Food and Agriculture Organization of the United Nations

OVERVIEW OF LAND DEGRADATION NEUTRALITY (LDN) IN EUROPE AND CENTRAL ASIA

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FOREWORD

Land is a vital natural resource provisioning for food, water and air for the millions of people who are depending on agriculture. However, land degradation has accelerated during the past two centuries due to combined pressures on land by agricultural and livestock production, urbanisation, and extreme climate events such as droughts. Continued land use change, unsustainable agricultural practices and climate change may put our human well-being in danger and, most of all, be a great threat to entire ecosystem services and biodiversity. The economic costs of desertification and land degradation are estimated at USD 490 billion per year while impacting an estimated 3.2 billion people's health and livelihoods.

This is not an exception to Europe and Central Asia (ECA) where there are over one billion people living across over 50 countries with diverse socio-ecological conditions – different climates, landscapes, and topographies – experiencing livelihood-threatening environmental challenges. This "Overview of land degradation neutrality (LDN) in Europe and Central Asia (ECA)" has been prepared in response to urgent needs for awareness on the up-to-date LDN situation in the ECA region and a coherent regional strategic approach within the United Nations Convention to Combat Desertification (UNCCD) 2018–2030 Strategic Framework to achieve national LDN targets and sustainable land management. Furthermore, achieving a land degradation neutral world by 2030 is one of the targets of Sustainable Development Goal (SDG) 15 (Life on land), particularly target 15.3.

Along with a 2-day workshop organised on 20–21 October 2021 by the Regional Office for Europe and Central Asia of the Food and Agriculture Organization of the United Nations (FAO), this publication presents basic concepts and principles of LDN, the international landscape for LDN, a regional overview on progress towards LDN commitment, an analysis of LDN-related biophysical and social indicators, as well as recommendations. It also presents a compilation of the 17 fact sheets published separately on LDN status for each of the 17 countries included and the LDN Decision Support System (DSS) developed for the region.

In fulfilment of FAO's international mandate, we hope that this publication will be useful as a common basis to support stakeholders' decision-making in the ECA region by providing knowledge, evidence and guidance in LDN, identifying the challenges and opportunities, and facilitating regional dialogue and consultation to promote sustainable land management and a sustainable future.

Vladimir Rakhmanin
FAO Assistant Director-General
Regional Representative for Europe and Central Asia

ACKNOWLEDGEMENTS

This publication is an output of the FAO regional office for Europe and Central Asia, which shows how important Land Degradation is to the region. Land is the primary source of natural capital from which we derive a wide range of ecosystem services in connection with food security, however, land degradation has been accelerating in many parts of the world, threatening billions of people's livelihood and health. To address this challenge and in the context of the SDGs, many countries set voluntary national LDN targets to avoid, reduce and reverse such degradation.

With the coordination of Carolina Rizzi Starr, the authors César Luis García, Ingrid Teich, Hernán Gonzalez, Bradley Paterson and Carolina Rizzi Starr collected, analysed and organised all the information here presented.

We also would like to thank our colleagues in the FAO country offices for helping us organising the meeting with the UNCCD focal points, and the focal point and their teams for their time, valuable information shared and support.

In addition, we would like to thank Jamal Annagylyjova and Munazza Naqvi for providing value information on the UNCCD work in the region, Sungyeon Park for supporting with inputs, reference verification and data checking; Eugenia Raviolo for programming and improving the App; Tori Patterson for proofreading the document and for giving a unit to the report; and Nina Barrois for the design and layout.

ABBREVIATIONS AND ACRONYMS

AFOLU	Agriculture, Forestry and Other Land Use
CBD	Convention on Biological Diversity
CCI-LC	Climate Change Initiative Land cover
CGLS	Copernicus Global Land Service dataset
CLC	CORINE Land cover
COP	Conference of the Parties
CORINE	Coordination of Information on the Environment
DLDD	Desertification, land degradation and drought
DSS	Decision Support System
ECA	Europe and Central Asia
EEA	European Environment Agency
EO	Earth Observation
ESA	European Space Agency
FAO	Food and Agriculture Organization of the United Nations
FIRMS	Fire Information for Resource Management System
FLR	forest and landscape restoration
FRA	Forest Resources Assessment
GDP	gross domestic product
GEE	Google Earth Engine
GEF	Global Environmental Facility
GHG	greenhouse gas
GM	Global Mechanism
GPG	Good Practice Guidance
GPM	Global Precipitation Mission
GSOCseq	Global Soil Organic Carbon Sequestration
GSP	Global Soil Partnership
INDCs	Intended Nationally Determined Contributions
IPBES	Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change

IUCN	International Union for Conservation of Nature
JRC	Joint Research Center
KBA	key biodiversity area
LDN	land degradation neutrality
LPD	Land productivity dynamics
NAPs	National Action Programmes
NBSAP	National Biodiversity Strategies and Action Plans
NDC	Nationally Determined Contributions
NDVI	Normalized Difference Vegetation Index
NPP	Net Primary Productivity
PRAIS	Performance Review and Assessment of Implementation System
PROBA-V	Project for On-Board Autonomy - Végétation
RECSOIL	Recarbonisation of global agricultural soils
RSPs	Regional Soil Partnerships
SDGs	Sustainable Development Goals
SLM	Sustainable Land Management
SO	Strategic Objective
SOC	Soil Organic Carbon
SPI	Science-Policy Interface
SSM	Sustainable Soil Management
STAR	System for Transparent Allocation of Resources
TE	Terminal Evaluation
TSP	Target Support Programme
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
VGGT	Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security
WOCAT	World Overview of Conversation Approaches and Technologies

EXECUTIVE SUMMARY

Land is the primary source of natural capital from which we derive a wide range of ecosystem services in connection with food security, climate change and biodiversity, which are key to achieving the Sustainable Development Goals by 2030. However, land degradation has been accelerating in many parts of the world, threatening billions of people's livelihood and health. To address this challenge, many countries set voluntary national LDN targets to avoid, reduce and reverse such degradation.

This report presents an overview of the status of land degradation neutrality in Europe and Central Asia region, including a national overview for 17 countries in the region: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Kazakhstan, Kyrgyzstan, Montenegro, North Macedonia, Republic of Moldova, Serbia, Tajikistan, Turkey, Turkmenistan, Ukraine, and Uzbekistan. This report serves as a reference for the region´s progress towards achieving LDN, increasing awareness and supporting countries with technical expertise in achieving it.

The report is organised into four sections. The first section is an introduction to the concept and principles of LDN and its link to FAO's Strategic Framework. LDN, alongside biodiversity conservation, promotes the sustainable use of natural resources and ecosystems and provides a significant benefit to climate change mitigation and adaptation. FAO's Strategic Framework is linked with the LDN framework, serving as the principal basis for human livelihoods and well-being, including the supply of food, freshwater and multiple other ecosystem services, as well as biodiversity.

The second section presents the international landscape on LDN in the region. The concept of LDN is relatively new, but it has been supported by many organisations. The United Nations Convention to Combat Desertification (UNCCD), the Global Environmental Fund (GEF), the Global Soil Partnership (GSP), and the World Overview of Conservation Approaches and Technologies (WOCAT) represent complementary organisations that play a key role globally for achieving LDN. The section explains the partnership between these organisations, UNCCD in the region, and each organisation's role, function and relevant experiences in the region.

The third section presents an overview of the status and progress towards land degradation neutrality in Europe and Central Asia Region based on the analysis of the countries' reported data to UNCCD, satellite-derived biophysical indicators, and socio-economic data. This section also presents a Regional LDN Decision Support System that was developed as part of this initiative to facilitate access to key statistics, data sets, maps and interactive functionalities to support countries in achieving LDN.

Finally, the report ends with recommendations and 17 factsheets published separately with national statistics, maps and data on countries' LDN-related indicators and efforts.

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Okatse Canyon, Georgia

1

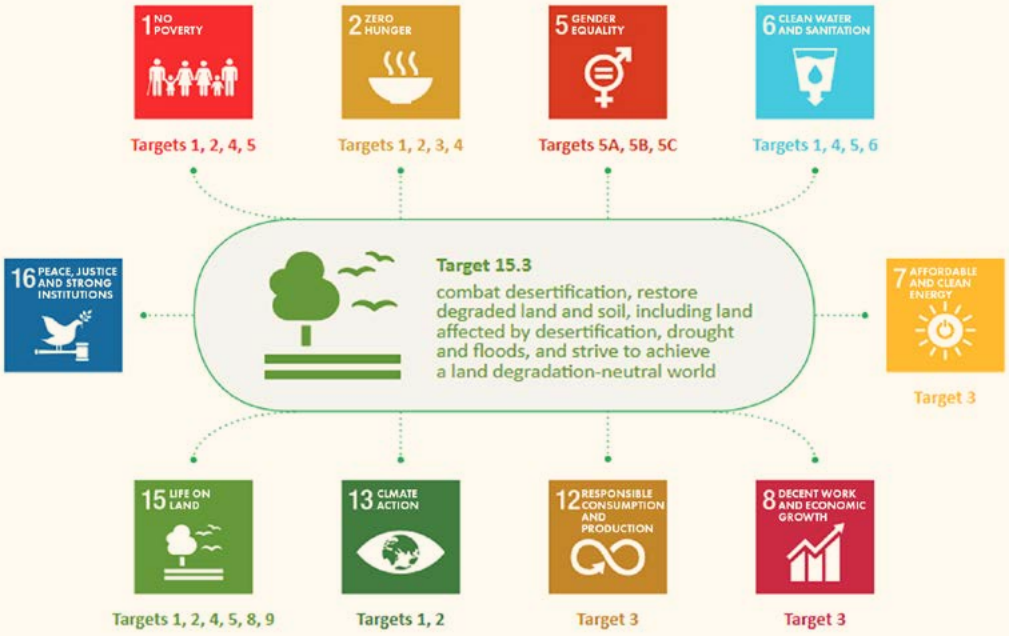
INTRODUCTION

1. INTRODUCTION

The present report aims to prepare an overview of the status of land degradation neutrality (LDN) in the Europe and Central Asia region[1], including a national overview for the following countries: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Kazakhstan, Kyrgyzstan, Montenegro, North Macedonia, Republic of Moldova, Serbia, Tajikistan, Turkey, Turkmenistan, Ukraine, and Uzbekistan.

The concept of LDN was introduced into the global dialogue by the United Nations Convention to Combat Desertification (UNCCD), accepted by the international community during the Rio+20 conference in 2012 (UNCCD, 2015b) and adopted as part of the 2030 Agenda for Sustainable Development in 2015 (UNCCD, 2021a). LDN aims to preserve the land resource base by ensuring no net loss of healthy and productive land via a combination of measures that avoid, reduce and reverse land degradation (Orr *et al.*, 2017). Achieving neutrality requires estimating the likely impacts of land-use and land management decisions, then counterbalancing anticipated losses through strategically planned rehabilitation or restoration of degraded land within the same land type (Cowie, 2020). The LDN approach aims to achieve a functional balance between what we take from the land and what we give back, providing a framework for a balanced approach, which considers trade-offs and anticipates new degradation.

Figure 1: Land degradation neutrality, an accelerator of the Sustainable Development Goals



Source: Global Mechanism of the UNCCD. 2019.

[1] This document is a result of a large consultation process including the UNCCD focal points in the countries, FAO country offices, and other stakeholders linked to LDN in the region.

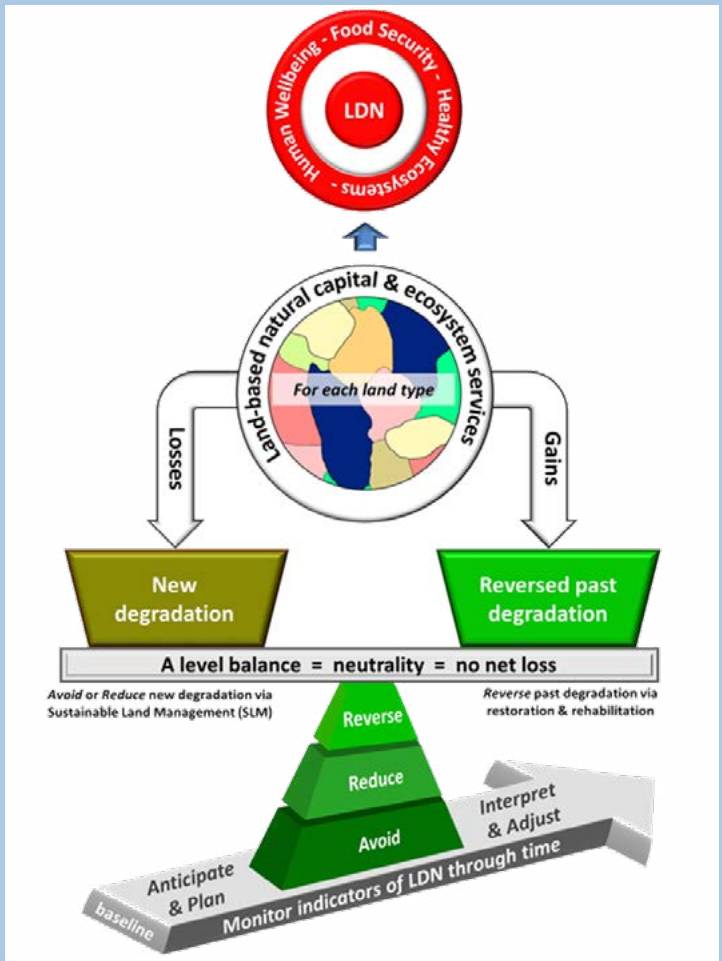
Policies and programmes to avoid, halt, and reverse land degradation have long suffered from the absence of a clear, overarching goal and quantitative, time-bound targets to guide action and make measurable progress. In October 2015, UNCCD country parties reached a breakthrough agreement on the LDN concept. The LDN concept and the frameworks to achieve it are still evolving, particularly regarding the neutrality mechanism, which still needs to be widely tested in the field. There are many remaining challenges, particularly related to on the ground implementation and monitoring of progress towards achieving LDN linking different scales.

