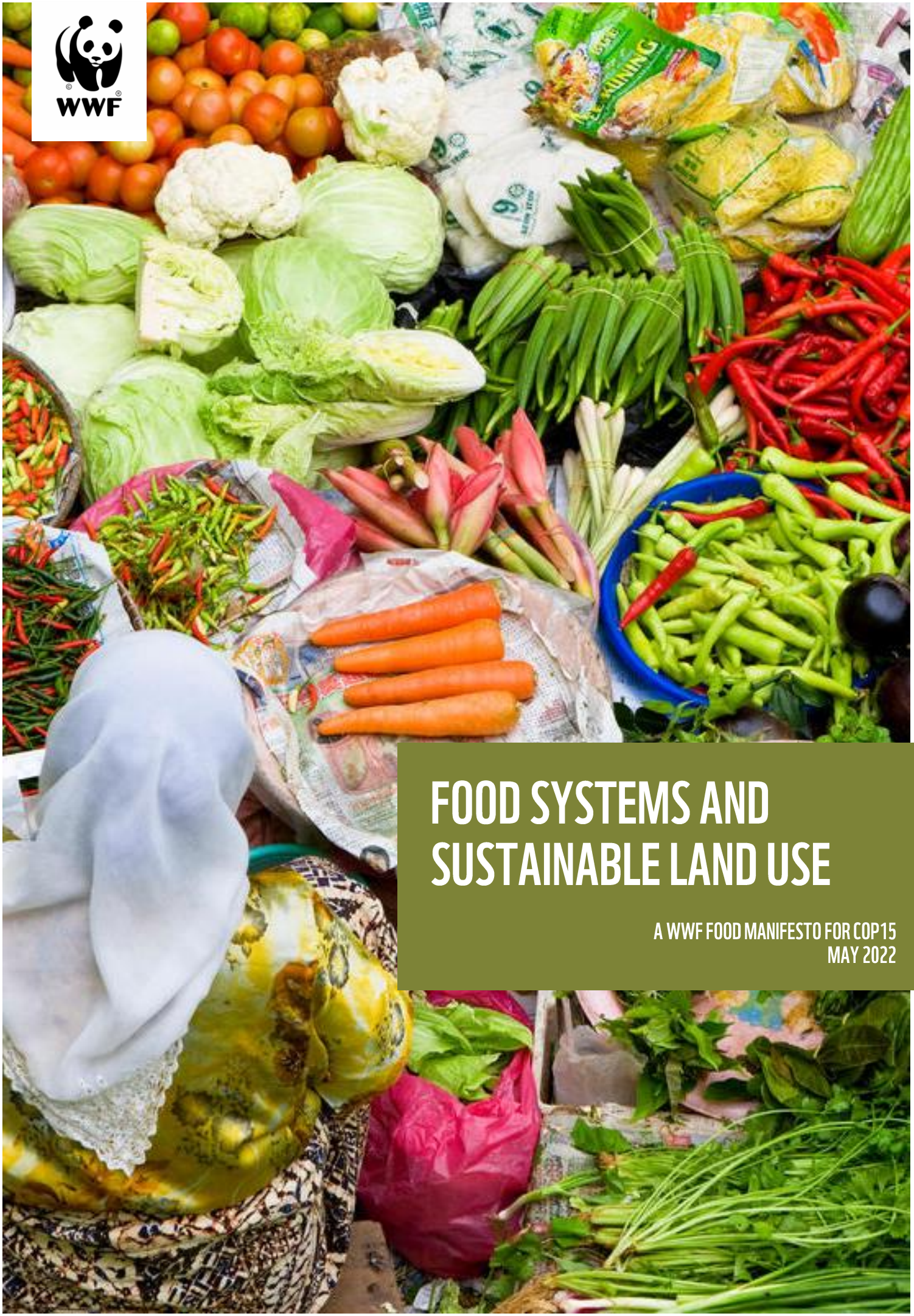


FOOD SYSTEMS AND SUSTAINABLE LAND USE

A WWF FOOD MANIFESTO FOR COP15
MAY 2022

Copyright Credit © Elizabeth Dalziel / WWF-UK

CONTENTS

Cover photography: Copyright Credit © naturepl.com / Gavin Hellier / WWF

Food Systems: Shifting from the principal cause of land degradation to the primary catalyst for restoration and a nature-positive future.

Food Systems have been the primary cause of land degradation, but our ability to produce healthy and nutritious food is also suffering from this deterioration. By applying a suite of solutions across food systems, both in production and on the demand-side, it is possible for them to become the principal catalyst for restoration and recovery. UNCCD COP15 presents a timely and urgent opportunity to place food systems transformation at the heart of land restoration, climate change mitigation and adaption, and recovery for a nature-positive future.

Soil degradation, biodiversity loss and climate change-induced droughts are among the most pressing environmental problems facing humanity. Soil degradation has reduced the productivity of nearly a quarter of the global land surface, affected the well-being of about 3.2 billion people and cost about 10% of annual global gross domestic product in lost ecosystem services. Food systems have been at the heart of this degradation. What we eat and how we produce it accounts for 80% of deforestation, 70% of biodiversity loss on land and around 30% of all greenhouse gas emissions. The Global Land Outlook Second Edition emphasised these trends, noting that climate change, overgrazing, excessive cultivation, deforestation and urbanisation have left up to 40% of the planet's land degraded - affecting half of humanity.

At the same time, food security suffers as a result of land degradation. Both directly, with food quantity and quality lower on the 52% of farmland that is degraded than on healthy land, and indirectly as a result of other depleted ecosystem services like healthy waterflows and carbon sequestration.

Restoring arable and pasture land is critical to food security. By applying a suite of solutions across food systems, it is possible to transform them from being the primary cause of land degradation to the principle catalyst for restoration and recovery. This requires a shift in thinking, focusing not only on supply-side solutions in changing food production practices, but also demand-side solutions, like consumption and food loss and waste, and socio-economic factors.

The UNCCD COP15 provides a timely and urgent opportunity to accelerate the implementation of these solutions. This COP will be the first of any Rio Convention to host a dedicated day for food systems events and discussions. **Food Day - Seeds of Change for a Nature-Positive Future** will focus on the interdependence of demand-side drivers and supply chains, and help place food systems considerations at the centre of debates on land degradation, climate change and biodiversity loss. There is additional opportunity to build on the declaration of an upcoming International Year of Rangelands and Pastoralists to establish dedicated mechanisms for protecting and restoring often over-looked ecosystems like grasslands and savannahs.

Below, we highlight six key areas in which stakeholders can take immediate action to transform food systems and meet Land Degradation Neutrality targets. In summary, these areas and the necessary actions are:

- ***Grasslands, Savannahs and Rangelands***
    - Protect: increase the area conserved in protected and conserved areas to include ecologically-representative, viable and well-connected examples of all grassland, savannah and rangeland (GSR) ecoregions
    - Manage: improve management of the world's GSRs to increase carbon storage, optimise grazing levels, boost biodiversity to support adaption to climate change, reduce compaction and erosion, and increase other ecosystem services, such as water security
    - Restore: implement large-scale restoration to re-establish ecosystem services and improve the livelihoods of over a billion people living on degraded farmland. The UN Decade on Ecosystem Restoration, provides a mandate for a radical scaling up of restoration ambitions

- ***Healthy Soils***
    - Improve soil health on 50 percent of all agricultural land by 2030
    - Encourage 100 million farmers to adopt improved soil-health practices by applying agroecology and regenerative practices
    - Mobilise USD 100 million in finance and investments and by repurposing agrifood support
    - Increase the current amount of annual soil-sequestered CO2 by five times

- ***Healthy and Sustainable Diets***
    - Include a food systems approach in land restoration commitments
    - Halt conversion of natural habitats for food production
    - Commit to turning food systems from being a primary cause of land degradation to being a primary solution for land restoration
    - Repurpose food and agriculture subsidies to reward actions that are good for climate, nature and people

- ***Agrobiodiversity***
    - Using agrobiodiversity to support productive and resilient agricultural ecosystems and increase knowledge about its benefits
    - Creating incentives and markets for diversified production
    - Increasing access to and exchange of quality seed and planting material through resilient and efficient systems that meet farmers' needs and build capacity in using sustainable management practices

- ***Land Tenure***
    - Securing legitimate land rights to safeguard people from chronic poverty and food insecurity
    - Securing legitimate land rights to enable collective natural resource management
    - Securing legitimate land rights to provide an incentive for investing in ecosystem restoration
    - Securing legitimate land rights to enable local innovations for sustainable resource use
    - Securing legitimate land rights to democratise the food system

- ***Gender Mainstreaming***
    - Take steps to advance innovative policies and measures that recognise women's equal access to land, resources and tenure security as enabling conditions for combating desertification and land degradation — especially in rural areas
    - Promote gender-responsive and gender-transformative measures and awareness-raising
    - Take steps to remove systemic inequalities as well as socio-economic and cultural barriers that:
        - Disempower and victimise women, making them — especially for rural and Indigenous women — more likely to disproportionately suffer from droughts and other natural disasters
        - Prevent women from accessing land and resource security, education or extension services
        - Limit women's full, informed and equitable participation in policy and decision making related to land use, food systems, budgeting and other relevant policies.
    - Ensure gender-responsive mobilisation of resources for the implementation, monitoring and reporting of the GAP, as well as capacity building for all actors
    - Strengthen collaboration and synergies across the Rio Conventions for mainstreaming gender and developing gender-responsive and gender- transformative measures while building associated capacities as relevant
    - Continue to support systematic documentation of gender-related knowledge such as women's innovations and effective practices that women have historically employed to maintain soil fertility and biodiversity and to mitigate the impact of drought and desertification.

GRASSLANDS, SAVANNAHS & RANGELANDS

POLICY BRIEF • MAY 2022

Strategic Approaches to Restore Grasslands, Savannahs & Rangelands (GSRs)

Prepared by the organisers of the UNCCD COP15 Food Day - Seeds for Change for a Nature-Positive Future

Key Recommendations:

UNCCD's goal of Land Degradation Neutrality[1] (LDN) provides a unique opportunity to focus attention on the protection, management and restoration of grassland, savannah, and rangeland ecosystems.

