gained multiple environmental benefits. Much of the success is attributed to the fact that the Government transferred the forest land-rights to 345 communes serving almost 1 million people.

Argentina: In 2006, in North West Buenos Aires in Argentina, cotton production collapsed due to saline build up. Farmers abandoned the land. The non-governmental organization Grupo Ambiental par el Desarrollo, introduced a native nutritious tree that rehabilitates the soil and provides wood, flour and honey. Nearly 7,000 ha have been reforested in 6 years, with youth in the lead.



India: In India, the Foundation for Ecological Security has worked with communities to set up community governance mechanisms that have enabled them to conserve over 200,000 hectares of common property rangelands, forests and water resources. Communities can be effective at restoring ecosystem functions and the land's productivity even on communal land. Their work has improved the livelihoods of 1.7 million people people living in more than 4,000 villages, and influenced national environmental policy.

A NATURAL INSURANCE POLICY

Sustainable land management practices can reduce vulnerability to land degradation and climate change. Communities should not slide backwards when there is severe pressure on the land or climatic shocks. Land users need timely information about looming disasters such as drought and knowledge about how to respond and manage the situation. They need reliable systems to fall back on in case of disaster. And they need to know how their land and ecosystems function in order to optimize land use and minimize their vulnerability.

By creating information systems to monitor and communicate changing climatic disaster situations quickly, setting up insurance and co-contributory voluntary schemes in the good times and diversifying their produce, family farmers and small-scale producers can manage their risks and cope with disaster. It will save lives, strengthen recovery and contain conflicts and migration.

EXPERIENCE

Brazil: Ceará, the north-west state of Brazil, is a dryland region with serious water challenges. The State government has constructed water reservoirs to assist livelihoods in times of drought. The reservoirs are monitored in real-time in order to warn local people when a drought is emerging and to manage water effectively during crises. Contributory voluntary insurance schemes are activated when the state government declares a drought disaster. In 2011-2012, these measures enabled subsistence farmers and herders, for the first time, to cope with the second-worst drought the region has experienced in 50 years. And most of the land recovered faster after the drought because it was not used during this period.

CONNECTING THE DOTS

When land use practices such as agroforestry, farmer managed natural regeneration and evergreen agriculture are replicated and cover large areas they transform the land in fundamental ways. Their large-scale application connects the dots. It helps communities to recover many of the services that natural ecosystems play; roles that are lost when ecosystems are converted to other land uses.

Restoring land at large scale improves watersheds and water drainage, refills aquifers, increases tree and plant cover, and helps to recover biodiversity and soil fertility. Communities gain the benefits of natural ecosystems and increased economic production. By connecting the dots we could also secure the rights of land users, strengthen their ability to plan, collaborate and monitor change and provide the knowledge, about land under climate change, to boost the resilience of rural people.

EXPERIENCE

New Zealand: Since 1990, agroforestry has been an established practice in New Zealand with a view to increase overall profits from the land and to meet many non-economic goals such as erosion control, weed suppression, livestock welfare and the beauty of the land. Small-scale growers have planted trees on more than 650,000 ha, mostly on pasture land. The three most common forms of agroforestry are: farm-based – trees planted on existing farms; forest-based – animals grazing in existing forests; and timber belts – shelterbelts on farms managed to produce high quality timber.

South Korea: Between 1957 and 1980, forest cover in the Republic of Korea increased from 34% to 64% and many different diverse ecosystem services were restored. The benefits include forest recreation, enhanced water storage, improved air and water quality, soil erosion control and landslide prevention. The return, every year, from this investment is over US$61 billion.

- 2 billion hectares of degraded land have the potential for land rehabilitation and forest restoration

GLOBAL SOCIETY AT A CROSS-ROAD

Converging livelihoods and consumption patterns are making us more and more dependent on each other and on the land we share. Climate change has amplified the challenges and led us to a cross-road. We now have to choose. One path leads us to more conflict and insecurity.

The other takes us towards a land-degradation neutral world, if we monitor land degradation globally as the UN Conference on Sustainable Development (Rio+20) held in 2012 proposed. It would help us to avoid degrading new area simply by strengthening the recovery of the degraded areas. In a land-degradation neutral world, the amount of healthy and productive land resources needed to support vital ecosystem services remains stable or increases in a given time and space. This can happen naturally or because of improved land management and ecosystem restoration. By following this path, we can have enough productive land to sustain future needs. Nature can power us towards resilience in the face of climate change.

GOING LAND-DEGRADATION NEUTRAL

Small-scale producers who are creating employment, supporting our livelihoods, and using techniques that protect the land are crucial stakeholders. They will be most affected by climate change and are pivotal for meeting future demand for food, energy and water. The 1.5 billion people living on degrading land can help achieve the goals of security and resilience. If we empower them to recover the lost productive potential of their land, it is possible to support the livelihoods of billions of people. Even in the face of climate change. And the processes of recovering lost land productivity can also absorb gigatonnes of carbon dioxide from the air.

The Sustainable Development Goals and the Post-2015 Development Agenda, currently under negotiation, can help promote land-based adaptation. By agreeing on targets and indicators for going land-degradation neutral we will secure vital ecosystem services, we will adapt and mitigate climate change. Land degradation neutrality will enhance drought risk prevention, preparedness, mitigation and management. We will help to feed a growing population.

LAND-BASED ADAPTATION AND RESILIENCE

As we head towards a 2015 climate change agreement, there are opportunities to ensure land users adapt and become resilient to climate change. Linking adaptation measures to land use practices and agreeing on common measures of success will send a powerful signal that things cannot stay the same.

Land degradation is a slow invisible process. The fact that the land is failing to cope with current climate change impacts, especially the challenges of growing water scarcity and increasing flooding, is a clear signal of the state our land is now in. We have run out of time.

Our lives and livelihoods are too closely tied to land to ignore it in the climate change agenda. Land-based action is the climate change adaptation agenda for most people and most communities. Land-based adaptation is a pathway to resilience and security – food security, water security, energy security, economic security and even human security.

Future generations rely on us to make the right choice and to take the right path. Iceland's experience shows that the journey to recovery may be a long one, but it is necessary.

EXPERIENCE

Iceland: In 1907, Iceland passed the Forestry and Protection Against Soil Erosion Act to take action against soil erosion and desertification. The mix of a harsh climate, unsustainable land uses and volcanic activity had taken a toll on a country which, prior to its discovery by the Vikings, over half was once covered by trees, shrubs, and grasses. By 1990, nearly a hundred years after the Act, a national survey showed serious soil erosion persisted in about 40% of the country. However since the 1980s, restoration initiatives have accelerated from annual plantings of about 1 million tree seedlings to 4 million in the 1990s and then 5 million for the first seven years of the 2000's.

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