BOX 1: DEFINITION OF LDN

The United Nations Convention to Combat Desertification (UNCCD) defines land degradation neutrality as "a state whereby the amount and quality of land resources necessary to support ecosystem functions and services and enhance food security remain stable or increase within specified temporal and spatial scales and ecosystems"

Source: decision 3/COP.12, UNCCD, 2015a.

Figure 2: The overarching concept of LDN, the key elements of the conceptual framework, and their interrelationships



Source: Orr *et al.*, 2017.

Also, LDN was adopted as a target for the Sustainable Development Goal 15 (SDG 15.3), providing a framework to verify the status of land degradation, understand its magnitude, and evaluate its current and potential impact on the environment and livelihoods in the region. Stakeholders can use the LDN framework to identify an optimal mix of policies and sustainable land management (SLM) interventions that optimise local and global benefits in line with existing international agreements and initiatives, such as the 2030 Agenda.

Achieving LDN will directly contribute to the region´s global goals and commitments, including the SDGs of no poverty (SDG 1), zero hunger (SDG 2), clean water (SDG 6) and life on land (SDG 15), with its target 15.3 on LDN. FAO has been providing support to the region through projects and programmes.

LDN provides a framework for action that can integrate biodiversity conservation and other objectives in its overarching goal of keeping our lands healthy and productive. The LDN framework is built around a set of principles, including integrated land-use planning and good governance, which are likely to ensure that biodiversity conservation is taken into account in more integrated environmental policymaking. Both LDN and biodiversity conservation aim at promoting the sustainable use of natural resources, ecosystems and biodiversity and can, therefore, strongly reinforce each other. Both also include a commitment to socio-economic goals, including contributing to health, livelihoods and well-being and ensuring that the benefits from the sustainable use of land and biodiversity accrue to all, especially women, indigenous communities and the poor and vulnerable.

Also, the Convention on Biological Diversity (CBD) and the UNCCD work rests on core objectives that show strong support for the sustainable use of natural resources, including ecosystems and biodiversity and a commitment to the 'triple bottom line' of environmental, economic and social goals.

When it comes to climate change, LDN provides significant benefits in terms of mitigation and adaptation to climate change. Land degradation is a driver of climate change through emissions of greenhouse gases (GHGs) and reduced uptake of carbon, and at the same time, climate change exacerbates land degradation via increased soil erosion, vegetation loss, wildfires and extreme events (IPCC, 2020). Avoiding, halting, and reversing land degradation can not only stop land from being a source of greenhouse gas emissions but also can capture and store carbon by increasing carbon stocks in soils and vegetation. Furthermore, LDN plays a key role in strengthening the resilience of rural communities against climate shocks by securing and improving the provision of vital ecosystem services. Based on the Intergovernmental Panel on Climate Change (IPCC) report from 2020, agriculture, forestry and other land use (AFOLU) is a significant net source of GHG emissions (high confidence), contributing to about 23 percent of anthropogenic emissions of carbon dioxide (CO^2), methane (CH^4) and nitrous oxide (N^2O). These links between land and climate were previously reflected in the Intended Nationally Determined Contributions (INDCs) which were submitted by countries to the Conference of Parties (COP) 21 of the United Nations Framework Convention on Climate Change (UNFCCC) in Paris in 2015. Since then, more than 100 of the INDC, which has been turned into the Nationally Determined Contributions (NDCs), included land-based activities for mitigation and adaptation. UNCCD's voluntary LDN targets and associated measures contribute to and depend on the implementation of national climate plans and vice versa. Such synergies should be taken into account when developing national plans for LDN. Revising and updating the NDCs under the Paris Agreements should be as well in order to accelerate the transition to an economy that is resilient to climate crisis and reduce the vulnerability of rural people and their livelihoods worldwide.

Black Lake, Durmitor National Park, Montenegro

LAND DEGRADATION NEUTRALITY PRINCIPLES

1. Maintain or enhance land-based natural capital: LDN is achieved when the quantity and quality of land-based natural capital (World Bank, 2012) is stable or increasing, despite the impacts of global environmental change.
2. Protect human rights and enhance human well-being: Actions taken in pursuit of the LDN target should not compromise the rights of land users (especially small-scale farmers and indigenous populations) to derive economic benefit and support livelihoods from their activities on the land and should not diminish the provisioning capacity and cultural value of the land.
3. Respect national sovereignty: Governments set national targets guided by the global level of ambition, while taking into account national circumstances. Governments decide the level of aspiration and how LDN targets are incorporated in national planning processes, policies and strategies.
4. The LDN target equals (is the same as) the baseline: The baseline (the land-based natural capital as measured by a set of globally agreed LDN indicators at the time of implementation of the LDN conceptual framework) becomes the target to be achieved in order to maintain neutrality.
5. Neutrality is usually the minimum objective: Countries may elect to set a more ambitious target, that is, to improve the land-based natural capital above the baseline, to increase the amount of healthy and productive land. In rare circumstances, a country may set (and justify) its LDN target acknowledging that losses may exceed gains if they forecast that some portion of future land degradation associated with past decisions/realities is not currently possible to counterbalance.
6. Apply an integrated land-use planning principle that embeds the neutrality mechanism in land-use planning: The mechanism for neutrality should be based on a guiding framework for categorising and accounting for land-use decisions and the impacts of land use and management with respect to a "no net loss" target.
7. Counterbalance anticipated losses in land-based natural capital with gains over the same timeframe to achieve neutrality: Achieving LDN may involve counterbalancing losses in land-based natural capital with planned gains elsewhere within the same land type.
8. Manage counterbalancing at the same scale as land-use planning: Counterbalancing should be managed within national or subnational boundaries at the scale of the biophysical or administrative domains at which land-use decisions are made, to facilitate effective implementation.
9. Counterbalance "like for like": Counterbalancing gains and losses should follow, as far as possible, "like for like" criteria and thus will generally not occur between different types of ecosystem-based land types, except where there is a net gain in land-based natural capital from this exchange. Clear rules should be established ex ante for determining what types of "net gains" permit crossing land type boundaries to ensure that there is no unintended shifting in the overall ecosystem composition of a country and no risk to endangered ecosystems.
10. Balance economic, social and environmental sustainability: LDN seeks to maintain or enhance the quality of all ecosystem services, optimising the trade-offs between environmental, economic and social outcomes. Implementing LDN contributes to sustainable development by integrating economic and social development and environmental sustainability within the biophysical limits of natural capital and seeking to manage the land for ecosystem services while avoiding burden shifting to other regions or future generations.
11. Base land-use decisions on multi-variable assessments: Land-use decisions should be informed by appropriate assessments (land potential; land condition; resilience; social, cultural and economic factors, including gender consideration) validated at the local level before initiating interventions to ensure evidence-based decisions and reduce the potential risk of land appropriation.

12. Apply the response hierarchy: In devising interventions and planning for LDN, the response hierarchy of Avoid > Reduce > Reverse land degradation should be applied, in which avoid and reduce have priority over reversing past degradation so that the optimal combination of actions can be identified and pursued with the aim of achieving no net loss across the landscape.
13. Apply a participatory process: Planning and implementation of LDN involves well-designed participatory processes that include stakeholders, especially land users, in designing, implementing and monitoring interventions to achieve LDN. Processes should consider local, traditional and scientific knowledge, applying a mechanism, such as multi-stakeholder platforms, to ensure these inputs are included in the decision-making process. The process should be sensitive to gender and imbalances in power and information access.
14. Apply good governance: Good governance underpins LDN and thus planning and implementation should involve:
    - removing and reversing policy drivers that lead to poor land management;
    - applying the principles and standards of the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests (VGGTs) to ensure tenure rights and security in the pursuit of LDN (FAO, 2012b);
    - taking account of availability of resources (human and economic) for implementing good practices to combat land degradation and desertification;
    - making provisions for monitoring and reporting on LDN implementation;
    - developing a mechanism for the coordination of integrated land-use and management planning across scales and sectors to ensure stakeholder input to national and international decision-making and reporting;
    - developing a mechanism for the timely review of implementation outcomes and recommendations for improvement; and
    - ensuring upward and downward accountability and transparency.
15. Make use of three land-based indicators and associated metrics: Land cover (assessed as land cover change), land productivity (assessed as national project personnel) and carbon stocks (assessed as SOC) as minimum set of globally agreed indicators/metrics, which were adopted by the UNCCD for reporting and as a means of understanding the status of degradation (UNCCD, 2013b).
16. The integration of results of the three global indicators should be based on a "one-out, all-out" approach where, if any of the three indicators/metrics shows significant negative change, it is considered a loss (and conversely, if at least one indicator/metric shows a significant positive change and none shows a significant negative change, it is considered a gain).
17. Make use of additional national and subnational indicators, both quantitative and qualitative data, and information to aid interpretation and to fill gaps for the ecosystem services not fully covered by the minimum global set.
18. Apply in-situ validation and local knowledge obtained through local multi-stakeholder platforms to interpret monitoring data according to local context and objectives, within agreed guidelines.
19. Monitoring should be viewed as a vehicle for learning. Monitoring provides opportunities for capacity building; the basis for testing hypotheses that underpin the counterbalancing decisions and the interventions implemented, the LDN concept, and this conceptual framework; and knowledge to inform adaptive management.

Leshnica, North Macedonia

1.1. ACHIEVING AND MONITORING LAND DEGRADATION NEUTRALITY

Measures to achieve LDN are most effective when they are planned in an integrated way, considering the different land types in the landscape. The neutrality mechanism should be implemented at the scale of the biophysical (e.g. catchment/landscape) or the administrative (e.g. province) spatial domain of land-use planning and decision-making and be scalable so that the results can be reported nationally. Ideally, neutrality would be integrated into existing land-use planning processes and implemented by existing institutions. In many instances, this will translate into comprehensive national, institutional and corporate strategies that embrace complementary activities. These can include the adoption of sustainable land management and holistic land-use planning, the restoration of degraded land for production, as well as of natural and semi-natural ecosystems that provide valuable functions and benefits.

The generic impact pathway or theory of change for achieving LDN starts with assessing and strengthening the enabling environment for LDN, i.e. the institutions, policies, legal frameworks and capacities that need to be in place across sectors to support implementation of LDN. An integrated approach at the landscape scale that aims to reconcile the multiple objectives of sustainable agricultural productivity, conservation of ecosystems and livelihoods can only be achieved through collaboration across sectors, promotion of synergies and management of trade-offs, and involvement of multiple stakeholders.

According to the LDN response hierarchy, avoiding degradation of natural and intact ecosystems is a priority. Sustainable land management and landscape-scale restoration are also part of the LDN response and necessary to boost livelihoods, secure food, protect soils and waterways, improve nutrient cycling, support pollinators, and create resilience to climatic uncertainties.

It is expected that through the implementation of Sustainable Land Management Practices land degradation will be avoided, reduced, or reversed (according to the UNCCD response hierarchy), enabling progress towards a land degradation neutral world (SDG 15.3). Accordingly, it is expected that these changes will eventually impact the proportion of land that is degraded over total land area (SDG indicator 15.3.1). To assess this indicator, the Good Practice Guidance (GPG) (Sims *et al.*, 2017; Sims *et al.*, 2021), developed by the UNCCD, recommends the calculation of three Change of State indicators: (1) trends in land cover, (2) trends in land productivity or functioning of the land, and (3) trends in carbon stocks above and below ground. Regional and global datasets derived from global earth observation systems play an important role in obtaining these indicators, particularly for assessing changes in land productivity and land cover dynamics.

Countries need to report and monitor progress towards LDN at the national level, and for this matter, the three SDG 15.3.1 Change of State indicators are used (see section 3). However, to achieve LDN, interventions are applied at the field level, and projects and decision makers need to base land-use decisions on additional variables and indicators, validated at the local level, before initiating interventions to ensure evidence-based decisions. This gap is often difficult to bridge, and

there is a need for better understanding of the many methods and tools to choose reliable indicators and how to monitor them at different spatial and temporal scales.

A global study of SLM measures based on the WOCAT best practices database showed that a clear impact on the trend in the land productivity indicator may require more than a ten-year period (González-Roglich *et al.*, 2019) after implementation. Change of national indicators alone might not be enough to capture the more subtle changes in landscape processes. Process and response indicators that are related to strengthening the enabling environment, and stress reduction/change of pressure indicators related to SLM and land-use planning activities, are necessary for monitoring progress towards LDN, especially at the project level, including local and landscape plans. It is important to capitalise on all the efforts made to achieve LDN since over time these additional indicators may produce a change of state, while acting on reversing, avoiding and reducing land degradation. There is a continuum development in tools to improve monitoring information, actions, and indicators on multiple scales (the project/field scale behaves very differently than district, province, or national scales) to produce a better understanding of this holistic process.

Bosnia and Herzegovina

1.2. FAO PROGRAMMATIC APPROACH AND WORK ON LAND DEGRADATION NEUTRALITY

FAO's Strategic Framework contributes to the achievement of the 2030 Agenda and 3 Global Goals of Members by supporting the transformation to more efficient, inclusive, resilient and sustainable agri-food systems for better production, better nutrition, a better environment, and a better life, leaving no one behind. The four betters represent an organising principle for FAO's contribution to high-level aspirational goals, crucial for attaining FAO's overall vision and viewed through the guiding lens of SDG 1 (no poverty), SDG 2 (zero hunger), and SDG 10 (reduced inequalities). The betters reflect the interconnected economic, social and environmental dimensions of agri-food systems. As such, they also encourage a strategic and systems-oriented approach within all FAO's interventions. It is important to connect the FAO's Strategic Framework with the LDN framework as land provides the principal basis for human livelihoods and well-being, including the supply of food, freshwater and multiple other ecosystem services, as well as biodiversity.