Globally, these ecosystems are in urgent need of three overarching actions:

1. **Protect:** increasing the area conserved in protected and conserved areas to include ecologically-representative, viable and well-connected examples of all GSR ecoregions – **LDN Response Hierarchy Action 1:** "***Avoid*** *new degradation of land by maintaining existing healthy land*".

2. **Manage:** improving management of the world's GSRs to increase carbon storage,[2] optimise grazing levels, boost biodiversity to support adaption to climate change,[3] reduce compaction and erosion,[4] and increase other ecosystem services, such as water security – **LDN Response Hierarchy Action 2:** "***Reduce*** *existing degradation by adopting sustainable land management practices that can slow degradation while increasing biodiversity, soil health and food production.*"

3. **Restore:** implementing large-scale restoration to re-establish ecosystem services and improve the livelihoods of over a billion people living on degraded farmland. The UN Decade on Ecosystem Restoration[5,6] provides a mandate for a radical scaling up of restoration ambitions – **LDN Response Hierarchy Action 3:** "***Reverse*** *land degradation through the rehabilitation and restoration of biodiversity and ecosystem processes.*"

This briefing paper argues that given their high rate of loss and low level of protection, **GSRs require particular attention in UNCCD's LDN voluntary in-country Target setting** and identifies some targets and **indicators to measure progress**.

Grasslands, Savannahs & Rangelands (GSRs) play critical but often forgotten roles in a wide range of ecosystem services, including biodiversity conservation, food production, and climate change mitigation and adaptation.

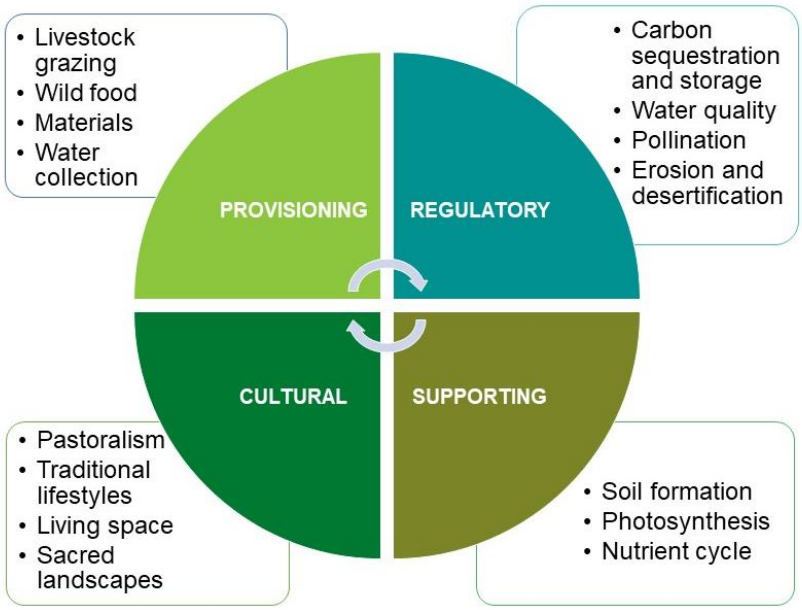


Figure 1: Some of the ecosystem services from grasslands, savannahs, and rangelands

Ecosystem services from GSRs are far more valuable than usually recognised.[7] They store carbon to mitigate climate change,[8] possibly better than forests in places at high fire risk,[9] with huge potential for restoration, which for many ecosystem, services can be achieved faster than for other ecosystems.[10] Grasslands cover 54% of the land.[11] They reduce desertification[12] and dust storms, and protect water supplies.[13] They support a quarter of the world's people, with huge cultural diversity, from gauchos in South America to nomads in Central Asia,[14] and contain many sacred landscapes.[15] Grasslands support food security[16] with natural grasslands providing feed for many livestock[17] and resources for wild food collection,[18] and grasslands also provide the source ecosystems for almost all agricultural lands. Sustainable pastoralism plays a key role in the maintenance of many ecosystem services. GSRs are critical to the 500 million people who identify themselves as pastoralists,[19] and on 15 March 2022, the United Nations General Assembly in New York unanimously declared 2026 the International Year of Rangelands & Pastoralists.[20] Regaining the health and sustainability of the world's GSR ecosystems is a critical component in the Nature Positive by 2030 movement.[21]

But these ecosystems are amongst the most threatened in the world: under pressure on three fronts, from conversion, degradation, to the impacts of climate change.

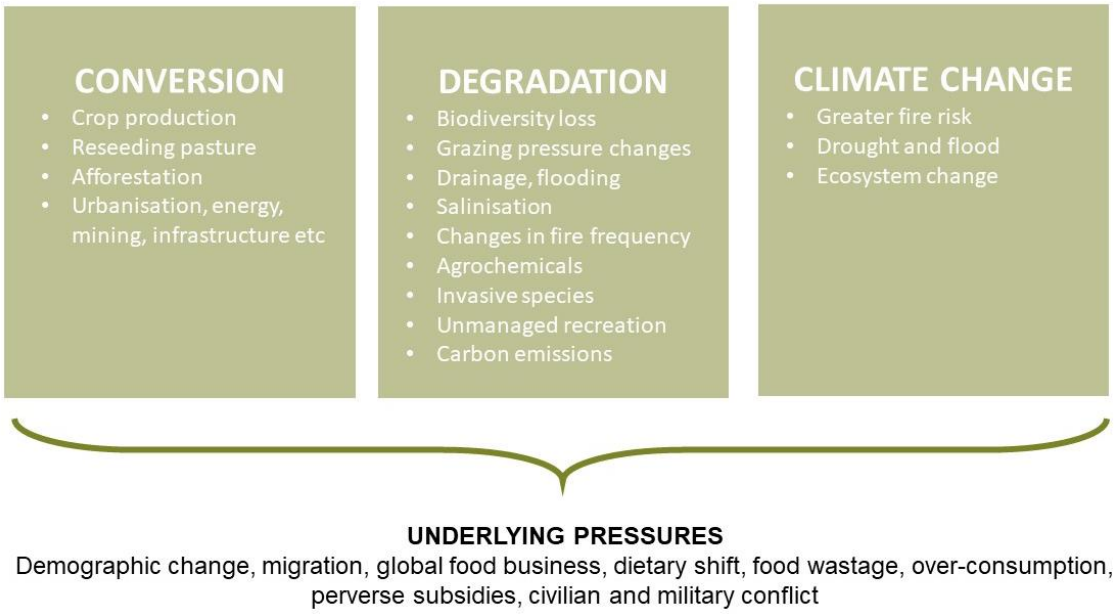


Figure 2: Threats to grassland and savannah ecosystems

Grassland ecosystems are at high risk. Over 40% have been converted.[22] From 1998 to 2013, 19% of grasslands, and 27% of rangelands showed persistent declining productivity trends.[23] Grasslands are poorly protected, with only 4.5% of temperate grasslands in protected areas,[24] leaving the biome liable to fragmentation and loss,[25] with national laws often too weak to provide security.[26]

Losses come from ***conversion*** to agricultural crops[27] and tree plantations,[28,29] the latter sometimes under the auspices of "reforestation policies";[30] from reseeding for intensive livestock production;[31] and through the impacts of urbanisation,[32] transport infrastructure,[33] mining[34] and other factors.

Equally serious, but harder to measure, are various forms of ***degradation***, caused by changes in grazing (both over-[35] and under-grazing), drainage of wet grasslands, poor irrigation creating salinisation,[36] agrochemical[37,38] and other pollution, invasive species[39] and harmful recreational activities including off-road driving.[40]

Meanwhile, ***climate change*** increases the likelihood, frequency, and severity of many pressures, including droughts,[41] floods and catastrophic fires,[42] shifting the baseline for entire ecosystems.

WWF requests that UNCCD, to support 128 Parties in setting the 2030 LDN targets, and with particular reference to the 250M hectares of farmland[43] that has already been voluntarily pledged for restoration:

1) **Develop a better understanding of status and trends in degraded and converted Grasslands, Savannahs and Rangelands (GSR)** including a measurable baseline against which to measure change

2) **Place a stronger and more explicit focus on policies relating to grasslands, savannahs, and rangelands through**:
   a) Explicitly including GSRs in LDN target setting, as well as other development and environmental plans, with a view to promoting large-scale ecological restoration
   b) Promoting the restoration, protection, and sustainable management of degraded GSRs to regain productivity in places impacted by desertification, degradation, and drought, at national and international levels
   c) Providing evidence of the important role of GSRs in food production, biodiversity conservation and the sequestration and storage of carbon and thus in climate change mitigation

3) **Identify successful GSR restoration approaches (tools and enabling conditions) that address ecological, cultural, and social needs, in particular**:
   a) Improve the selection of tools for restoration so that they distinguish important GSR ecosystems that require conservation
   b) Avoid and remove perverse incentives for countries addressing targets, including the risk of afforestation of ecologically significant GSRs with plantations[44,45,46]

4) **Agree measurable targets for GSR restoration as a component of LDN:**
   a) Targets for carbon sequestration in the 250 million ha of farmland already committed by countries towards the UNCCD LDN targets
   b) Targets for restoration of natural GSR ecosystems, inside and outside protected and conserved areas

This policy brief is in alignment with:

- The UN's 2026 International Year of Rangelands & Pastoralists (IYRP)[47]
- The UN Decade on Ecosystem Restoration[48, 49]
- The IUCN's resolution on Protecting and restoring endangered grassland and savannah ecosystems[50]

For more information

Martina Fleckenstein, Global Policy Manager Food, WWF
mfleckenstein@wwfint.org

Nigel Dudley, Equilibrium research
www.equilibriumresearch.com

Barbara Bendandi
Barbara.Bendandi@wwf.de

Karina Berg, Lead Global Grassland & Savannah Initiative, WWF
karinaberg@wwf.org.br

The Role of Healthy Soil for Food System Transformation, Ecosystem Restoration and Climate Action

Prepared by the organisers of the UNCCD COP15 Food Day - Seeds for Change for a Nature-Positive Future

Key Recommendations:

In alignment with the U.N. Decade on Ecosystem Restoration (2021–2030) and the U.N. Food Systems Summit, this paper recommends that the global community needs to work toward:

1. Improving soil health on at least 50 percent of all agricultural land
2. Encouraging and supporting 100 million farmers to adopt improved soil-health practices
3. Mobilising USD 100 million in finance and investments
4. Increasing the current amount of annual soil-sequestered CO2 by five times

Why focus on soils?