BETTER PRODUCTION - Ensure sustainable consumption and production patterns through efficient and inclusive food and agriculture supply chains at local, regional and global levels, ensuring resilient and sustainable agri-food systems in a changing climate and environment. LDN aims to avoid, reduce and/or reverse land degradation, promoting healthy and productive land.

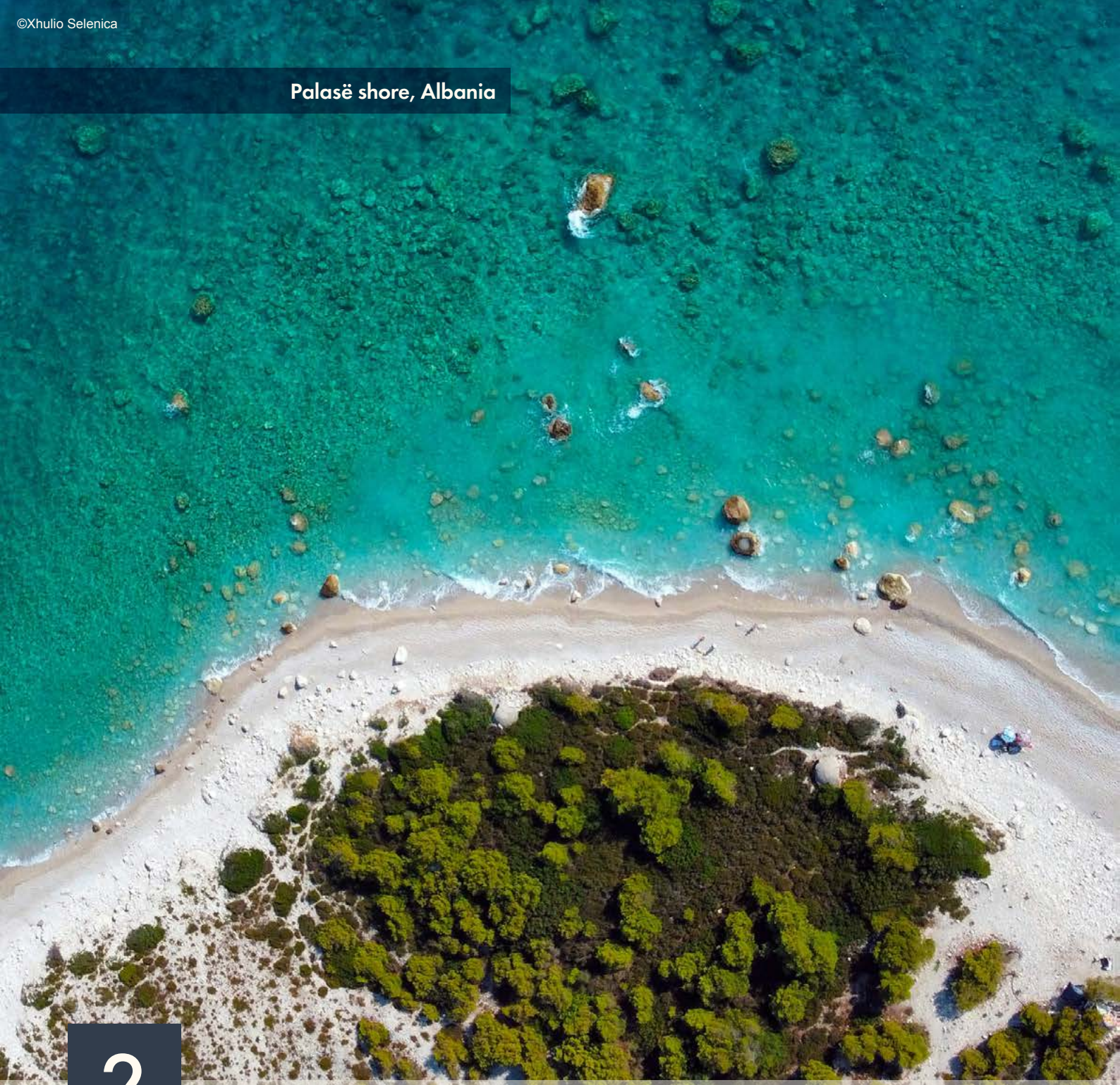
BETTER NUTRITION - End hunger and achieve food security and improved nutrition in all its forms, including promoting nutritious food and increasing access to healthy diets. Not directly linked to better nutrition, LDN can indirectly promote it, and healthy and productive land leads to better production which in turn leads to better nutrition.

BETTER ENVIRONMENT - Protect, restore and promote sustainable use of terrestrial and marine ecosystems and combat climate change (reduce, reuse, recycle, residual management) through more efficient, inclusive, resilient and sustainable agri-food systems. LDN promotes healthy and productive land in an integrated landscape approach, including integrated land-use planning and good governance, which are likely to ensure biodiversity conservation, generating benefits in terms of mitigation and adaptation to climate change and, therefore, a better environment for all.

BETTER LIFE - Promote inclusive economic growth by reducing inequalities (urban/rural areas, rich/poor countries, men/women). One of the LDN principles is to "protect human rights and enhance human well-being" by promoting healthy and productive land without compromising the rights of land users (especially

small-scale farmers and indigenous populations) to derive economic benefit and support livelihoods from their activities on the land; LDN can support a better life for all. LDN interventions must include a participatory gender-responsive approach to define land-use planning, adopt equitable land management decisions, and institute evaluation and adaptive learning systems (UN Women, Global Mechanism of the UNCCD & IUCN, 2019).

FAO is actively supporting countries in achieving LDN by generating on-the-ground information, data and tools to restore, combat and monitor land degradation, desertification and drought, as well as implementing and mainstreaming SLM to tackle these issues. It is also providing decision support and policy options for SLM, the sustainable management of soil resources, and drought management aimed at achieving LDN, as well as demonstrating the links between LDN, food security, poverty reduction, and the provision of ecosystem services. FAO pursues coherent approaches that address governance, gender and local community aspects within the role and mandate of the UNCCD, including through partnerships with other international organisations and cooperative efforts to increase attention, create an enabling environment and improve funding for such approaches.



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Palasë shore, Albania

2

LAND DEGRADATION NEUTRALITY AT THE GLOBAL LEVEL

2. LAND DEGRADATION NEUTRALITY AT THE GLOBAL LEVEL

Land degradation neutrality is a relatively new concept but is anchored in a very strong international setup. The concept was introduced into the global dialogue by the UNCCD but is also strongly supported by FAO and WOCAT. These three organisations are providing support to countries in the implementation of LDN on different fronts and are complementary in their scope.

For instance, UNCCD and WOCAT strengthened their global partnership through an agreement in 2020 by committing to implementing the WOCAT 2020+ Initiative. The initiative aims to establish a leading platform of expertise on sustainable land management to help countries to achieve LDN and related SDGs. Based on the vast knowledge presented in the global SLM database in WOCAT, their joint efforts will strengthen regional cooperation from agricultural advisory services to UNCCD national focal points.

UNCCD also worked with the Global Soil Partnership (GSP) team at FAO by coordinating efforts to launch the first Global Soil Organic Carbon (SOC) Map on 5 December 2017. The map contributes to the soil- and land-related targets under the SDGs and to climate change mitigation and adaptation by establishing a global soil monitoring and governance framework – which enables interested stakeholders to track and forecast the condition of soil resources on Earth.

FAO is a member of the Inter-Agency Advisory Group on SDG indicator 15.3.1, which UNCCD leads, and is also an observer to the Science Policy Interface of the UNCCD. FAO supports delivery of SDG target 15.3 through programmes and activities that assist countries achieve LDN targets, including in Uzbekistan, Georgia, Republic of Moldova, Armenia and Turkey. Finally, a technical guide to integrate the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security into the implementation of the Convention and to achieve LDN is being developed by UNCCD and FAO. The technical guide is scheduled to be presented at UNCCD COP 15 in 2022.

2.1. UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION

Established in 1994, the United Nations Convention to Combat Desertification (UNCCD), one of the three Rio Conventions, specifically addresses the arid, semi-arid and dry sub-humid areas known as the drylands. The Convention works to improve the living conditions for people in drylands, to maintain and restore land and soil productivity, and to mitigate the effects of drought through national action programmes (NAPs) that incorporate long-term strategies supported by international cooperation and partnership arrangements. The UNCCD 2018–2030 Strategic Framework is the most comprehensive global commitment to achieving LDN through 5 strategic objectives (SOs).
The UNCCD is the custodian agency for SDG targets on LDN (SDG 15.3.1) and indicator 15.3.1: "proportion of land that is degraded over total land area." Information on this indicator has been regularly collected by the UNCCD through its national reporting and review process since 2018, and every 4 years thereafter.

BOX 2: 5 STRATEGIC OBJECTIVES OF THE UNCCD 2018–2030 STRATEGIC FRAMEWORK

Strategic objective 1: To improve the condition of affected ecosystems, combat desertification/land degradation, promote sustainable land management and contribute to land degradation neutrality

Strategic objective 2: To improve the living conditions of affected populations

Strategic objective 3: To mitigate, adapt to, and manage the effects of drought in order to enhance resilience of vulnerable populations and ecosystems

Strategic objective 4: To generate global environmental benefits through effective implementation of the UNCCD

Strategic objective 5: To mobilise substantial and additional financial and non-financial resources to support the implementation of the Convention by building effective partnerships at the global and national level

Source: The UNCCD 2018–2030 Strategic Framework.

The UNCCD is essentially a treaty body that is "owned" by the country Parties; these country Parties also bear the main responsibility for implementing activities to meet the objectives of the Strategic Framework. The Convention process, related collaboration and implementation are facilitated and supported by different branches: The Secretariat and the Global Mechanism (GM) that is established in the Convention text. These branches systematically function and support subsidiary bodies in a manner that enables scientific evidence-based decision-making and leads to successful action in advancing the implementation of the Convention's vision through the strategic objectives. Detailed functions of each branch entity are described in the following sections.

EVALUATION OFFICE

The UNCCD evaluation office is responsible for monitoring and evaluating the planned results. Systematic monitoring and evaluation of activities carried out under the UNCCD started in 2014. It is intended to strengthen the external credibility and accountability of the Secretariat and the GM and to enhance their internal culture of learning. The evaluations under the UNCCD are usually prepared by independent evaluators. The evaluation office plans and schedules the evaluations, recruits the independent evaluators, arranges for knowledge-sharing of the evaluation outcomes, and follows-up on the implementation of evaluation recommendations. The evaluation reports and related management responses are openly accessible to parties and other stakeholders through its web page. They are also presented to parties at the COP in the context of the agenda item on programme and budget.

2.1.1. SECRETARIAT OF THE UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION

The key function of the Secretariat is to service the sessions of the COP and its subsidiary bodies. This includes a multitude of tasks, ranging from the preparation of substantive documentation to logistical arrangements for the sessions. The overall aim of the Secretariat is to service the COP and its subsidiary bodies in a manner that enables well-founded decision-making and successful action in advancing the implementation of the UNCCD. To this end, the Secretariat also maintains the reporting platform – Performance Review and Assessment of Implementation System (PRAIS) – which enables country parties to validate and submit national data and information following the indicators of the UNCCD 2018–2030 Strategic Framework. Particular attention is paid to:

(a) Increasing the political momentum: Active promotion of the land-related agenda, notably by linking scientific findings with political decision-making, supports a growing global commitment to halt land degradation and rehabilitate already degraded land.

(b) Moving to meet global targets: Efforts towards more ambitious national/regional LDN commitments and recognition of the critical role of land and soil in climate change adaptation and mitigation, as well as securing biodiversity and social wellbeing, are essential factors for meeting the global development agenda that is summarised in the SDGs.

(c) Improving conditions for national implementation: Access to information, up-scaling of good practices, and opportunities for capacity-building are critical for progress in implementing the UNCCD at the national level.

Since 2014, a small UNCCD Evaluation Office has functioned as part of the structure of the Secretariat. This Office has commissioned several independent evaluations on specific aspects of LDN, as follows:

- Evaluation of the UNCCD support to the development of transformative projects and programmes for land degradation neutrality (2021)
- Evaluation of the LDN target-setting programme (2019)
- Evaluation of the LDN Fund development (2017)

2.1.2. GLOBAL MECHANISM OF THE UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION

The Global Mechanism (GM) was established under Article 21 of the UNCCD to assist countries in the mobilisation of financial resources to implement the Convention and address desertification, land degradation and drought. It is an operational arm of the Convention, providing advisory services and working together with developing countries, the private sector and donors to mobilise substantial resources for UNCCD implementation. As of today, the GM has given support to 127 countries to put the LDN concept into political commitments through the voluntary Land Degradation Neutrality Target Setting Programme. It further supports countries in the development of transformative LDN projects and programmes that contribute to the achievement of the voluntary targets and deliver multiple benefits (UNCCD, 2021b).

2.1.3. UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION IN THE REGION

The UNCCD works in the regions through the Regional Implementation Annexes. The region of Europe and Central Asia, which includes more than 50 countries, is covered by 3 Regional Implementation Annexes of the UNCCD: Annex II – Asia and Pacific, Annex IV – Northern Mediterranean, and Annex V – Central and Eastern Europe (UNCCD, 2021c).

The decisions of the Conference of the Parties are applicable to all countries across the regional annexes. At the same time, facilitated by the regional committees, each annex specifies the regional priorities and identifies relevant regional initiatives and partnerships to bolster regional coordination and collaboration. The regional priorities are laid down in the regional or sub-regional action programmes. For example, the Regional Action Programme to combat desertification, land degradation and drought for Central and Eastern Europe (2015–2021) focuses on the attainment of national LDN targets, amongst other regional priority areas (UNCCD, 2015c).

Similar to other regions, the countries of Europe and Central Asia benefit from the global programmes and initiatives mandated by the UNCCD COP decisions. Since 2016, 18 countries[2] of the region joined the LDN Global Support Programme to enable LDN target setting. Since 2018, 11 countries[3] joined the Global Drought Initiative which supports countries in the development of national drought programmes.

Regional policy advocacy is an important tool for the UNCCD. Land-centred solutions for green recovery are actively promoted through regional partnerships, such as ECCA 30 of Bonn Challenge, a collaboration with the Drought Management Center for Southeastern Europe, joint

[2] Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Kazakhstan, Kyrgyzstan, Italy, Montenegro, North Macedonia, Republic of Moldova, Russian Federation, Serbia, Tajikistan, Turkey, Turkmenistan, Ukraine, and Uzbekistan.

[3] Azerbaijan, Bosnia and Herzegovina, Montenegro, North Macedonia, Republic of Moldova, Russian Federation, Serbia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

advocacy on peatland restoration with the Global Peatland Initiative, support for drought and sand and dust storms management policies in Central Asia, and research on land-based employment as a factor to strengthen resilience and security in Central Asia. Launched in 2020, a new Peace Forest Initiative of the UNCCD bridges land restoration and peace building (UNCCD, 2021d). The Initiative is exploring how transboundary management of shared resources in the post-conflict areas could help achieve LDN in Central and Eastern Europe.

Turning policy into action is a key priority for the GM. Currently, six countries in the region (Armenia, Belarus, Georgia, Montenegro, Turkey and Uzbekistan) have received support through the LDN Transformative Projects and Programmes. An Impact Investment Fund for LDN (LDN Fund) has been operational since 2017 (UNCCD, 2021e). To better understand the barriers for private and blended finance in sustainable land management and value chains in the region, the UNCCD GM and Secretariat are working on the report in terms of scope, barriers and solutions to access innovative financial mechanisms to implement LDN transformative projects in Central and Eastern Europe.

BOX 3: FOUR BUILDING BLOCKS FOR LDN TARGET SETTING

Leveraging LDN: facilitating the engagement of decision makers and stakeholders involved in land management and the LDN target-setting process

Assessing LDN: strengthening countries' capacities for making informed decisions on what action to take by assessing the current state of land and the drivers of land degradation, using the best available data

Setting LDN targets and associated measures: supporting countries to define the country's ambitions in combating land degradation by defining LDN targets and measures

Achieving LDN: helping countries to create an enabling environment by integrating LDN into national policies and identifying investment opportunities along with transformative LDN programmes and projects

Source: UNCCD.

2.2. WORLD OVERVIEW OF CONSERVATION APPROACHES AND TECHNOLOGIES (WOCAT)

WOCAT is a global network on sustainable land management that was established in 1992. As part of its mission, WOCAT strives to support evidence-based decision making and influences policy making at various levels to promote wider implementation and scaling up of identified good practices. The WOCAT Network launched efforts to compile, document, evaluate, share, disseminate, and apply SLM knowledge. It paved the way for recognising that land users lead the way to sustainable solutions and the pressing need for corresponding knowledge management. In early 2014, WOCAT's growth and ongoing improvement culminated in it being officially recognised by the UNCCD as the primary recommended Global SLM Database for best practices, which currently has nearly 2 000 SLM practices from 130 countries.

WOCAT played an essential role in providing solutions for land degradation. WOCAT's global relevance is shown by various institutions and initiatives' frequent use of its global SLM database, the WOCAT definitions, and the standardised WOCAT methods and tools. WOCAT is widely used and referenced, for example, in the UNCCD Science-Policy Interface (SPI) report on SLM contribution to successful land-based climate change adaptation and mitigation, in the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) assessment report on land degradation and restoration, and in the European Commission's Joint Research Centre World Atlas of Desertification for which the part on solutions was prepared in collaboration with WOCAT.[4]

WOCAT's network in the ECA region is strong, with partners at all policy levels. Regional success stories on implementation of SLM practices, along with policy actions, have been documented. There are currently 284 SLM approaches and technologies documented in the WOCAT SLM database by the 17 countries analysed in this report. This information comprises a key knowledge base for expansion of SLM in the ECA region, where unsustainable agricultural practices, such as excessive irrigation, mono cropping, tillage on steep slopes, overgrazing of pastures, and deforestation, remain problematic. Building on the vast knowledge contained in the global SLM database and new partnership actions, the WOCAT 2020+ initiative will synthesise local, national and regional experiences, conduct and facilitate targeted research, and disseminate lessons learned. Thus, it will provide new SLM insights and guidance to a wide range of stakeholders in the region, from the local to the global level.

[4] For more information see https://www.wocat.net/en/

BOX 4: SLM PRACTICE EXAMPLE IN KYRGYZSTAN

One of the most recent SLM practices reported in WOCAT for the region is Tree windbreaks within irrigated agriculture in Central Asia. The technology is an example of the major efforts to introduce agroforestry systems across Central Asia and eastern Europe to collect its multiple benefits. In this area this specific practice with windbreaks reduce the overall water consumption of irrigated agriculture by 10-20 percent and increase farm income by 10-15 percent. In other areas and with different set of tree species it is also reported to increase crop/fodder production, reduce land degradation, improve resilience of orchards/croplands to climate extremes, capture carbon and improve local socio-economic conditions.

This experience is documented and shared through the Global SLM Database in WOCAT using a very compressive form with detailed and useful information, visit:
https://qcat.wocat.net/en/summary/5861/?as=html

Find more from around the world at: https://qcat.wocat.net/en/wocat/ or visit the DSS App presented in the section 3.5 to find a link to counties practices and approaches:
https://projectgeffao.users.earthengine.app/view/reu-ldn-assessment

2.3. THE GLOBAL ENVIRONMENT FACILITY (GEF) TRUST FUND

The Global Environment Facility (GEF) Trust Fund was established on the eve of the 1992 Rio Earth Summit to help tackle our planet's most pressing environmental problems. GEF funding to support the projects is contributed by donor countries. These financial contributions are replenished every 4 years by the GEF's 39 donor countries. FAO is one of the 18 Partner Agencies accredited to the GEF; this partnership between FAO and the GEF has developed over more than 2 decades and provides support to countries in their efforts to address the root causes of environmental degradation and poverty.

FAO became a full-fledged member of the GEF in 2006. Over the past 12 years, the FAO-GEF partnership has helped deliver more than 180 projects in over 120 countries across continents. These projects have benefitted more than 4.6 million women and men, created over 350 000 jobs in rural communities, safeguarded biodiversity in 189 vulnerable marine ecosystems, and saved close to 1 000 crop varieties and animal species and breeds from extinction. Importantly, in 90 of these projects, indigenous peoples and local communities have been actively involved in project design and implementation (FAO, 2018).

Land degradation was included in GEF's mandate in 2002, primarily focusing on desertification and deforestation to support the UNCCD as a financial mechanism for the UNCCD. GEF's Land Degradation Focal Area seeks a holistic approach that promotes synergies amongst other GEF focal areas, and most projects are targeted at integrating SLM into national development priorities; strengthening capacities (human, technical, and institutional); helping create necessary policy and regulatory reforms; and implementing innovative SLM practices (GEF, 2009).

The GEF's Land Degradation Focal Area provides an opportunity for eligible countries to follow the Convention's Strategic Framework 2018–2030, especially on agricultural and rangeland management practices which support the livelihoods of poor rural farmers and pastoralists. Alongside the UNCCD, GEF has been supporting countries' voluntary LDN target-setting projects, providing technical and financial support through an appropriate mix of investments and programmes such as the Food Systems, Land Use and Restoration Impact Programme and the Sustainable Forest Management Impact Programme. The Land Degradation Focal Area allocation for the current funding cycle GEF-7 (2018–2022) is USD 475 million, which is a 10 percent increase compared to GEF-6. Furthermore, the impact programmes, other focal areas (as multifocal areas), and the non-grant instruments will be added to maximise the focal area results. Leveraging other GEF resources, this could make USD 1.4 billion available to support the implementation of the UNCCD agenda globally (GEF, 2019). In the region, the partnership between GEF and FAO has grown since GEF-5, and there are currently 15 LDN-related GEF projects[5] covering 13 member countries.

[5] Which includes both active and under preparation projects from GEF-5 to GEF-7.

Table 1 shows the amount of fund from both GEF-6 and GEF-7 allocated to SLM and LDN in the 17 countries. Looking at the GEF-6 and 7 cycles, the data indicates that only half of the countries allocated money for LDN-related projects and only 8.5 percent of the total System for Transparent Allocation of Resources (STAR) funds for the regions was invested in this focal area. This investment gap is more important in light of the magnitude of the problem, which, according to the PRAIS-3 reports for the region, 25 percent of the area is degraded, or about 155 million hectares.

Table 1: GEF-6 and GEF-7 STAR country allocations (million USD) of 17 countries in Europe and Central Asia

Country in FAO REU	Total GEF STAR allocation (million USD)	Distribution of investment by projects' main targets (million USD)		
		SLM/Biodiversity	LDN	Other
Albania	8.1	4.2	-	3.9
Armenia	15.3	8.4	2.5	4.4
Azerbaijan	20.0	4.7	2.4	13.0
Belarus	19.2	12.0	-	7.1
Bosnia and Herzegovina	8.2	4.6	1.0	2.6
Georgia	11.3	3.6	2.0	5.7
Kazakhstan	38.7	19.5	6.3	12.9
Kyrgyzstan	12.3	12.0	-	0.3
Montenegro	8.2	5.5	-	2.8
North Macedonia	11.3	8.3	-	3.0
Republic of Moldova	17.3	1.0	1.7	14.6
Serbia	10.2	3.7	0.7	5.7
Tajikistan	12.0	6.7	-	5.3
Turkey	42.2	7.4	2.7	32.1
Turkmenistan	18.4	8.4	-	10.0
Ukraine	34.7	2.0	-	32.7
Uzbekistan	36.6	16.7	8.3	11.7
REU Region Total	**324.3**	**128.7**	**27.6**	**168.0**

Source: GEF portal.

Moutains in Kyrgyzstan

2.4. GLOBAL SOIL PARTNERSHIP

The Global Soil Partnership (GSP) is a globally recognised mechanism established in 2012. It aims to develop awareness of soil resources and to position soils in the global agenda through collective action. The key objectives are to promote Sustainable Soil Management (SSM) and improve soil governance to guarantee healthy and productive soils and support the provision of essential ecosystem services towards food security and improved nutrition, climate change adaptation and mitigation, and sustainable development. The GSP is supported by nine regional soil partnerships (RSPs) covering the whole globe. Therefore, region-specific aspects for implementation can be considered and strengthened.

Because of its multifunctional roles, one of the three main indicators for LDN is changes in Soil Organic Carbon (SOC). Mapping and monitoring changes in SOC is a challenging task that the Global Soil Partnership has tackled at the global scale with a bottom-up approach, producing the GSOC map, the first global soil organic carbon map produced through a consultative and participatory process involving member countries of the GSP, under the guidance of the Intergovernmental Technical Panel on Soils and the Global Soil Partnership Secretariat. Countries agreed on the methodology to produce the map and were trained on state of the art tools and methodologies to develop their own national maps. The Global Soil Partnership then gathered all national maps to produce a global country-driven dataset, ensuring a thorough harmonisation process. The capacities developed, as well as the final GSOC map, can greatly enhance countries' tools to achieve and monitor progress towards LDN.

Other important initiatives of the GSP in the context of LDN are:

1. The Global Soil Organic Carbon Sequestration (GSOCseq) Potential maps. The extent and rates of soil organic carbon (SOC) sequestration under different land use and management practices can vary greatly depending on soil characteristics, topography, and climate. Identifying which areas and agricultural systems present the greatest potential for increasing SOC stocks is key to prioritising areas of intervention and to establishing priorities for the implementation of public and private policies.

2. Recarbonisation of global agricultural soils (RECSOIL). It aims to support and improve the national and regional greenhouse gases (GHG) mitigation and carbon sequestration initiatives. The programme includes financial incentives that will be achieved by establishing a robust methodology that allows carbon credits to be traded. As a result, additional and multiple benefits can be achieved: yields can increase, biotic and abiotic resilience of crops can improve, and carbon and ecosystem services lost through traditional farming can be recovered. Thus, carbon sequestered due to sustainable soil management produces additional relevant benefits at the farm level, providing an incentive and mechanism to achieve LDN.

Fields of Naryn region, Kyrgyzstan

3

LAND DEGRADATION NEUTRALITY IN THE REGION

3. LAND DEGRADATION NEUTRALITY IN THE REGION

3.1. LAND DEGRADATION NEUTRALITY TARGET SETTING AND COUNTRIES' COMMITMENTS

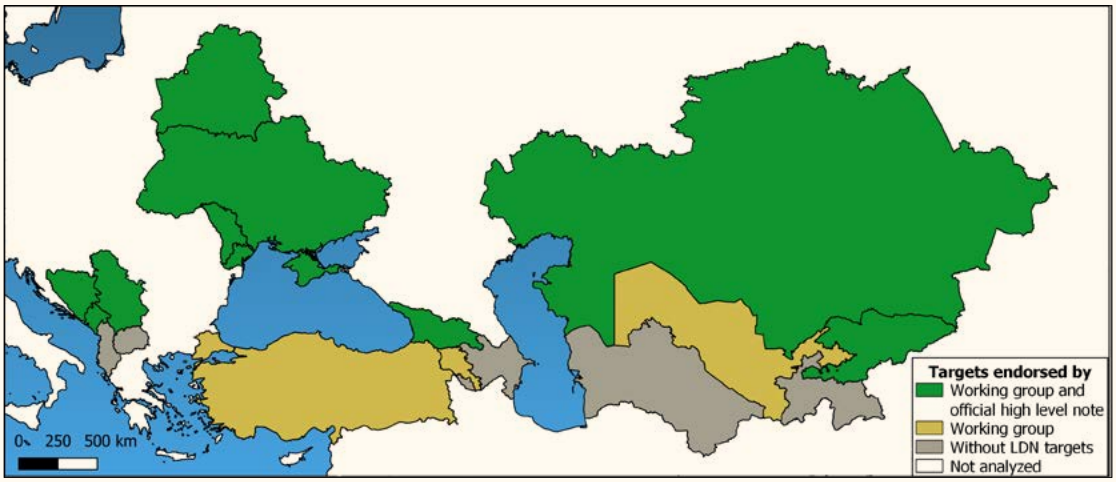
Decision 3/COP 12 (UNCCD, 2015) invited parties to formulate national targets to achieve land degradation neutrality in accordance with their specific national circumstances and development priorities.[6] Mandated by the decision, the Global Mechanism of the UNCCD rolled out the global LDN target support programme (LDN TSP) for all countries willing to formulate voluntary commitments. The LDN TSP process in the countries was steered by the Technical Guide[7] on how to define national baselines, identify voluntary targets and associate measures to achieve LDN by 2030, and monitor progress towards LDN targets. Two training sessions (2016, 2017) were organised for the countries in Europe and Central Asia to support national teams during the target-setting process.