Soils are one of earth's most valuable resources. They provide ecosystem services such as land productivity, flood regulation, nutrient cycling, carbon sequestration and biodiversity. In fact, one teaspoon of soil contains more biodiversity than there are people on earth. Farmers rely on healthy soils to reliably grow and produce food for everyone everywhere.

Each year, however, the world is losing approximately 36 billion metric tons[1] of nutrient-rich topsoil and 17 billion metric tons of cropland soil due to erosion, chemical inputs and climate change. Such land degradation negatively affects about 3.2 billion people – especially in developing communities – and costs USD 300 billion in lost agricultural production each year.

Investing in healthy soils therefore has the potential to:

- Increase food and nutrition security
- Improve livelihoods
- Aid in climate change mitigation and adaptation goals
- Enhance biodiversity above and below ground
- Restore ecosystems

In short, soil health is essential for sustainable food system transformations.

Fast facts

⅓ of soils are degraded worldwide, affecting an estimated 3.2 billion people[2]	Soils can store up to 4X more carbon than terrestrial vegetation[3]	Soil erosion affects roughly ⅕ farmlands worldwide[4]

The importance of good stewardship for healthy soils

Everyone — farmers, policy makers, businesses, and individuals — **has some responsibility to promote and support healthy soil stewardship practices.** While it is tempting to think that individual farmers should take on the primary responsibility for soil health on their land, the challenges they face may require other stakeholders' involvement. For example, smallholders may lack access to financing that would allow them to transition into soil restoration activities. The Coalition of Action 4 Soil Health (CA4SH)[5] aims to lift such barriers in knowledge, implementation, monitoring, policy, and financial investment that currently constrain farmers from adopting and scaling healthy soil practices. To do this, multi-stakeholder actors must work together to:

- Align public and private stakeholders so that **soil health considerations are integrated in policy** across local, national, and global scales
- **Work with and empower smallholder farmers** by facilitating accessible and inclusive multi-stakeholder partnerships
- **Address technical barriers for monitoring of soil health indicators.** The CIFOR-ICRAF Soil-Plant Spectral Diagnostics Lab[6], for example, uses visible, near-infrared (NIR) and mid-infrared (MIR) spectroscopy to provide the high-quality soil analytics.
- **Expand research** on soil health practices for developing agricultural communities
- Champion the business case for private investment in soil as a capital asset, and **significantly increase financial investments** by five to 10 times above current levels
- Significantly **increase the global land area that is under improved soil-health practices**

Equally important is the ability to measure results using achievable, measurable, and trackable targets. Already, CA4SH is working to **develop a systemic approach to improving soil health** that simultaneously benefits producers, the environment, the economy and strengthens climate change resilience and mitigation. These actions are aligned with the UNCCD's Land Degradation Neutrality (LDN) targets[7], which promote efforts to monitor and improve soil organic carbon.[8]

CA4SH members — including states, corporations, researchers, civil society groups, farmers organisations, foundations and non-governmental organisations (NGOs) — will **collaborate through regional hubs that support the specific needs and priorities of local stakeholders.**

Furthermore, CA4SH is not the only global partnership focused on improving global soil health. Other interdisciplinary groups include, but are not limited to:

- The **Landscape Restoration Transformative Partnership Platform (TPP),**[9] which works towards evidence-based solutions that will encourage people everywhere to implement equitable and sustainable landscape restoration practices at scale, including those that promote healthy soils.
- The **Living Soils of the Americas (IICA)** [10] — a programme dedicated to enhancing Brazilian soils with agricultural incentives, among other things, that encourage farmers to update sustainable practices.
- The FAO **Global Soil Partnership (GSP)**[11] — a globally-recognised mechanism that works to promote collective action for sustainable soil management.
- **4p1000: Soils for Food Security and Climate**[12] — a plan that encourages Paris Climate Summit signatories to scale up regenerative farming, grazing and land-use practices.
- **The Soil Health Institute (SHI)**[13] — a nonprofit which seeks to safeguard and enhance the vitality and productivity of soil through scientific research and advancement.
- The **Global Soil Health Partnership (SHP)** — a farmer-led organisation that promotes the adoption of soil health practices for economic and environmental benefit.

- The **UNCCD**, which calls broadly for LDN and supports many other soil stewardship initiatives.

Therefore, it is essential to find synergies with existing initiatives that are promoting soil health.

For more information

Leigh Ann Winowiecki, Global Research Theme Leader: Soil and Land Health, CIFOR-ICRAF
L.A.Winowiecki@cgiar.org

Martina Fleckenstein, Global Policy Manager Food, WWF
mfleckenstein@wwfint.org

Kelly Witkowski, Manager, Climate Change and Natural Resources Program at Inter-American Institute for Cooperation on Agriculture
kelly.witkowski@iica.int

Prof. Rattan Lal, Director, C-MASC, Chair Soil Science IICA, OSU, Columbus, OH 43210 USA
lal.1@osu.edu

HEALTHY & SUSTAINABLE DIETS

POLICY BRIEF • MAY 2022

Healthy and Sustainable Diets: A Global Enabler for Keeping Land in Balance

Prepared by the organisers of the UNCCD COP15 Food Day - Seeds for Change for a Nature-Positive Future

Key Messages:

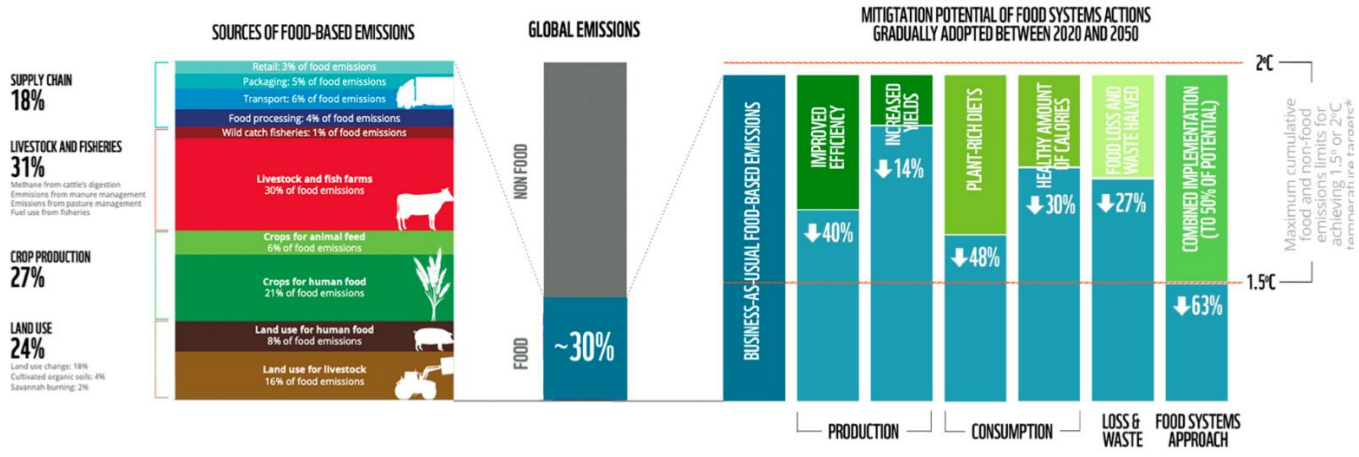
1. **Include a food systems approach in land restoration commitments**
2. **Halt conversion of natural habitats for food production**
3. **Commit to turning food systems from being a primary cause of land degradation to being a primary solution for land restoration**
4. **Repurpose food and agriculture subsidies to reward actions that are good for climate, nature, and people**

Rapid transformation of the global food system is needed to ensure that land stays healthy and able to sustain life. Despite this, certain parts of the food system are still not included in land negotiations and policy. This failure to take a "food systems approach" to account for all impacts of the food system, from production to consumption, will preclude our chances of keeping land in balance. This includes, addressing a key driver of land degradation, the widespread adoption of unsustainable and unhealthy diets.

Food systems occupy approximately 40% of land and are responsible for 80% of deforestation. We can't phase out food in the same way we can fossil fuels, but we can transform food systems so that they pivot from being the primary cause of land degradation to becoming the principal catalyst for land and soil restoration. With systemic transformation, the food system can become a major part of the solution to the land crisis.

Currently, however, not enough is being done to realise this potential. No country has committed to a food systems approach in achieving land restoration commitments. Many have committed to action on agriculture, including supporting innovative methods such as nature-positive, regenerative, or agroecological farming practices. Yet even radically different modes of farming will drive a rising demand for land, including continued land degradation, if they are not accompanied by more sustainable food consumption patterns.

Dietary change is a necessary global enabler to allow for widespread adoption of nature-positive farming practices, without increasing the pressure to convert more land and use more of nature's resources to produce more food. Integrated action across food systems is required to achieve the potential of agriculture to restore land and achieve zero land degradation. Taking a food systems approach is no longer optional, it is a prerequisite for a 1.5C world.



Essential food-based climate commitments that must be advanced at COP15

1. **Include a food systems approach in land restoration commitments:** Although a food systems approach is required to realise the potential of agriculture to achieve land and soil restoration, systemic thinking is missing from current plans. Several land restoration commitments, including on agriculture, land use and natural ecosystems, are clearly connected to food systems but are treated in a siloed and disconnected manner. Currently, there is insufficient attention on addressing unhealthy and unsustainable diets, a key driver of land-use and degradation. Unless all relevant land-use strategies (demand and supply side) are included, and food actions coordinated through integrated target setting, land restoration commitment will not be ambitious enough to achieve global goals.