From the 17 countries in the region, 12 have set and endorsed LDN targets through the working group consultation (LDN TSP country report), of which 9 have also endorsed these targets with an official High-Level Note (Figure 3). Nevertheless, of those member countries in the region that set voluntary LDN targets, many neither have a mechanism for monitoring the implementation and achievement towards LDN nor accurate local data on national relevant LDN indicators (besides the three minimum global ones). In addition, a lack of a regulatory and institutional framework has deteriorated land degradation without proper land management.

National LDN targets and measures should not be designed and implemented in isolation from the nature-based commitments under the bilateral and multilateral treaties and agreements, including National Determined Contributions of the UNFCCC, biodiversity targets of the CBD, Bonn Challenge, and domestic initiatives. When efforts are set up through different intergovernmental processes, they remain institutionally isolated and compete for limited public and private resources.

[6] For more information see https://www.unccd.int/sites/default/files/sessions/documents/2019-08/3COP12_0.pdf
[7] For more information see https://knowledge.unccd.int/sites/default/files/2018-08/LDN%20TS%20Technical%20Guide_Draft_English.pdf

Figure 3: LDN target-setting status by September 2021



Source: UNCCD knowledge hub.

Restoration commitments in the region are estimated to be between 15.9 and 17.2 million hectares (Table 2). Most of these commitments have been made in the context of LDN (69 percent to 74 percent). The countries with the greatest commitments are Turkey, Kazakhstan, Republic of Moldova, Serbia and Uzbekistan. The pledged area under LDN could be considered insufficiently small as the region hosts nearly 155 million hectares of degraded lands (UNCCD, 2019a). It is important that LDN commitments meet the standards of ecological restoration. Often, countries favour afforestation measures as an easily deployed and cost-effective measure. Restoration success should not be assessed using only the number of hectares under restoration or trees planted but also with improvements in land-based natural capital and restored ecosystem services. The learning and knowledge platforms of the UN Decade on Ecosystem Restoration can contribute to fostering national communities of practice and applied research on achieving LDN in the region.

Table 2: Restoration commitments by country (in hectares)(Part 1)

Country	LDN	NBSAP	NDC	Bonn Challenge
Armenia	73 500	-	-	500 000
Azerbaijan	-	-	-	270 000
Georgia	9 236	-	869 000	10 000
Kazakhstan	571 429	-	-	1 800 000
Kyrgyzstan	120 000	30 000	-	323 200
Republic of Moldova	1 030 000	5 500	-	-
Serbia	1 000 844	-	-	-
Tajikistan	-	-	-	70 000
Turkey	8 541 551	-	-	-
Ukraine	-	2 500	-	-
Uzbekistan	-	-	-	1 000 000

Source: Sewell *et al*., 2020.

Table 2: Restoration commitments by country (in hectares) (Part 2)

Country	Low estimate	Middle estimate	High estimate
Armenia	500 000	536 000	573 500
Azerbaijan	270 000	270 000	270 000
Georgia	869 000	870 000	888 236
Kazakhstan	1 800 000	2 371 429	2 371 429
Kyrgyzstan	323 200	463 200	473 200
Republic of Moldova	1 030 000	1 030 500	1 035 500
Serbia	1 000 844	1 000 844	1 000 844
Tajikistan	70 000	70 000	70 000
Turkey	8 541 551	8 541 551	8 541 551
Ukraine	2 500	2 500	2 500
Uzbekistan	1 000 000	1 000 000	1 000 000

Source: Sewell *et al.*, 2020.

Since the SDGs provide a holistic and multidimensional view on development, interactions amongst them may cause diverging results, such as synergies (positive) and trade-offs (negative). Although positive correlations amongst SDGs largely outweigh the negative ones, care has to be taken to avoid trade-offs between SDG 15 and other goals, such as SDG 10 on reduced inequalities, SDG 1 on no poverty and SDG 4 on quality education (Pradhan *et al.*, 2017). However, it can be argued that achieving LDN will directly or indirectly have a positive effect on all 17 SDGs. Initiatives targeting conservation and sustainable management of forests (SDG 15.1 and 15.2), mountain ecosystems and biodiversity (15.4), as well as actions to increase cropland areas under sustainable agriculture and the average income and livelihood of farmers (SDG 2), or to strengthen resilience and adaptive capacity to climate change (SDG 13) will impact LDN indicators and target 15.3. Tools and indicators that make these synergies and trade-offs more visible for decision makers are crucial to improve investment allocations and the strategic selection of project implementation areas. Successful sustainable management and restoration of ecosystems require a holistic approach (at a landscape scale) that can integrate all human and natural dimensions.

Köl-Suu, Kyrgyzstan

3.2. TOWARDS STRATEGIC OBJECTIVE 1: BIOPHYSICAL INDICATORS

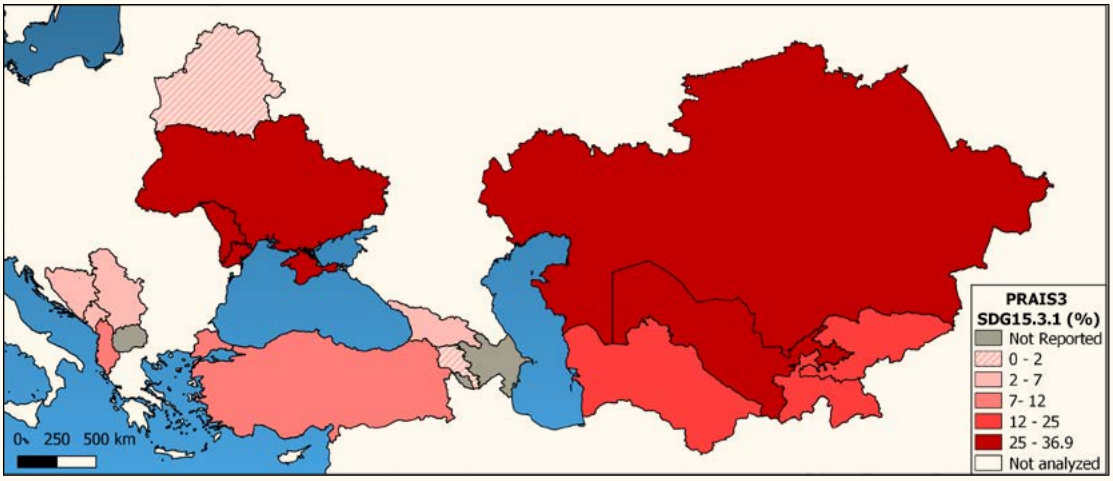
Strategic objective (SO) 1 of UNCCD 2018–2030 Strategic Framework aims at improving the condition of affected ecosystems, combating desertification/land degradation, promoting sustainable land management and contributing to LDN. To monitor advances towards SO 1 and understand current conditions, a set of indicators are used for reporting on the UNCCD 2018–2030 Strategic Framework. These indicators are those identified by parties in decisions 22/COP.11 to measure progress on SDG 15.3.1 target (the proportion of land that is degraded over total land area) on the basis of its 3 sub-indicators, represented as the trends in:

(a) Land cover (metric: land cover change);
(b) Land productivity or functioning of the land (metric: land productivity dynamics (LPD));
(c) Carbon stocks above and below ground (metric: soil organic carbon (SOC) stock).

In order to facilitate national reporting, the UNCCD Secretariat provided country parties with national estimates for each respective metric of the progress indicators based on available data sources through the performance review and assessment of implementation system (PRAIS). A tier classification was proposed to represent increasing level of accuracies with: Tier 1 (broad methods with default values) to Tier 2 (additional use of country-specific data) to Tier 3 (more complex methods involving ground measurements and modelling). Countries were urged to subsequently verify or replace these global default estimates using data sourced/computed nationally/locally. The PRAIS3 report (for baseline period 2000 to 2015) included a section related to SDG indicator 15.3.1 and the 3 sub-indicators employing the one-out, all-out (1OAO) principle (Sims *et al.*, 2017). This principle maintains that degradation is considered to have occurred if negative or declining changes are reported in any one of the indicators for a given pixel or land unit.

Fifteen out of the 17 countries included in this overview submitted the PRAIS3 report to UNCCD. The proportion of reported degraded land (SDG 15.3.1) ranged from 0.71 percent in Belarus to 36.9 percent in Kazakhstan, comprising a total of about 155 million hectares of degraded land, representing approximately 25 percent of the region (Figure 4 and Table 3). Only 10 of the countries used the one-out all-out principle to estimate SDG 15.3.1, and most of them (13) based the estimation on the default Tier 1 datasets provided. Only three countries reported the use of national data or adjusted methods. It is expected that with time countries will strive to reach Tier 3 to monitor SDG progress.

Figure 4: Proportion of land degraded over total land area as reported by countries in their PRAIS3 national reports (2018)



Source: PRAIS3.

Table 3: Total land area, proportion of land degraded over total land area (SDG 15.3.1), and methodology used for the estimation by the 15 countries that submitted the PRAIS3 report for the period 2000–2015

Country	Total land area (km^2)	SDG 15.3.1 (%)	Use of 3 Sub indicators	1OAO*	Confidence level
Albania	28 099	7.9	Yes	Yes	Medium
Armenia	28 249	1.7	No	No	Medium
Belarus	205 288	0.7	Yes	No	Medium
Bosnia and Herzegovina	50 941	3.9	Yes	Yes	Low
Georgia	69 441	5.9	Yes	Yes	Low
Kazakhstan	2 686 316	36.9	Yes	Yes	Medium
Kyrgyzstan	192 091	24.3	No	Yes	Medium
Montenegro	13 436	6.4	Yes	Yes	Medium
Republic of Moldova	33 073	29.1	No	-	Medium
Serbia	87 729	6.5	Yes	Yes	Low
Tajikistan	14 254	13.1	No	No	Medium
Turkey	767 163	9.3	Yes	Yes	Medium
Turkmenistan	484 232	22.2	No	No	Medium
Ukraine	599 568	25.6	Yes	Yes	Medium
Uzbekistan	435 779	28.6	Yes	Yes	Medium

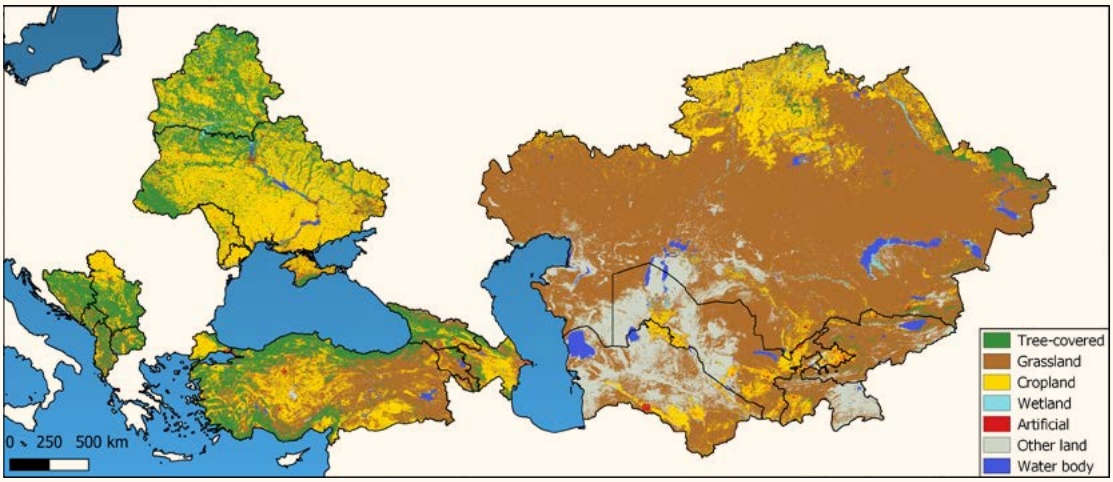
* One-out, all-out principle
Source: PRAIS3.

3.2.1. SUB-INDICATORS RELATED TO SO1

LAND COVER

Land cover change is a key indicator of land dynamics that may identify land degradation at different spatial scales. There are different global satellite-derived land cover products available with different temporal and spatial resolutions. The European Space Agency (ESA) Climate Change Initiative Land cover (ESA CCI-LC) 300 meter dataset was selected as default Tier 1 data for the assessment of land cover change by the UNCCD. This data set includes global annual LC maps starting from 1992 and going through 2018. For the analysis in this report, we also considered the Copernicus Global Land Service (CGLS) dataset, which was developed using data derived from the Project for On-Board Autonomy - Végétation (PROBA-V) 100 meter database and is available from 2015 to 2019; continuity of the product is expected with annual resolution (Figure 5). The enhanced resolution and precision of CGLS over CCI-LC, both produced by ESA, propose a shift to the newest product in the future.

Figure 5: Land cover in the region



Source: CGLS, 2019.

To detect changes in land cover, reporting methods require reducing the classes to the seven UNCCD land cover categories (Tree-covered areas, Grassland, Cropland, Wetland, Artificial surfaces, Other land, and Water bodies). However, this legend is not competent enough to capture important land degradation processes occurring in the region, such as the loss/gain of shrublands, as stated in many countries' LDN TSP reports. Further work within the countries to devise an alternative legend that allows specific degradation processes to be monitored, especially at the subnational level, and that can be later generalised to UNCCD classes for the purpose of aggregated reporting is necessary.

Kapadokya, Turkey

BOX 5: ALTERNATIVE DATASETS IN THE REGION FOR COVER CHANGE MONITORING

Many countries in the region also have a regional land cover change database available from Coordination of Information on the Environment (CORINE) for the years 1990, 2000, 2006, 2012, and 2018 from the European Environment Agency (EEA) with 100 meter resolution. These maps are renewed every six years in compliance with EEA standards and represent a great tool for monitoring land cover/land-use changes in the region. They are only available for six countries in the region (Turkey, Albania, Bosnia and Herzegovina, Montenegro, North Macedonia and Serbia). National teams from Armenia, Azerbaijan, Georgia, Republic of Moldova and Ukraine produced the 2018 and 2020 CORINE Land cover (CLC) maps for a selected pilot area around the capitals of each country. This initiative, if completed and expanded, can greatly improve the region's capacity to monitor land degradation and inform decision making processes to achieve LDN.

Some countries also have their own nationally developed land cover maps, such as North Macedonia and Turkey, which normally have much better spatial resolution than previously mentioned products. Also, a new global product was recently published (Karra *et al.*, 2021) with 10 meter pixel resolution for the year 2020 (based on sentinel 1 and 2 data). While these land cover maps represent a significant improvement in capturing current situations, because of a lack of temporal data to see trends, most countries in the region used the default ESA CCI land cover data to estimate SDG 15.3.1 during PRAIS3.

Current land cover statistics vary at the regional level depending on the product. However, according to CGLS in 2019, the dominant land cover class in the region was grasslands at 55 percent of the area, followed by 19 percent cropland, 11 percent tree-covered and 10 percent other land. These results indicate the importance of sustainable rangeland management for the region and the economic relevance of livestock rearing for livelihoods.

When comparing two land cover maps, different types of transitions can be found. This is usually represented by a transition matrix. In Table 4 and Figure 6, land cover changes between 1992 and 2018 in the region are shown based on the ESA LC CCI dataset. Most of the territory is stable, but there is a clear net change in the region in the last 30 years with croplands growing (+6.2 million ha), together with tree-covered (+ 3.9 million ha) and artificial areas (+3.4 million ha), at the expense of grasslands, other lands and waterbodies. In total, almost 6 million ha of grasslands were lost, mostly to croplands and tree-covered areas. Whether these changes correspond to positive or negative changes in terms of degradation is a decision that must be made considering the landscape context. Understanding the main type of land cover also provides information about the possible land-use practices that can be implemented. Changes in the land cover can be a major driver of land degradation or land improvement, depending on the local context and ecosystem in which they occur (Figure 7). For this reason, besides the evident need of choosing the most accurate data source, a transition matrix should be validated in a participatory way to interpret the directions of the changes and possible impacts. Nevertheless, the overall change in the region indicates that attention needs to be placed on understanding how the advance of croplands is occurring and

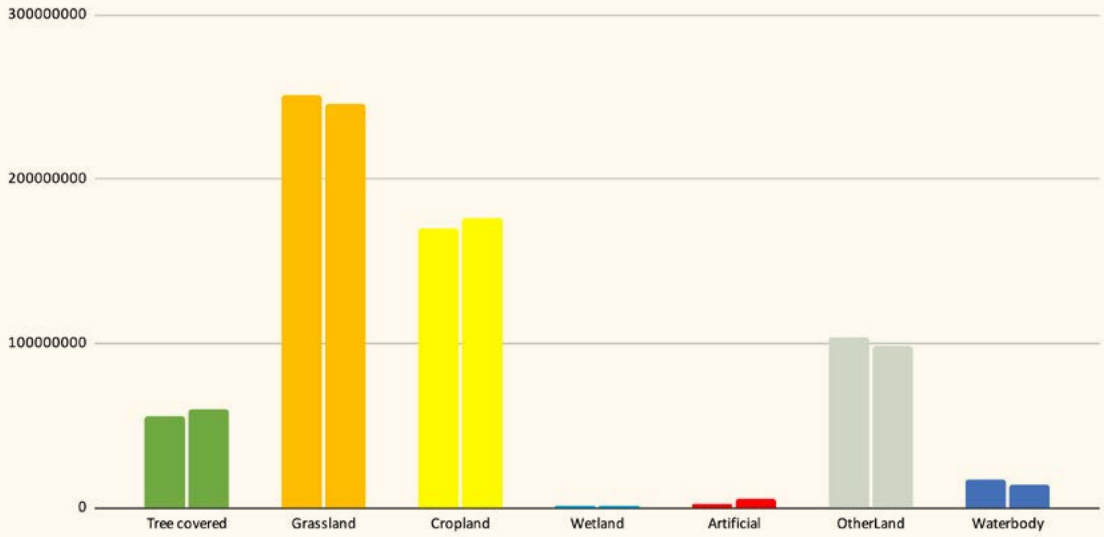
how to mitigate or balance the effects that may be arising from this modification (e.g. water cycle alterations, salinisation, pollution, biodiversity loss). Also, it is necessary to keep in mind that when changing to croplands it has to be done using sustainable production methods.

Table 4: Land cover transition matrix for the 1992–2018 period using as source ESA CCI-LC product (thousands hectares)

	ESA land cover 2018							
	Tree-covered	Grassland	Cropland	Wetland	Artificial	Other land	Water body	**Total**
Tree-covered	52 393	1 249	1 747	34	137	55	97	55 711
Grassland	5 521	235 443	9 142	18	380	575	180	251 260
Cropland	1 584	995	164 896	15	2 580	98	109	170 276
Wetland	17	4	4	1 704	3	0	10	1 741
Artificial	0	0	0	0	2 118	0	0	2 118
Other land	38	7 406	536	0	258	95 053	167	103 458
Water body	98	282	143	35	9	3 010	13 512	17 091
Total	**59 651**	245 380	176 467	1 807	5 484	98 791	14 075	601 656

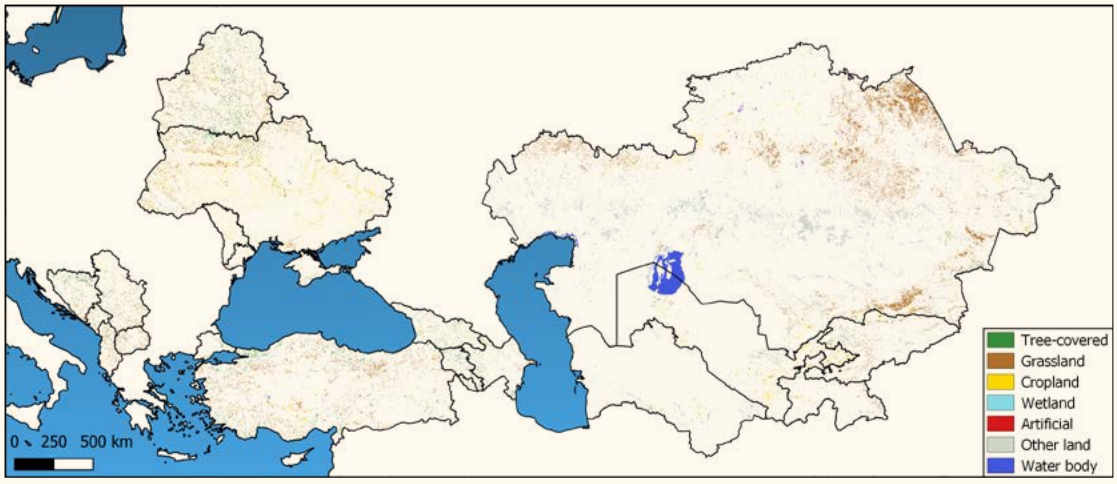
Source: ESA CCI-LC product.

Figure 6: Land cover total surface by category for the year 1992 (left) and 2018 (right)



Source: Developed by the author (2021).

Figure 7: Spatial pattern of land cover loss for the period 1992–2018



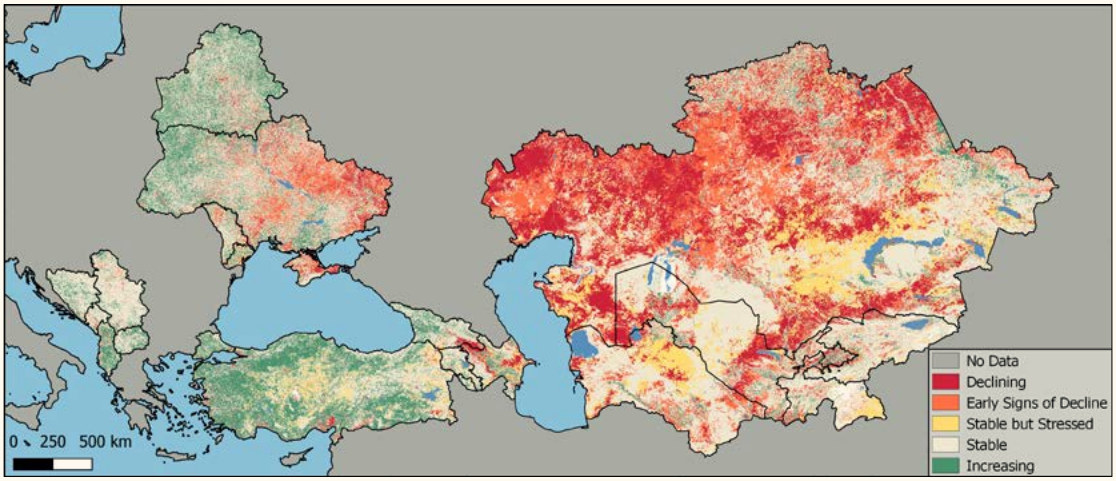
Source: ESA CCI-LC product.

LAND PRODUCTIVITY DYNAMICS (LPD)

The dynamics in the land productivity indicator is related to changes in the health and productive capacity of the land and reflects the net effects of changes in ecosystem functioning due to changes in plant phenology and biomass growth, where declining trends are often (but not always) a defining characteristic of land degradation. Understanding changes in the productive capacity of the land is critical for assessing the impact of land management interventions, its long-term sustainability, and the climate-derived impacts which could affect ecosystem resilience and human livelihoods. Various vegetation indices can be calculated from satellite data to be used as a proxy for land productivity, with the Normalized Difference Vegetation Index (NDVI) being the most frequently used (Yengoh *et al.*, 2015). There are also currently numerous methods that can be used to analyse and extract insights from time series image datasets to estimate LPD (Teich *et al.*, 2019). In this report the algorithm used to analyse land productivity dynamics in the ECA region is based on the Nonlinear Phenology developments of Ivits and Cherlet (2013), which were later incorporated by the Joint Research Center (JRC) in the World Atlas of Desertification (WAD) (Cherlet *et al.*, 2018). The method combines calculations of linear trends of time series of annual NDVI by non-parametric methods and changes in performance with respect to the current state, considering the initial biomass value. Areas with incipient decline and deterioration are often considered areas undergoing degradation processes.

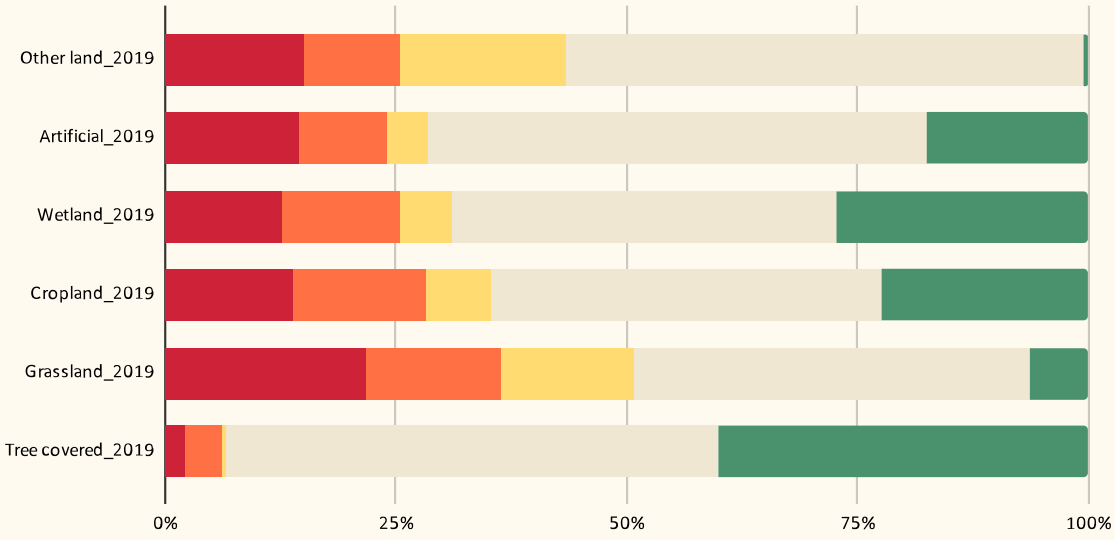
In the region, 29 percent of the land shows a decline in productivity in the last 20-year period (2001–2020) while 13 percent has increasing productivity and 58 percent of the area present a stable situation (Figure 8). In terms of achieving neutrality in the region, there is an urgent need to balance losses of natural capital, especially if we observe the situation in dominating land covers like grasslands and croplands (Figure 9). However, it would also be necessary to further explore other algorithms and satellite-derived indexes that could better capture the productivity dynamics of the different land covers.

Figure 8: Land productivity dynamics (LPD) for the region in the 2001–2020 period



Source: Developed by the author (2021).