2. **Halt conversion of natural habitats for food production:** Halting conversion of nature for food production will require optimising food production on all existing farmlands. Doing so will require investment in soil health, which has the triple benefit of supporting yields (easing pressures to convert more nature to meet food demand), restoring biodiversity, and sequestering carbon. In fact, carbon sequestration in soils is an important nature-based solution and better management can significantly increase the amount of carbon stored on agricultural lands. In addition, combining rehabilitation of farmlands, half of which are degraded, with other actions has the potential to even release some agricultural lands for implementation of additional nature-based solutions, such as reforestation.

3. **Commit to turning food systems from being a primary cause of land degradation to being a primary solution for land restoration:** Agricultural lands offer tremendous potential for restoring land. Achieving this will require that we adopt nature-positive production, reduce food loss and waste, and transition to healthy and sustainable diets. These actions will enable wide scale implementation of nature-based solutions. However, implementation of any nature-based solution, including reforestation, must not come at the expense of natural habitats such as grasslands and savannahs. Natural grasslands and savannahs can sequester large amounts of carbon, are important reservoirs of biodiversity, and support the livelihoods of millions of people globally – services which would be impacted if they were to be afforested. We must not solve one problem and create another.

4. **Repurpose food and agriculture subsidies to reward actions that are good for climate, nature, and people:** Current public financial support to food and agriculture has helped to rapidly increase production but has failed to address growing environmental and climate challenges, such as soil degradation and water pollution, biodiversity loss, food insecurity and pandemic risks, nor have they effectively addressed world hunger. Only a fraction of subsidies support production practices that are good for climate and nature. Actions to repurpose harmful subsidies and reward food producers for sustainable practices must be accelerated if we are to achieve the Paris Agreement. This will require holistic approaches to policy-making and aligning agriculture with national climate, nature and health goals. True Cost Accounting, which measures the full economic, environmental and social costs of food production, should be applied and used to guide public spending.

For more information

Brent Loken, Global Food Lead Scientist, WWF
bloken@wwf.org

Martina Fleckenstein, Global Policy Manager Food, WWF
mfleckenstein@wwfint.org

AGROBIODIVERSITY

POLICY BRIEF • MAY 2022

Agrobiodiversity is Key to Achieving Land Degradation Neutrality (LDN) Targets

Prepared by the organisers of the UNCCD COP15 Food Day - Seeds for Change for a Nature-Positive Future

The Land Degradation Neutrality target setting programme launched by UNCCD in 2015 provides a unique opportunity to leverage the potential of agrobiodiversity for land restoration.

Land Degradation is a global concern for food and nutrition security, sustainable development, biodiversity conservation and climatic change adaptation and mitigation. To achieve Land Degradation Neutrality (LDN), it is essential to halt and reverse degradation and to implement sustainable land management practices, which means managing land in ways that enhance and preserve biodiversity, maintain productivity, and support livelihoods and ecosystem resilience.

Agrobiodiversity – the wealth of plants, animals, and micro-organisms that make up our agri-food systems – contributes to avoiding and minimising the negative environmental impacts of agricultural activities. Conservation and sustainable use of agrobiodiversity supports farmers' livelihoods, nourishes our soils, and helps us adapt to and mitigate climate change while safeguarding biodiversity. Integrating agrobiodiversity and sustainable agricultural practices into LDN national action plans is essential to restore land and avoid further degradation.

The food we eat - and the way we produce, source, handle, and process it - impact both environmental and human health.

Today, agriculture accounts for 70% of all freshwater use[1] and drives 80% of deforestation worldwide[2], causing natural habitat conversion into croplands. It is also a large driver of biodiversity loss[3] and contributes to climate change[4] (mainly from changing land use, livestock production, and soil and nutrient management). The expansion of agricultural land, unsustainable agricultural practices and overharvesting of trees are all interrelated drivers of land degradation resulting from societal changes, including population growth and economic development.

In addition to all these impacts, agriculture is failing to provide nutritious and healthy diets to everyone. Diets worldwide have become increasingly homogenous, dominated by staple crops rich in energy but poor in macronutrients.[5] Today, only nine plant species account for 70% of total crop production, and rice, wheat and maize alone provide more than 50% of the world's plant-derived calories[6.] Feeding the human population by improving the performance and yields of a limited number of staple crops and animal breeds, combined with intensive chemical inputs, is causing severe land degradation[7] [8], eroding our soils and reducing nutritional value of food through lower concentrations of vitamins and micronutrients. Land degradation has already reduced the productivity of nearly one-quarter of the global land surface, affected the well-being of about 3.2 billion people, and cost about 10% of annual global gross domestic product in lost ecosystem services.[9]

To tackle these global challenges, we have an underused strategic asset in our toolbox – agrobiodiversity. This wealth of neglected edible plants could be unlocked to support sustainable agriculture and at the same time, ensure food security and nutrition, and protect the environment.[10] This is even more urgent now, with the financial, health and political crises putting our food systems under unprecedented stress.[11]

Agrobiodiversity plays critical roles in fighting current global challenges, including land restoration, biodiversity conservation and climate adaptation and mitigation.

In agricultural production, agrobiodiversity supports long-term productivity and resilience by providing multiple ecosystem services. It can help control soil erosion, improve soil nutrient cycles, and increase water quality[12], contributing to improving living conditions in drylands, maintaining and restoring land and soil productivity, and mitigating the effects of drought. Oversimplification of vegetation, particularly in areas cleared for agriculture, reduces soil protection from external forces such as wind or water. Examples of agrobiodiverse management strategies to reduce soil erosion include hedgerows (which help reduce runoff speed, facilitate infiltration, reduce wind erosion and can host beneficial species), cover crops (which protect soil from impacts of raindrops or wind erosion), agroforestry (which increases infiltration and produces mulching material), riparian buffer protection (which increases infiltration, retains sediment and reduces runoff speed), and intercropping (which reduces exposed bare soil and optimises nutrient cycling).

Agrobiodiversity can help protect plants through 'natural pest control'.[13] [14] Monocropping increases the risk of agricultural losses to pest outbreaks and climate change. Mixing varieties or species with different functional diversity over different seasons and across different parts of the farm is an effective climate and disease management strategy[15] that can help reduce the risk of pest epidemics and climate-related losses.[16] Diversified landscapes also tend to have more natural pest enemies,[17] fewer pests, and often greater yields.[18] This strengthens farmers' livelihoods while reducing the need for synthetic fertilisers. Complex landscapes also show increased pollinator abundance and diversity,[19] and contribute to conserving wild biodiversity, helping to maintain the ecological functions and services that they provide. Higher crop species diversity can lead to improved quality of produce.[20]

Agrobiodiversity also maintains healthy soils, which provide essential ecosystem services such as carbon cycling and nutrient cycling,[21] regulating the biological processes that underpin long-term agriculture sustainability, crop health, and climate. [22] Soil quality determines how productive agricultural land is,[23] and increases its resilience against climate change. Intensive land management is associated with lower levels of soil diversity.[24] Some agrobiodiverse management interventions that farmers can undertake to positively impact soil diversity and increase ecosystem service provision include reduced tillage systems, organic production and crop rotations.

The Land Degradation Neutrality Targets provide a unique opportunity to leverage the potential of agrobiodiversity for land restoration, biodiversity conservation and climate action.

For agrobiodiversity to bring these benefits and help deliver progress on the 2030 Agenda for Sustainable Development, its use needs to be strengthened in food systems, including in production systems. This can be done by:[25]

1. *Using agrobiodiversity to support productive and resilient agricultural ecosystems and increase knowledge about its benefits:* Increased funding should be invested in upscaling and mainstreaming adoption of agrobiodiverse practices and in studying the thousands of species, breeds, strains, and varieties that remain largely overlooked by agricultural research and development efforts. Funding should also encourage participatory research methods, where scientists, farmers, and Indigenous Peoples work side by side, to ensure that both scientific and Indigenous Peoples' traditional knowledge about local agrobiodiversity can be exchanged and used.

2. *Creating incentives and markets for diversified production:* Markets for diverse food products are essential to stimulate sustainable production through increased consumer demand. Market demand can be encouraged through public procurement programs, subsidies, and promotional campaigns. Investment along the entire value chain is also essential for food systems transformation.

3. *Increasing access to and exchange of quality seed and planting material through resilient and efficient systems that meet farmers' needs and build capacity in using sustainable management practices:* Diversification of crops, forages, trees, livestock, fish, and aquatic organisms gives farmers more options in times of need. This needs to be combined with access to knowledge about which options best suit farmers' needs as well as access to diverse, high-quality seed, and planting material. Establishing community-based approaches, such as seedbanks, can strengthen local seed systems, including through open-source approaches, running participatory improvement programs, and engaging rural producers in evaluation trials. Setting in place government policies that facilitate the registration of seed varieties, local breeds, and strains, and ensure market access for traditional and locally adapted varieties and other products is also critical.

For more information

Martina Fleckenstein, Global Policy Manager Food, WWF
mfleckenstein@wwfint.org

Karina Berg, Lead Global Grassland & Savannah Initiative, WWF karinaberg@wwf.org.br

Nigel Dudley, Equilibrium research
www.equilibriumresearch.com

LAND TENURE

POLICY BRIEF • MAY 2022

Legitimate Tenure Rights for Food Security, Climate Resilience and Ecosystem Restoration

Prepared by the organisers of the UNCCD COP15 Food Day - Seeds for Change for a Nature-Positive Future

Key Messages:

1. **Securing legitimate land rights to safeguard people from chronic poverty and food insecurity.** Work on chronic poverty identifies a link between access to land and escape from chronic poverty and vice versa. Incremental increases in the size of accessible land can already have significant welfare effects. Even highly diversified livelihoods that rely on off-farm incomes in rural contexts depend on secure access to natural resources.

2. **Securing legitimate land rights to enable collective natural resource management.** Collective management of land and other natural resources by smallholder farmers is a key avenue to achieve sustainable livelihoods and ecosystem protection and restoration. Secure rights to land are a precondition for the successful collective governance of natural resources by smallholders. The boundaries of the natural resource need to be properly defined and the resource users must be able to defend these boundaries against possible rights violations.