Figure 9: Combination of land cover (Copernicus 2019) and LPD (2001–2020) to understand the productivity situation of main land types



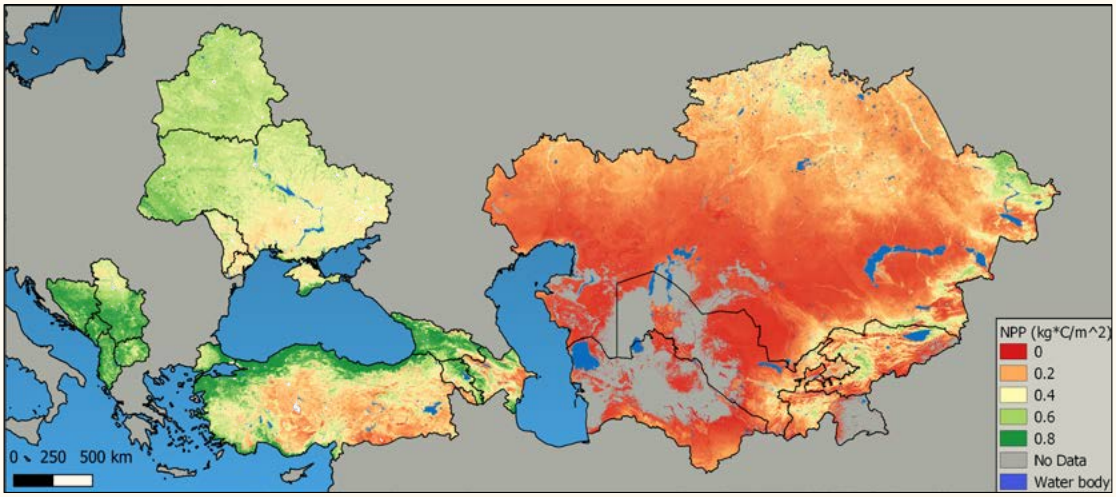
Source: Developed by the author (2021).

Different calculations based on the same Earth Observation (EO) source data can produce different results, highlighting the importance of integrating EO data with other sources of information, such as experts' knowledge through participative processes (García *et al.*, 2018). Also, interpretation of results in the local context and with experts is needed to identify false positives and negatives and the drivers of degradation. In the region, afforestation of biodiverse wetlands and grasslands or invasions of tree species could be the reason for a high proportion of false positives.

To better interpret the LPD indicator, it is important to consider the total amount of natural capital and the ecosystems services it provides. One indicator to illustrate the capacity of the land to produce

food is Net Primary Productivity (NPP). During photosynthesis, living plants convert water and carbon dioxide in the air into sugar molecules they use for food, and NPP represents the total amount of carbon dioxide fixed by plants (Figure 10). The magnitude of the effects and impacts of declining or increasing productivity depend on this baseline capacity of the local environment.

Figure 10: Net Primary Productivity for 2020.



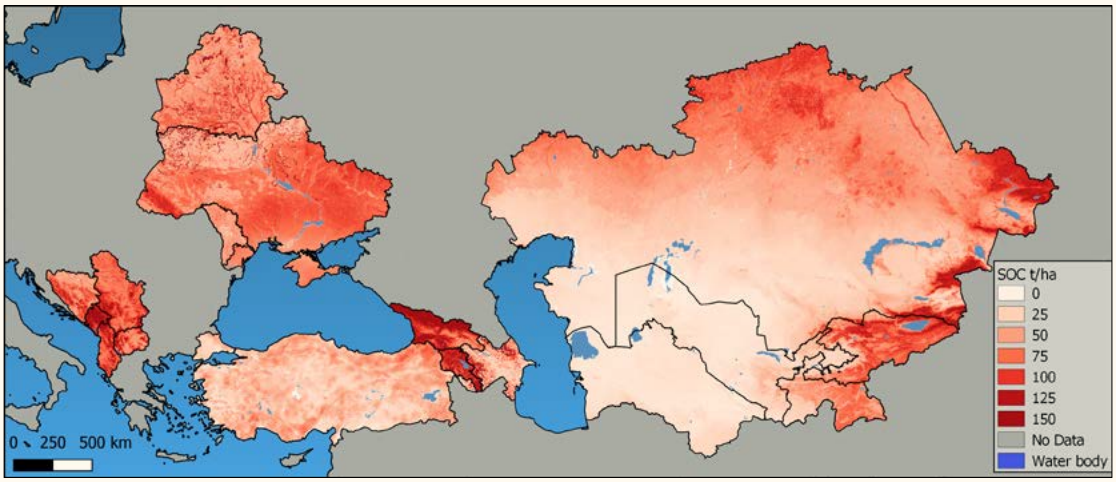
Source: MODIS.

SOIL ORGANIC CARBON (SOC)

Soil Organic Carbon (SOC) is the carbon in the main component of Soil Organic Matter (SOM) and supports key soil functions such as soil stability and nutrient cycling (FAO, 2017). The loss of SOC indicates a certain degree of soil degradation and is also a key indicator of LDN. For some LDN interventions, SOC changes are directly linked with a change in land productivity and/or land cover, so SOC stock changes can be estimated using the indicators for land productivity and land cover. However, for sustainable land management (SLM) technologies and approaches that do not markedly change land cover or productivity, additional SOC-related metrics are necessary. Determining both the carbon stocks (above and below ground) and its trends is a complex task, especially over large areas. SOC is the metric used to determine carbon stocks for LDN. For this report, the Global Soil Organic Carbon Map (GSOC v1.5.0) was selected as the main data source because it was produced by a bottom-up approach implemented by the Global Soil Partnership (GSP). Maps produced with national data and by national experts are an improvement from other Tier 1 products towards Tier 2/3. We based the analysis in this report on SOC stocks rather than in the changes of SOC. The extent and rates of SOC sequestration under different land use and management practices can vary greatly depending on soil characteristics, topography and climate. Identifying which locations and agricultural systems have the most potential for raising SOC stocks is, therefore, important in the context of achieving LDN, particularly for informing decisions related to the mechanism for neutrality.

According to GSOC data, the whole region has a total stock of 27.3 petragrams of SOC and an average of 48 tonnes per hectare that varies greatly amongst the ecosystems (Figure 11).

Figure 11: Map of global soil organic carbon stocks (GSOC v1.5 1 km resolution)



Source: Developed by the author (2021).

3.2.2. ADDITIONAL INDICATORS FOR THE NATIONAL/SUBNATIONAL SCALE

Besides the need to validate and adjust SDG 15.3.1 sub-indicators for their use at subnational and project level, it is also very important to find synergies amongst other SDG targets and national priorities. The LDN conceptual framework recognises the importance of adding complementary indicators that are relevant to the ecosystem services of each country's geography. Looking for convergence of evidence amongst different indicators, perspectives and scales is necessary to produce better land degradation assessments, create ownership and awareness, and better inform decision makers. Complementing the analysis with additional indicators can clarify the drivers of SDG 15.3.1 and contribute to planning holistic interventions that are synergetic with other targets and national commitments.

MOUNTAIN ECOSYSTEMS

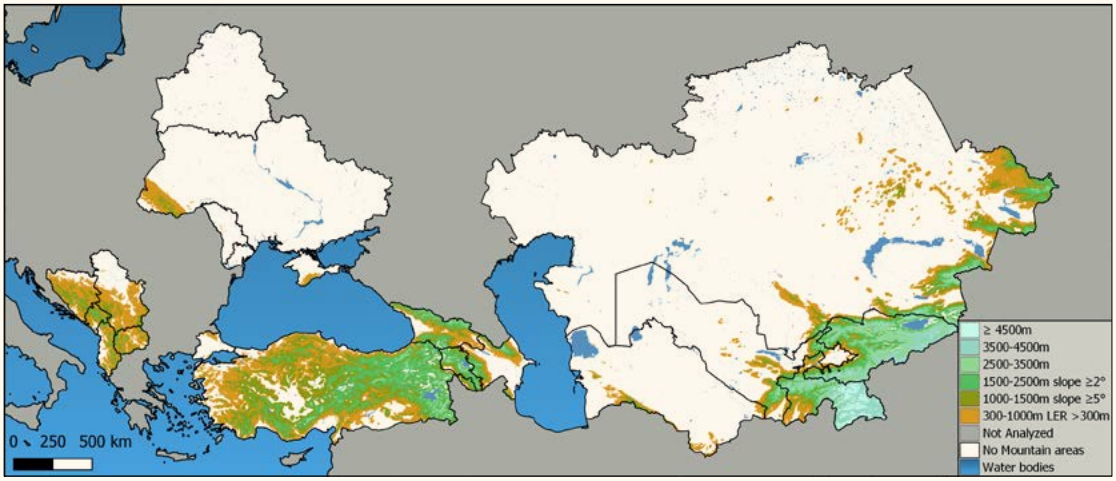
Mountain areas are home to unique ecosystems that provide key ecosystems services. Due to slope and harsh climatic conditions, mountainous areas are fragile and prone to soil erosion that can be exacerbated by unsustainable land management and climate change. The standard definition of mountains within the UN is the UN Environment Programme World Conservation Monitoring Centre definition based on Kapos *et al.* (2000) work, which combines altitude and slope to identify the mountainous environments of the world, indicating six elevation classes.[8] According to the Global

[8] http://www.fao.org/mountain-partnership/about/definitions/

Dushanbe, Tajikistan

Mountain Explorer Map,[9] in the ECA region, 25 percent of the area is classified as mountains (Figure 12), allowing for ample opportunities to establish synergies with SDG 15.4 (conservation of mountain ecosystems), while achieving LDN.

Figure 12: Mountain ecosystems



Source: Global Mountain Partnership.

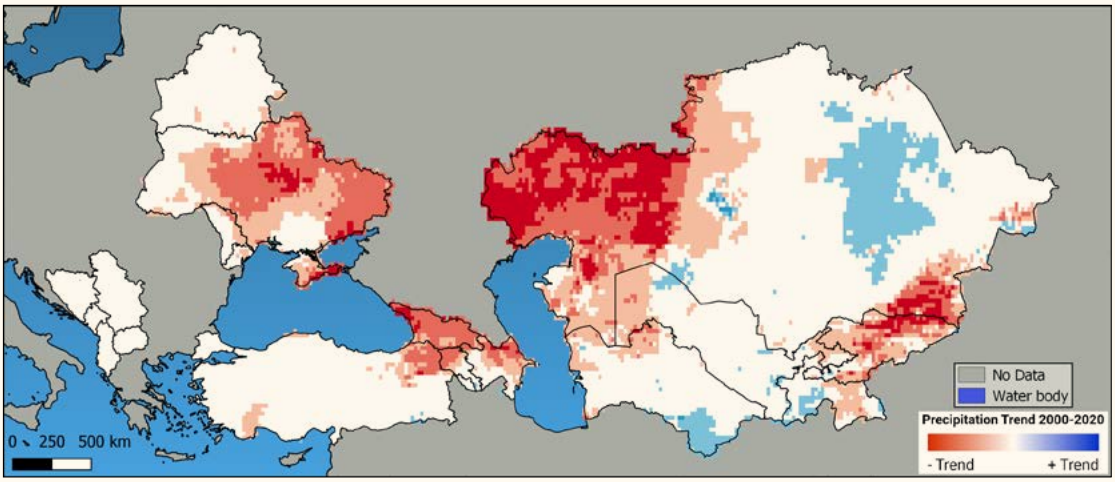
RAINFALL TRENDS

The consideration of climate data, such as the recent history of precipitation trends, contributes to a better understanding of the drivers of land productivity trends and adds important value to considering climate adaptation needs. The regional trends in annual precipitation during the last 20 years (2000–2020) were estimated by an index that represents the level of agreement amongst 3 widely used global databases: TerraClimate,[10] ERA5[11] and Global Precipitation Mission (GPM).[12] The trends were calculated on the annual total rainfall using a Mann-Kendall test for each product and classified as negative, positive or not significant. The three resulting maps were mathematically combined to show areas of agreement that generate a higher level of confidence in both negative (intensity of red) and positive (intensity of blue) trends.

In the region a high proportion of the area shows negative precipitation trends (Figure 13). Considering this information can also help understand the driving forces of land degradation, allowing the separation of climate-induced or human-induced land productivity trends.

[9] https://rmgsc.cr.usgs.gov/gme/
[10] University of California: http://www.climatologylab.org/terraclimate.html
[11] European Centre for Medium-Range Weather Forecasts and Copernicus: https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-single-levels?tab=overview
[12] NASA: https://disc.gsfc.nasa.gov/datasets/GPM_3IMERGM_06/summary

Figure 13: Trend in precipitation according to the multi-product level for the 2000–2020 period



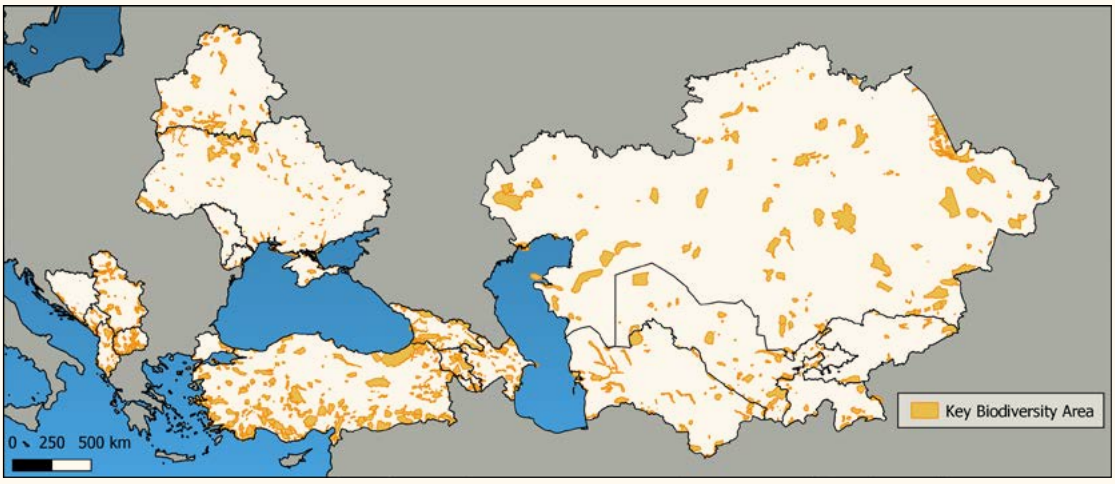
Source: Prepared by the author based on data from global databases: TerraClimate, ERA5 and Global Precipitation Mission (GPM).