3. **Securing legitimate land rights to provide an incentive for investing in ecosystem restoration.** If poor or food insecure resource users are to invest in more sustainable natural resource use (be it through use change, adaptation, or investments in resource condition), they need to be able to reap the returns of these investments. The commitment of scarce resources is unlikely to occur if it is uncertain whether the returns accrue to the person investing. To provide an investment incentive, land tenure rights need to be secure. Due to the climate crisis, the needs to invest in natural resources to maintain and enhance ecosystem services are likely to increase. This implies that the urgency of securing land tenure rights will increase even further.

4. **Securing legitimate land rights to enable local innovations for sustainable resource use.**
    a. Innovations are necessary to address the magnitude and the urgency of the interrelated food, biodiversity, and climate crises. Local resource users are often the prime innovators to find adapted resource use solutions. Hence, there is a need to secure spaces for locally driven innovations. Power dynamics exist at all levels, and infringements of the land rights of the most "powerless" frequently occur. Therefore, providing space for local innovations requires a rights-based framework. Social innovations and securing legitimate land tenure rights are two sides of the same coin.

5. **Securing legitimate land rights to democratise the food system.**
    a. Acknowledging legitimate land tenure rights and redistribution of land rights can also contribute to a changing political environment in rural areas, as there are often close ties between landholding and political power. In the absence of acknowledged claims to resources (be it through codification or by other means), valuable natural resources are nevertheless likely to be used. In these contexts, acknowledging the legitimate land tenure rights of smallholders to natural resources is very likely to alter the distribution of access among societal groups. Securing legitimate land tenure rights is a pathway towards equity and one way to create more democratic food systems.

Background: The basics of land tenure lingo

Language on land tenure and land rights is notoriously complex. Further, different legal histories give similar terms very different meanings, compounding complexity. To avoid misunderstandings, here is an introduction to land tenure lingo:

- Land rights are adaptable social relations, not static things. Rights exist because others bear the duty to observe them and because States have the obligation to protect them. Land tenure is insecure, if there is a risk that third parties violate rights or if the State cannot or does not enforce them. The perceived land tenure insecurity matters for investment decisions including the investment of labour and time.

- Rights do not need to be individualised and codified to be legitimate. Collective, communal rights are as important as individual rights. Rights can be recognised by statutory and customary systems. To determine what a suitable land rights regime is, context matters.

- Very often, women, youth, persons with disabilities, disadvantaged communities, and indigenous people suffer from violations of their land rights. Their rights require special attention to be secured.

- Land rights are one element of an enabling environment of sustainable land and natural resource use, they are a necessary but not a sufficient criterion. Land rights need to form part of broader reforms to create an enabling environment, that includes inclusive rural financial systems, responsive extension services, and access to markets.

- Country Parties who wish to strengthen responsible governance of tenure of land can build on a wealth of global agreements. The Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries, and Forests in the Context of National Food Security (VGGT) have been unanimously adopted by members of the UN Committee on World Food Security. That means, wherever you are from, your country has adopted this global standard on responsible land tenure governance. Further, binding human rights agreements underpin the principles included in the VGGT.

- The UNCCD decision 26/COP.14 on land encourages the parties to follow the VGGT in the implementation of activities to combat desertification/land degradation and drought and achieve Land Degradation Neutrality (LDN). Parties are invited to adopt national land governance legislation and procedures supporting sustainable land use and land restoration and are encouraged to recognise legitimate tenure rights, including customary rights.

From scarcity to prosperity – Responsible land governance to enhance food security and resilience

Sustainable land use is a key factor in many of the most pressing socio-ecological challenges of our time. As the United Nations Convention to Combat Desertification (UNCCD) states, “healthy and productive land can play an unparalleled role as an engine of economic growth and a source of livelihood for billions worldwide, including the most vulnerable populations”.[1] The approach of LDN can become an accelerator for achieving the United Nations Sustainable Development Goals (SDGs) by contributing to the restoration of natural resources and improving food security, thus reducing poverty and hunger and stimulating economic growth[2].

For smallholder farmers to become the drivers of sustainable land management, and to actively participate in the achievement of LDN at national level, it is essential to promote responsible land governance. This means guaranteeing tenure security for smallholder farmers and other marginalised natural resource users. It is against this background that the landmark Decision 26 on land tenure was reached at the 14th Session of the Conference of the Parties to the UN Convention to Combat Desertification (UNCCD, COP 14) in New Delhi in 2019.

The Decision on Land Tenure recognises the importance of responsible land governance for sustainable land management and restoration, as well as for combatting desertification, land degradation and drought. The decision, recognising the importance of responsible land governance in the implementation of LDN activities, also encourages stakeholders to comply with the principles of tenure governance set down in the VGGT.

The VGGT are a globally accepted framework of reference for improving the governance of tenure of land, fisheries, and forests with the overarching goal of achieving food security for all. While many countries have expressed their commitment to combatting land degradation by setting national-level targets to achieve LDN, few have adopted the land tenure decision. Additionally, the application of the VGGT themselves is limited as states appear slow to comply with a non-binding agreement. As a result, individuals’ and communities’ legitimate land rights are frequently violated by different actors, including the state. For example, LDN measures often prioritise conservation over the tenure security of affected communities. This in turn limits the ability and willingness of those with vulnerable tenure rights to contribute to the conservation and restoration of land. Furthermore, it threatens their food security and resilience in the context of climate change.

Outlook: Towards progress at the local level

Recent case studies conducted by TMG Research show that LDN measures have a direct impact on tenure rights and livelihoods of communities.[3] The data from the studies conducted in Kenya, Benin, Malawi, and Madagascar underlines that local communities often lack the capacities to leverage international standards to hold government actors to account. Governments in turn fail to fully recognise legitimate tenure rights and do not follow the provisions of the VGGT. Therefore, in many contexts, national and local civil society organisations are crucial intermediaries to achieve progress on securing legitimate land rights at the local level. They need to be strengthened to provide the essential services to communities.

The recognition of legitimate land rights is key to ensure that measures implemented in the context of LDN, and climate change adaptation and mitigation achieve their intended impacts. Strong tenure rights empower local communities, enable them to profit from and contribute to ecosystem restoration while becoming more resilient and food secure. The international community can provide financial and technical support to ensure tenure security effectively contributes to safeguarding people, livelihoods, climate, and biodiversity.

For more information

Martina Fleckenstein, Global Policy Manager Food, WWF
mfleckenstein@wwfint.org

Karina Berg, Lead Global Grassland & Savannah Initiative, WWF karinaberg@wwf.org.br

Nigel Dudley, Equilibrium research
www.equilibriumresearch.com

Gender Mainstreaming and Gender-Responsive Implementation of the UNCCD

Prepared by the organisers of the UNCCD COP15 Food Day - Seeds for Change for a Nature-Positive Future

Key Recommendations:

1. Take steps to **advance innovative policies and measures that recognise women's equal access** to land, resources and tenure security as enabling conditions for combating desertification and land degradation — especially in rural areas.

2. **Promote gender-responsive and gender-transformative measures** and awareness-raising. This includes implementing the Gender Action Plan (GAP) roadmap, convening the Gender Caucus, and developing tools and guidelines that enhance capacity at the national level to implement the GAP and support women's and girls' empowerment so that they contribute the effective implementation of the Convention. Such measures should be supported by reporting with gender-specific indicators and sex-disaggregated data.

3. **Take steps to remove systemic inequalities** as well as socio-economic and cultural barriers that:
    a. Disempower and victimise women, making them — especially for rural and indigenous women — more likely to disproportionately suffer from droughts and other natural disasters.
    b. Prevent women from accessing land and resource security, education, or extension services.
    c. Limit women's full, informed, and equitable participation in policy and decision making related to land use, food systems, budgeting and other relevant policies.

4. **Ensure gender-responsive mobilisation of resources** for the implementation, monitoring, and reporting of the GAP, as well as capacity building for all actors.

5. **Strengthen collaboration and synergies across the Rio Conventions** for mainstreaming gender and developing gender-responsive and gender-transformative measures while building associated capacities as relevant.

6. **Continue to support systematic documentation of gender-related knowledge** such as women's innovations and effective practices that women have historically employed to maintain soil fertility and biodiversity and to mitigate the impact of drought and desertification. Such knowledge is a foundation for more effective and gender-transformative, evidence-based policies for agriculture, forestry, fisheries, and the environment.

Why gender mainstreaming and gender-responsive implementation?

- Effective and inclusive action on land governance and land restoration to combat desertification and degradation requires all members of society to be fully engaged. This includes women and girls whose contributions, rights, knowledge, and practices are often undervalued and not appropriately reflected through equal participation in policy and decision making related to sustainable land-use governance, agriculture and other productive sectors. **Gender equality and women's empowerment are central to effective environmental decision-making processes and lead to better resource governance, land use and restoration outcomes**.

- Along with enduring gender inequality, **women often suffer disproportionate impacts from biodiversity loss, climate change, land degradation, desertification and drought** compared to men. Women — especially rural and indigenous women who are farmers, fishers, small traders, and food providers for their families — often bear the greater and direct brunt of the consequences when natural resources are destroyed or depleted. **The recent COVID-19 pandemic has also affected women more, thus furthering inequality.**[12]

- While women's economic and other contributions are crucial — over two-thirds of smallholder farmers are women — they are often limited to **roles at the margins or in the informal sector; they have minimal voice when it comes to decision-making for resource management**. For example, women accounted for just 14 percent of the 59.5 million people engaged in the primary sector of fisheries and aquaculture in 2018 but make up about 47 percent of the global fisheries labour force and just under 50 percent of the global agricultural workforce.[3] Furthermore, the World Economic Forum's Global Gender Gap Report 2021[4] identified economic participation and opportunity as the second largest gaps facing women.

- More recently, **there has been growing awareness and evidence to support the contributions that women make to land and resource governance, as well as to sustainable and equitable development**. However, much more needs to be done to systematically map, analyse and integrate women and girls' agency and diverse contributions.[5]

How can we narrow the gender equality gap?

- **Women's rights are human rights**. These rights include the right to live free from violence and discrimination, to be educated, to own property, to vote and to earn a fair and equal wage. Efforts to improve land use governance and combat desertification and drought need to ensure the protection, empowerment, leadership, decision making and meaningful and informed participation of women and girls. **Gender-responsive approaches identify and lead to actions that address gaps and systemic barriers** that stand in the way of women's enjoyment of human rights, including in relation to restoration and natural resource and land use.

- Women are still underrepresented in decision-making processes related to environmental policies, land use planning and budgeting at all levels. While participation is a fundamental right in itself, there is also evidence that **diversity in decision-making leads to stronger outcomes overall.**

- **Gender statistics and sex-disaggregated data are essential to support gender-responsive policy and action, implementation, and reporting**. Data is critical to influence policy making in support of gender-responsive measures in agriculture, fisheries, forestry, land use planning, education, and extension services, among others. There is already encouraging commitment to integrating gender questions and indicators in national reports. However, there is still a **gap in data and information related to gender, land governance and benefit-sharing, which must be urgently addressed.**[6]

- **All the three Rio Conventions** — the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD) and the United Nations Framework Convention on Climate Change (UNFCCC) —, **include gender provisions reinforced by subsequent COP decisions.** Moreover, all three Rio Conventions have adopted a **Gender Action Plan (GAP) or a Gender Plan of Action (GPA).** The integration of gender considerations into actions against biodiversity loss, climate change impacts and desertification will maximise the results of interventions and lead to gender-sensitive policy- and decision-making.

This recommendation paper refers to:

- **ICCD/COP (15)/17**: Follow-up on policy frameworks and thematic issues: Gender Note by the secretariat.[7]
    - This note summarises actions taken by the secretariat and the Global Mechanism (GM) in response to decision 24/COP.14. It also contains a road map to be included in the GAP to provide impetus and a focus on actions relating to women and men, and girls and boys, as per decision 12/COP.14 (*Decision 24/COP.14 Follow-up on policy frameworks and thematic issues: Gender*)

- **The Gender Action Plan (GAP)**[8]
    - The UNCCD adopted a GAP in September 2017 to accompany the 2018–2030 Strategic Framework. The plan recognises the vital need to include women as equal partners in land-use management and restoration initiatives and unlock women's transformative potential for LDN and the SDG agenda

- **Gender. Note by the secretariat ICCD/COP (15)/21**[9]
    - This note put forward draft decisions for consideration at the fifteenth session of the Conference of the Parties

For more information

Cristina Eghenter, Coordinator, Global Governance Policy, WWF
ceghenter@wwfint.org

Martina Fleckenstein, Global Policy Manager Food, WWF
mfleckenstein@wwfint.org

APPENDIX

Grasslands, Savannahs & Rangelands

[1] UNCCD. 2022. Land Degradation Neutrality. www.unccd.int/land-and-life/land-degradation-neutrality/overview

[2] Derner, J.D. and Schuman, G.E. 2007. Carbon sequestration and rangelands: a synthesis of land management and precipitation effects. *Journal of Soil and Water Conservation* **62** (7): 77-85.

[3] Van Oijen, M., Bellocchi, G. and Höglind, M. 2018. Effects of climate change on grassland biodiversity and productivity: the need for a diversity of models. *Agronomy* **8** (2):

[4] Zhu, H., Fu, B., Wang, S., Zhu, L., Zhaang, L. et al. 2015. Reducing soil erosion by improving community functional diversity in semi-arid grasslands. *Journal of Applied Ecology* **52**: 1063-1072.

[5] United Nations General Assembly. 2019. United Nations Decade on Ecosystem Restoration. 73/284. documents-dds-ny.un.org/doc/UNDOC/GEN/N19/060/16/PDF/N1906016.pdf? OpenElement

[6] Dudley, N., Eufemia, L., Fleckenstein, M., Periago, M.E., Petersen, I. and Timmers, J.F. 2020. Grasslands and Savannahs in the UN Decade on Ecosystem Restoration. *Restoration Ecology* **28** (6): 1313-1317.

[7] Bengtsson, J., Bullock, J.M., Egoh, B., Everson, T., O'Connor, T. ... Lindborg, R. 2019. Grasslands – more important for ecosystem services than you might think. *Ecosphere* **10** (2): e02582.

[8] Conant, Richard T. 2010. *Challenges and opportunities for carbon sequestration in grassland systems.* FAO, Rome.

[9] Dass, P., Houlton, B.Z., Wang, Y. and Warlind, D. 2018. Grasslands may be more reliable carbon sinks than forests in California. *Environmental Research Letters* **13**: 074027.

[10] Yang, Y., Tilman, D., Furey, G. and Lehman, C. 2019. Soil carbon sequestration accelerated by restoration of grassland biodiversity. *Nature Communications* **10**: 718.

[11] ILRI, IUCN, FAO, WWF, UNEP and ILC. 2021. *Rangelands Atlas*. ILRI, Nairobi Kenya.

[12] Bo, T.L., Fu, L.T. and Zheng, X.J. 2013. Modelling the impact of overgrazing on evolution processes of grassland. *Aeolian Research* **9**: 183-189.

[13] Siebert, S., Burke, J., Faures, J. M., Frenken, K., Hoogeveen, J., et al. 2010. Groundwater use for irrigation – a global inventory, *Hydrology and Earth System Sciences* **14**: 1863-1880.

[14] UNCCD. 2017. *Global Land Outlook*. UN Convention to Combat Desertification, Bonn

[15] Duan, C., Shi, P., Zhang, X, Zong, N., Chai, X. et al. 2017. The Rangeland Livestock Carrying Capacity and Stocking Rate in the Kailash Sacred Landscape in China. *Journal of Resources and Ecology* **8** (6): 551–558

[16] O'Mara, F.P. 2012. The role of grasslands in food security and climate change. *Annals of Botany* **110** (6): 1263–1270.

[17] Michalk, D.L., Kemp, D.R., Badgery, W.B., Wu, J., Zhang, Y. and Tomassin, P.J. 2018. Sustainability and future food security: a global perspective for livestock production. *Land Degradation and Development* **30** (5): 561-573.

[18] Stolton, S. and Dudley, N. 2019. *The* New *Lion Economy. Unlocking the value of lions and their landscapes*, Equilibrium Research, Bristol, UK.

[19] WCC. 2020. Resolution 009. Protecting and restoring endangered grassland and savannah ecosystems. portals.iucn.org/library/sites/library/files/resrecfiles/WCC_2020_RES_009_EN.pdf

[20] United Nations General Assembly. 2022. International Year of Rangelands and Pastoralists, 2026. documents-dds-ny.un.org/doc/UNDOC/LTD/N22/240/35/PDF/N2224035.pdf? OpenElement

[21] Nature Positive by 2030. 2021. Secure and Equitable, Nature Positive, Net Zero Emissions World: Non-state actors' call for governments to strengthen the Post-2020 Global Biodiversity Framework.

[22] Sayre, R., Karagulle, D., Frye, C., Boucher, T., Wolff, N.H. et al. 2020. An assessment of the representation of ecosystems in protected areas using new maps of World Climate Regions and World Ecosystems. *Global Ecology and Conservation* **21**: e00860.

[23]UNCCD. 2017. *Global Land Outlook*. UN Convention to Combat Desertification, Bonn.

[24] Carbutt, C., Henwood, W.D. and Gilfedder, L.A. 2017. Global plight of temperate grasslands: going, going, gone? *Biodiversity Conservation* **26**: 2911-2932.

[25] Jacobson, A.P., Riggio, J. Tait, A.M. and Baille, J.E.M. 2019. Global areas of low human impact ("Low Impact Areas") and fragmentation of the natural world. *Scientific Reports* **9**: 14179.

[26] Nelson, R. 2006. Regulating grassland degradation in China: shallow-rooted laws. *Asian-Pacific Law and Policy Journal* **7** (2): 385–417.

[27]Lambin, E. F. and Meyfroidt, P. 2011. Global land use change, economic globalization, and the looming land scarcity. *Proceedings of the National Academy of Sciences* **108** (9): 3465–3472.

[28] Veldman, J.W., Overbeck, G.E., Negreiros, D., Mahy, G., Le Stradic, S. et al. 2015. Tyranny of trees in grass biomes. *Science* **347** (6221): 484-485.

[29] Wilson Fernandes, G., Serra Coelho, M., Bomfim Machado, R., Ferreira, M.E., Moura de Souza Aguiar, L. et al. 2016. Afforestation of savannas: an impending ecological disaster. *Natureza & Conservação* **14**: 146-151.

[30] Bond, W.J., Stevens, N., Midgley, G.F. and Lehmann, C.E.R. 2019. The trouble with trees: Afforestation plans for Africa. *Trends in Ecology and Evolution* **34** (11): 963-965.

[31] Molinari, N. and D'Antonio, C.M. 2014. Structural, compositional and trait differences between native- and non-native-dominated grassland patches. *Functional Ecology* **28**: 745-754.

[32] Williams, N.S.G., McDonnell, M.J. and Seager, E.J. 2005. Factors influencing the loss of an endangered ecosystem in an urbanising landscape: a case study of native grasslands from Melbourne, Australia. *Landscape and Urban Planning* **71**: 35-49.

[33] Laurance W.F., Clements, G.R., Sloan, S., O'Connell, C.S., Mueller, N.D., et al. 2014. A global strategy for road building. *Nature* **513**: 229-232.

[34] Wilson Fernandes, G., Barbosa, N.P.U., Alberton, B., Barbieri, B., Dirzo, R. et al. 2018. The deadly route to collapse and uncertain fate of Brazilian rupestrian grasslands. *Biodiversity Conservation* **27**: 2587-2603.

[35] Pulido, M., Schnabel, S., Lavado Contado, J.F., Lozano-Parra, J. and González, F. 2016. The impact of heavy grazing on soil quality and pasture production in rangelands of SW Spain. *Land Degradation and Development*. DOI: 10.1002/ldr.2501.

[36] Barati, A.A., Asadi, A, Kalantari, K., Azadi, H. and Witlox, F. 2015. Agricultural land conversion in Northwest Iran. *International Journal of Environmental Research* **9** (1): 281-290.

[37] Costantini, D. 2015. Land-use changes and agriculture in the tropics: pesticides as an overlooked threat to wildlife. *Biodiversity Conservation* DOI 10.1007/s10531-015-0878-8.

[38] UNEP. 2014. *UNEP Year Book 2014: Emerging issues in our global environment*. United Nations Environment Programme, Nairobi, pp. 6-11.

[39] Paini, D.R., Sheppard, A.W., Cook, D.C., de Barro, P.J., Worner, S.P., et al. 2016. Global threat to agriculture from invasive species. *Proceedings of the National Academy of Sciences* **113** (27): 7575-7579.

[40] Bhandari, M.P. 2018. Impact of tourism of off road driving on vegetation biomass: a case study of Masai Mara National Reserve, Narok, Kenya. *SocioEconomic Challenges* **2** (3).

[41] Craine, J.M., Ocheltree, T.W., Nippert, J.B., Towne, E.G., Skibbe, A.M. et al. 2012. Global diversity of drought tolerance and grassland climate-change resilience. *Nature Climate Change* **3**: 63-67.

[42] Zong, X., Tian, X. and Yin, Y. 2020. Impacts of climate change on wildfires in Central Asia. *Forests* **11**. 802.

[43] https://www.unccd.int/land-and-life/climate-change/overview

[44] Bond, W.J., Stevens, N., Midgley, G.F. and Lehmann, C.E.R. 2019. The trouble with trees: Afforestation plans for Africa. *Trends in Ecology and Evolution* **34** (11): 963-965.

[45] Veldman, J.W., Overbeck, G.E., Negreiros, D., Mahy, G., Le Stradic, S. et al. 2015. Tyranny of trees in grass biomes. *Science* **347** (6221): 484-485.

[46] Dudley, N., Eufemia, L., Fleckenstein, M., Periago, M.E., Petersen, I. and Timmers, J.F. 2020. Grasslands and Savannahs in the UN Decade on Ecosystem Restoration. *Restoration Ecology* **28** (6): 1313-1317.

[47] United Nations General Assembly. 2022. International Year of Rangelands and Pastoralists, 2026. documents-dds-ny.un.org/doc/UNDOC/LTD/N22/240/35/PDF/N2224035.pdf? OpenElement

[48] United Nations General Assembly. 2019. United Nations Decade on Ecosystem Restoration. 73/284. documents-dds-ny.un.org/doc/UNDOC/GEN/N19/060/16/PDF/N1906016.pdf? OpenElement

[49] Dudley, N., Eufemia, L., Fleckenstein, M., Periago, M.E., Petersen, I. and Timmers, J.F. 2020. Grasslands and Savannahs in the UN Decade on Ecosystem Restoration. *Restoration Ecology* **28** (6): 1313-1317.

[50] WCC. 2020. Resolution 009. Protecting and restoring endangered grassland and savannah ecosystems. portals.iucn.org/library/sites/library/files/resrecfiles/WCC_2020_RES_009_EN.pdf

Healthy Soils

[1]https://esdac.jrc.ec.europa.eu/themes/global-soil-erosion

[2]*IPBES. 2018. The IPBES Assessment Report on Land Degradation and Restoration. Montanarella, L., Scholes, R. and Brainich, A. (eds.). Bonn: IPBES*

[3]*Prăvălie R et al. 2021. Arable lands under the pressure of multiple land degradation processes. A global perspective. Environmental Research 194:110697.*

[4]*Lal R. 2018. Digging deeper: A holistic perspective of factors affecting soil organic carbon sequestration in agroecosystems. Global Change Biology 24(8): 3285–3301.*

[5]https://foodsystems.community/coalitions/coalition-of-action-4-soil-health-ca4sh-2/

[6]https://www.cifor-icraf.org/research/theme/soil-and-land-health/soil-plant-spectral-diagnostics-laboratory

[7]https://www.unccd.int/land-and-life/land-degradation-neutrality/overview

[8]https://www.unccd.int/resources/publications/realizing-carbon-benefits-sustainable-land-management-practices
[9]https://www.worldagroforestry.org/output/transformative-partnership-platform-tpp-generating-and-leveraging-evidence-landscape
[10]https://www.iica.int/en/press/news/brazil-launches-living-soils-americas-program-restoration-initiative-promoted-iica and#:~:text=%E2%80%9CLiving%20Soils%20of%20the%20Americas,25%20November%202021%20(IICA)
[11]https://www.fao.org/global-soil-partnership/en/
[12]https://regenerationinternational.org/4p1000/
[13]https://soilhealthinstitute.org/

Additional Links [highlights on the Coalition of Action 4 Soil Health (CA4SH)]:

- Our on-line document brochure:
https://worldagroforestry.org/output/coalition-action-4-soil-health-ca4sh
- Webpage on UNFSS: https://foodsystems.community/coalitions/coalition-of-action-4-soil-health-ca4sh-2/
- Op-ed WSD 2021 https://www.indepthnews.net/index.php/opinion/4910-food-systems-transformation-must-be-grounded-in-healthy-soil
- Video on the Coalition: https://www.youtube.com/watch?v=aYOyWAKoro0
- World Soil Day:
The Conversation Podcast: https://theconversation.com/soil-isnt-dirt-its-the-foundation-of-life-and-needs-real-care-173162
- "The U.N. Food System Summit is laying the groundwork for change – from the soil up"**:**
https://forestsnews.cifor.org/74621/the-u-n-food-system-summit-is-laying-the-groundwork-for-change-from-the-soil-up?fnl=
- How soil can save us:
https://www.devex.com/news/sponsored/opinion-how-soil-can-save-us-all-101619
- Embrace the Earth blog:
https://www.thebrokeronline.eu/embrace-the-earth-soil-health-as-a-foundation-to-sustainable-food-systems/?utm_source=twitter+and+linkedin&utm_medium=post&utm_campaign=broker
- Co- authored blog from Action Track 3:
https://medium.com/@WWFFood/unleashing-the-potential-of-nature-positive-food-systems-1dd623dafcde
- Shining a light:
https://wle.cgiar.org/solutions-and-tools/science-driven-solutions/shining-a-light-on-soils-for-land-restoration/

Agrobiodiversity

[1] FAO (2011) The State of the World's Land and Water Resources for Food and Agriculture (SOLAW) – Managing
Systems at Risk. Food and Agriculture Organization of the United Nations, Rome and Earthscan, London. https://
www.fao.org/3/i1688e/i1688e.pdf
[2] FAO. 2017. The future of food and agriculture – Trends and challenges. Rome
[3] IPBES (2019) Global assessment report on biodiversity and ecosystem services of the Intergovernmental
Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo
(editors). IPBES secretariat, Bonn, Germany. https://ipbes.net/global-assessment
[4] IPBES (2019) Global assessment report on biodiversity and ecosystem services of the Intergovernmental
Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo
(editors). IPBES secretariat, Bonn, Germany. https://ipbes.net/global-assessment
[5] Khoury, Colin K. & Bjorkman, Anne & Dempewolf, Hannes & Ramirez-Villegas, Julian & Guarino, Luigi & Jarvis, Andy & Rieseberg, Loren & Struik, Paul. (2014). Increasing homogeneity in global food supplies and the implications for food security. Proceedings of the National Academy of Sciences of the United States of America. 111. 10.1073/pnas.1313490111.
[6] FAO. 2019. The State of the World's Biodiversity for Food and Agriculture, J. Bélanger & D. Pilling (eds.). FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome. 572 pp. (http://www.fao.org/3/CA3129EN/CA3129EN.pdf)
[7] IAASTD (International Assessment of Agricultural Knowledge, Science and Technology for Development), Agriculture at a Crossroads (2009) Synthesis Report: A Synthesis of the Global and Sub-Global IAASTD Reports (Washington DC).

https://assets.ctfassets.net/rrirl83ijfda/2iK5FGLRChIsnTVEwYsIt9/d22fd20dfaa7a1fbbda4d38806402d6f/211215Final_GSW21_BeninCountryReport.pdf
UNCCD: Decision 26/COP.14, Land Tenure, https://www.unccd.int/sites/default/files/sessions/documents/2019-11/26-

[8] UNEP (United Nations Environment Programme) (2007) Global Environment Outlook GEO 4: Environment for development (Progress Press Ltd, Nairobi).
[9] IPBES (2018): Summary for policymakers of the assessment report on land degradation and restoration of the Intergovernmental SciencePolicy Platform on Biodiversity and Ecosystem Services. R. Scholes, L. Montanarella, A. Brainich, N. Barger, B. ten Brink, M. Cantele, B. Erasmus, J. Fisher, T. Gardner, T. G. Holland, F. Kohler, J. S. Kotiaho, G. Von Maltitz, G. Nangendo, R. Pandit, J. Parrotta, M. D. Potts, S. Prince, M. Sankaran and L. Willemen (eds.). IPBES secretariat, Bonn, Germany. 44 pages
[10] Ulian, Tiziana & Diazgranados, Mauricio & Pironon, Samuel & Padulosi, Stefano & Liu, Udayangani & Davies, Lee & Howes, Melanie-Jayne & Borrell, James & Ondo, Ian & Pérez-Escobar, Oscar & Sharrock, Suzanne & Ryan, Philippa & Hunter, Danny & Lee, Mark & Barstow, Charles & Łuczaj, Łukasz & Pieroni, Andrea & Cámara-Leret, Rodrigo & Noorani, Arshiya & Mattana, Efisio. (2020). Unlocking plant resources to support food security and promote sustainable agriculture. Plants People Planet. 2020. 421-445. 10.1002/ppp3.10145.
[11] Nature (2022). The war in Ukraine is exposing gaps in the world's food-systems research. Available at: https://www.nature.com/articles/d41586-022-00994-8
[12] Bioversity International (2017) Mainstreaming Agrobiodiversity in Sustainable Food Systems: Scientific Foundations for an Agrobiodiversity Index. Bioversity International, Rome, Italy. https://cgspace.cgiar.org/handle/10568/89049
[13] Bioversity International (2017) Mainstreaming Agrobiodiversity in Sustainable Food Systems: Scientific Foundations for an Agrobiodiversity Index. Bioversity International, Rome, Italy. https://cgspace.cgiar.org/handle/10568/89049
[14] Oerke E-C, Dehne H-W (2004) Safeguarding production—losses in major crops and the role of crop protection. Crop Protection 23:275–285
[15] Jarvis DI, Hodgkin T, Sthapit BR, Fadda C, López Noriega I (2011) An heuristic framework for identifying multiple ways of supporting the conservation and use of traditional crop varieties within the agricultural production system. Critical Reviews in Plant Sciences 30(1–2):125–176.
[16] Garrett KA, Nita M, De Wolf ED, Gomez L, Sparks AH (2009) Plant pathogens as indicators of climate change. Ed. Letcher TM Climate Change: Observed Impact on Planet Earth (Elsevier, Amsterdam), pp 425–437.
[17] Molina GAR, Poggio SL, Ghersa CM (2014) Epigeal arthropod communities in intensively farmed landscapes: Effects of land use mosaics, neighbourhood heterogeneity, and field position. Agriculture, Ecosystems and Environment 192:135–143
[18] Liere H, et al. (2015) Trophic cascades in agricultural landscapes: indirect effects of landscape composition on crop yield. Ecological Applications 25(3):652–661
[19] Steffan-Dewenter I, Westphal C (2008) The interplay of pollinator diversity, pollination services and landscape change. Journal of Applied Ecology 45(3):737–741
[20] Malézieux E, et al. (2009) Mixing plant species in cropping systems: concepts, tools and models: a review. Agronomy for Sustainable Development 29(1):43–62.
[21] Barrios E (2007) Soil biota, ecosystem services and land productivity. Ecological Economics 64(2):269–285.
[22] Bioversity International (2017) Mainstreaming Agrobiodiversity in Sustainable Food Systems: Scientific Foundations for an Agrobiodiversity Index. Bioversity International, Rome, Italy. https://cgspace.cgiar.org/handle/10568/89049
[23] van der Heijden MGA, Bardgett RD, van Straalen NM (2008) The unseen majority: soil microbes as drivers of plant diversity and productivity in terrestrial ecosystems. Ecology Letters 11(3):296–310.
[24] Attwood SJ, Maron M, House APN, Zammit C (2008) Do arthropod assemblages display globally consistent responses to intensified agricultural land use and management? Global Ecology and Biogeography 17(5):585–599.
[25] 2nd International Agrobiodiversity Congress (2021). Using Agrobiodiversity to Transform Food Systems: The 2021 Rome Manifesto. Available at: https://alliancebioversityciat.org/stories/agrobiodiversity-congress-participants-around-globe

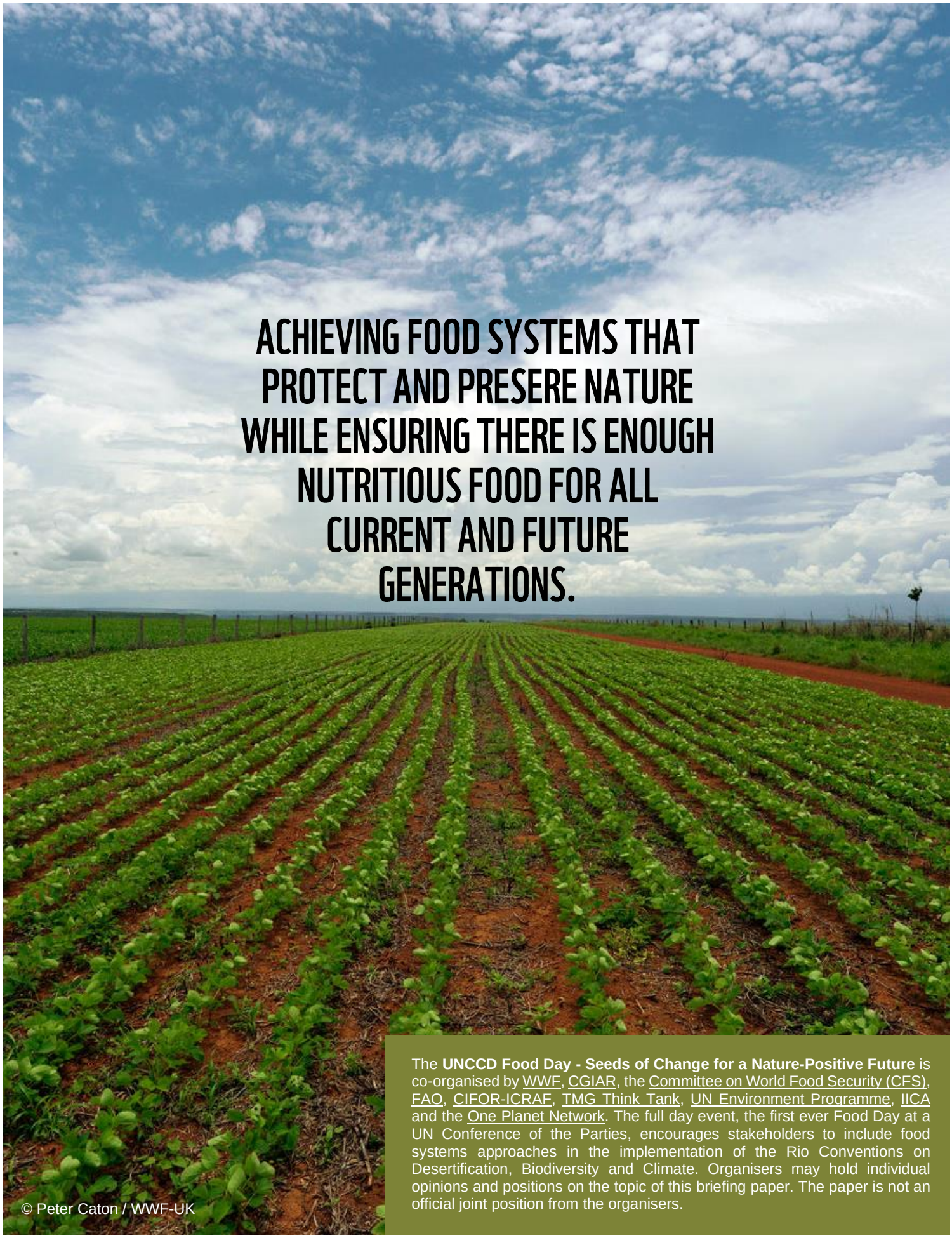
Land Tenure

[1] UNCCD LDN: Healthy Land for Healthy People
[2] UNCCD: Sustainable Development Goals, Overview
[3] TMG 2021: Responsible Land Governance in LDN Programmes. Kenya Case Study; TMG/APIC 2021:
Responsible Land Governance in LDN Programmes. Benin Case Study.
TMG 2021: Responsible Land Governance in LDN Programmes. Kenya Case Study. Written by: Brian Washe Kazungu, Anna Kramer, Jes Weigelt, Oscar Schimdt, TMG Working paper, online: https://assets.ctfassets.net/rrirl83ijfda/6psTyfJdjGNDSWs5VMImuE/9a0c48ef06e262098716db908edd5cf3/211217Final_GSW21_KenyaCountryReport.pdf
TMG/APIC 2021: Responsible Land Governance in LDN Programmes. Benin Case Study. Written by: Check Abdel Kader Baba, Anna Kramer, Charles Tamou, TMG Working paper, online
cop14.pdf
UNCCD: Land Degradation Neutrality: Healthy Land for Healthy People https://knowledge.unccd.int/topics/land-degradation-neutrality-healthy-land-healthy-people

UNCCD: Sustainable Development Goals, Overview https://www.unccd.int/land-and-life/sustainable-development-goals/overview
VGGT - Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security, FAO, Committee on World Food Security, https://www.fao.org/policy-support/mechanisms/mechanisms-details/fr/c/448858/

Gender Mainstreaming

[1]*Women4Biodiversity.Transformational Change: Best Practices for Gender-responsive Biodiversity Policy and Action Women – Agents of Change Voices from Asia, Africa and Latin America, July 2020*
[2] From Insight to Action. Gender Equality in the wake of COVID-19. UN Women 2020
[3] https://www.fao.org/state-of-fisheries-aquaculture
[4] https://www.weforum.org/reports/global-gender-gap-report-2021
[5] *Scalise and Giovarelli. 2020. Research Consortium. What Works for Women's Land and Property Rights?*
[6] UNEP 2019. Gender and environment statistics: Unlocking information for action and measuring the SDGs.
[7]https://www.unccd.int/official-documentscop-15-abidjan-cote-divoire-2022/iccdcop1517
[8] https://www.unccd.int/resources/publications/gender-action-plan
[9]https://www.unccd.int/official-documentscop-15-abidjan-cote-divoire-2022/iccdcop1521



ACHIEVING FOOD SYSTEMS THAT PROTECT AND PRESERE NATURE WHILE ENSURING THERE IS ENOUGH NUTRITIOUS FOOD FOR ALL CURRENT AND FUTURE GENERATIONS.

© Peter Caton / WWF-UK

The **UNCCD Food Day - Seeds of Change for a Nature-Positive Future** is co-organised by WWF, CGIAR, the Committee on World Food Security (CFS), FAO, CIFOR-ICRAF, TMG Think Tank, UN Environment Programme, IICA and the One Planet Network. The full day event, the first ever Food Day at a UN Conference of the Parties, encourages stakeholders to include food systems approaches in the implementation of the Rio Conventions on Desertification, Biodiversity and Climate. Organisers may hold individual opinions and positions on the topic of this briefing paper. The paper is not an official joint position from the organisers.

Working to sustain the natural world for the benefit of people and wildlife.

together possible. panda.org

WWF, 28 rue Mauverney, 1196 Gland, Switzerland. Tel. +41 22 364 9111

CH-550.0.128.920-7