KEY BIODIVERSITY AREAS

To achieve LDN, it is key to promote actions that address both the drivers of land degradation and biodiversity loss, enhancing their synergies and reinforcing the links between CBD and the UNCCD. The map of Key biodiversity areas (KBAs) (BirdLife International, 2021) provides the location of places that significantly contribute to the global persistence of biodiversity (Figure 14). There are 51 311 071 ha of KBAs identified in the region, which comprise 8.6 percent of its territory.

The identification and conservation of KBAs is supported and promoted by the KBA Partnership, which brings together most of the world's major international conservation organisations (BirdLife

Figure 14: KBAs version March 2021 version March 2021



Source: BirdLife International (2021), http://www.keybiodiversityareas.org/.

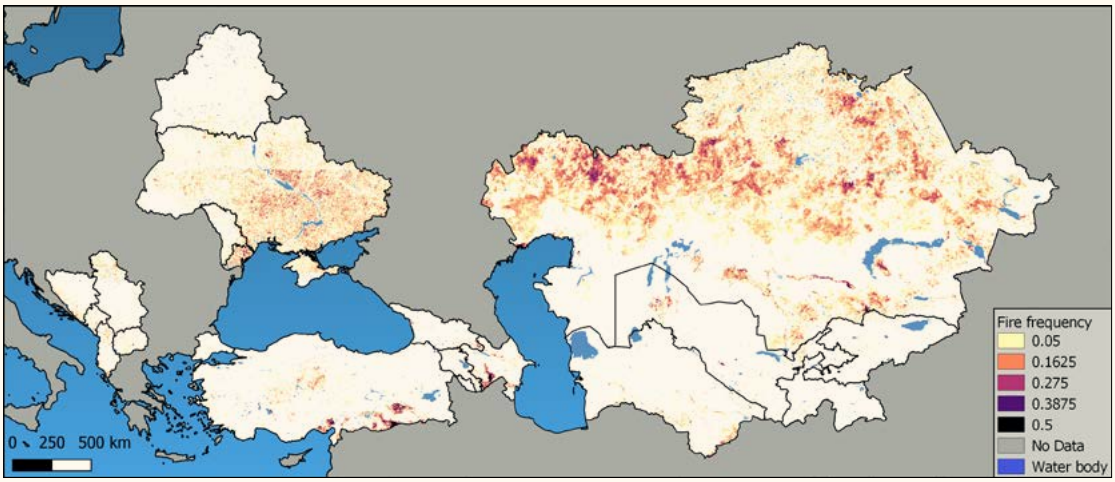
International, 2021). Considering the location of KBAs when planning interventions to achieve LDN will contribute to ensuring impacts on biodiversity are avoided or reduced to the greatest extent possible, as well as to focusing conservation efforts where they will have greatest impact for nature. This way, synergies amongst the efforts to achieve different Sustainable Development Goals (SDGs) and the international environmental conventions will be strengthened.

FIRE INDEX

Fires can be of natural occurrence and linked to droughts, but they are also widely used as a land management practice to produce a green pick in grazing areas or clean residues on cultivated lands. The wasted carbon gets released into the atmosphere instead of going into the soil, but the surface is also left bare and unprotected to the eroding effects of wind and water.

The fire index estimated for this analysis evaluates the recurrence of fires and fire hotspots on an annual scale. It was calculated by the number of events (years where there was burning) divided by the period length (in this case, 20 years from 2001–2020). Values close to 1 indicate an annual burning frequency and values of 0.1 indicate 1 fire every 10 years (Figure 15). The data comes from the combination of the Fire Information for Resource Management System (FIRMS)[13] database and the burned area product MCD64A1 Version 6.[14] In the region, some areas show markedly higher fire frequencies where fire management could be introduced.

Figure 15: Fire recurrence index



Source: Prepared by the author based on data from Fire Information for Resource Management System (FIRMS) database and the burned area product MCD64A1 Version 6.

[13] For more information see https://firms.modaps.eosdis.nasa.gov/
[14] MODIS Terra and Aqua combined Burned Area data monthly, global gridded 500 m: https://lpdaac.usgs.gov/products/mcd64a1v006/

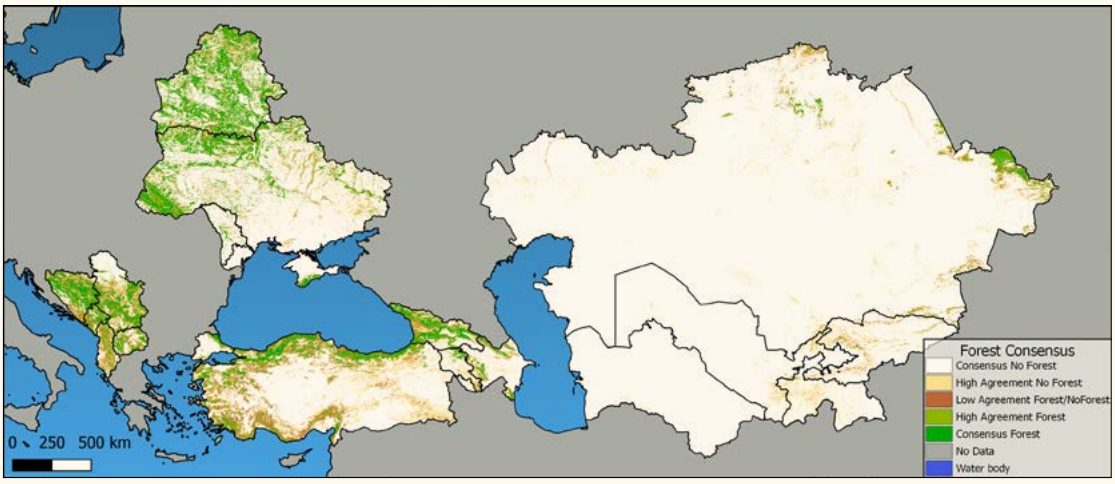
Forest fire at Suluklu Lake, Turkey

Forest in Serbia

FOREST AREAS

The loss of forests and trees is one of the biggest challenges for effectively combatting desertification, land degradation and drought. When considering forest areas, according to the LDN response hierarchy, avoiding degradation of natural and intact forests is the priority. Efforts to ensure permanent regeneration or enrichment planting in already established forests is also key to conserving biodiversity and the storage of vast amounts of carbon. Sustainable forest management and forest and landscape restoration (FLR) are also part of the LDN response. In addition, agroforestry, silvo-pastoralism and tree plantations contribute to improved livelihoods, food and water security, as well as a range of regulating and supporting ecosystem services, such as regulation of climate and water flows, carbon and nutrient cycling, and pollination. Many countries in the region recognise the need to increase and enhance forest cover in their national LDN voluntary targets.

Figure 16: Consensus in the location of forest/no-forest land covers according to several satellite estimates



Source: Developed by the author (2021).

Mapping forests with satellite-derived data is particularly challenging in the region. While Copernicus 2019 Land cover data indicates that there are 11 percent of forest lands (68.7 million hectares), the ESA 2018 Land cover estimates that there are 59.6 million hectares, and some consensus and discrepancies are found in their location. The Global Forest Resources Assessment (FRA), led by the Forestry Department of FAO, has been regularly collecting statistics on forests for many decades[15] and is the custodian of targets 15.1 and 15.2. The latest report was launched in 2020 and includes information on land tenure and management.[16] Additionally, the new FRA 2020 Remote Sensing Survey[17] was carried out last year. In this context, the Forest Consensus map was

[15] For more information see http://www.fao.org/forest-resources-assessment/past-assessments/en/
[16] For more information see https://fra-data.fao.org/WO/fra2020/home/
[17] For more information see http://www.fao.org/forest-resources-assessment/remote-sensing/fra-2020-remote-sensing-survey/es/

produced to visualise differences amongst satellite products to determine areas of consensus and disagreement which indicate the level of difficulty in forest mapping. A total of 7 Forest products from the year 2016 was considered to build this forest probability map (Figure 16).[18]

In the region, there are many areas where there is lack of agreement amongst forest maps, indicating high uncertainties and the need of improved methodology to monitor forest cover dynamics with remote sensing.

3.3. TOWARDS STRATEGIC OBJECTIVE 2: IMPROVING LIVING CONDITIONS OF AFFECTED POPULATIONS

Strategic Objective 2 of the UNCCD strengthens the connection between biophysical indicators and livelihood. Its expected impacts are:

- 2.1 Food security and adequate access to water for people in affected areas is improved;
- 2.2 The livelihoods of people in affected areas are improved and diversified;
- 2.3 Local people, especially women and youth, are empowered to participate in decision-making processes in combating Desertification, land degradation and drought (DLDD); and
- 2.4 Migration forced by desertification and land degradation is substantially reduced.

It is necessary to connect the three biophysical indicators and metrics used to measure and assess LDN with livelihood improvement. Though challenging, there is a need to understand, and measure, the possible effects of land degradation on people and recognise how land degradation can affect livelihoods, communities, rural populations, and vulnerable groups.

There is no universally agreed-upon list of social or economic indicators to assess the impacts of land degradation or the positive effects of achieving LDN (only the expected results from the UNCCD framework). Nevertheless, including socio-economic indicators in LDN assessments offers a way to bring more depth and context to the data and demonstrate how LDN affects people. Socio-economic indicators, providing a snapshot of livelihoods and human development, can complement the strictly biophysical indicators of LDN and reflect whether or not people's lives are improving as a result of LDN interventions. Alternatively, yet equally as important, socio-economic analyses can also reveal potential negative effects of LDN interventions, such as the economic price paid by small-scale farmers in adopting SLM practices or negative changes to tenure security.

[18] Maps used in the analysis are: MCD12Q1.006 MODIS Land cover – 500 m, GlobeLand30 from the National Geomatics Center of China – 30 m, ESA land cover 2016 100 m, Alos Palsar FnF 25 m, Hansen Global Forest Change v1.6 (2000–2018) 30 m, TanDEM-X Forest/Non-Forest Map from the German Aerospace Center 50 m and the LC_CCI from ESA 2015 300 m.

In order to allow for comparisons to be made across countries and regions, it is important that data for socio-economic indicators are readily available and easily obtained. While subnational data will provide a more nuanced picture of a country's situation, it can often be difficult and costly to obtain if the data does not already exist in reliable forms. For this reason and for the purposes of this publication, national level data which can be collected from pre-existing datasets are explored.

Indicators that measure poverty, agriculture, food security, and land tenure could offer a view into how people's livelihoods are being impacted or changed based on land degradation. The indicators listed below could be useful and provide a fuller picture of land degradation effects on populations. It should be noted that, even though the indicators listed are based on work of international organisations, data are not available for all countries in the world, including some countries in ECA.

BOX 6: SELECTED SOCIO-ECONOMIC INDICATORS TO ASSESS LDN EFFECTS ON POPULATIONS

POVERTY

- Proportion of the population living below the international poverty line by sex, age, employment status and geographic location (urban/rural) (SDG 1.1.1)
- Proportion of people living below 50 percent of median income, by sex, age and persons with disabilities (SDG 10.2.1)

BASIC SERVICES

- Proportion of population living in households with access to basic services (SDG 1.4.1)

AGRICULTURE

- Agriculture, forestry, and fishing, value added (as a percentage of gross domestic product (GDP) (World Bank)

FOOD SECURITY

- Prevalence of moderate or severe food insecurity in the population, based on FAO's Food Insecurity Experience Scale (SDG 2.1.2)

LAND TENURE

- Proportion of total adult population with secure tenure rights to land, (a) with legally recognised documentation, and (b) who perceive their rights to land as secure, by sex and type of tenure (SDG 1.4.2)
- Proportion of total agricultural population (a) with ownership or secure rights over agricultural land, by sex; and (b) share of women amongst owners or rights bearers of agricultural land, by type of tenure (SDG 5.a.1)

Source: The World Bank Open Data and the United Nations SDG Indicator Database.

As with many socio-economic indicators, there could be limitations in the manner in which the data are collected and analysed and whether or not the data can lead to reasonable conclusions being drawn. In addition to the abovementioned indicators, others that measure subnational migration, land abandonment, or conflicts over natural resources could be considered.

Currently, not all data are available for the indicators listed above. However, countries are being supported in reporting on all SDG indicators, which should result in a much more complete dataset. Table 5 presents data for some of the socio-economic indicators.

Table 5: Country data for selected socio-economic indicators with reference year

Country	Proportion of people living below 50 % of median income (% of people)		Agriculture, forestry, and fishing, value added (% of GDP)		Prevalence of moderate or severe food insecurity in the population (% of people)	
Albania	12	2017	19.3	2020	37.1	2018
Armenia	8	2018	11.7	2020	34.9	2018
Azerbaijan	1	2005	6.9	2020	9.6	2018
Belarus	5	2018	6.8	2020	no data	
Bosnia and Herzegovina	12	2011	6.2	2020	9.2	2018
Georgia	15	2018	7.4	2020	38.3	2018
Kazakhstan	4	2017	5.3	2020	2.1	2018
Kyrgyzstan	4	2018	13.5	2020	6.3	2018
Montenegro	21	2015	6.4	2019	12.9	2018
North Macedonia	18	2017	9.1	2020	14.4	2018
Republic of Moldova	4	2018	9.5	2020	27.5	2018
Serbia	8	2018	6.5	2020	12.4	2018
Tajikistan	12	2015	23.8	2020	no data	
Turkey	16	2018	6.6	2020	no data	
Turkmenistan	no data		10.8	2019	no data	
Ukraine	5	2018	9.3	2020	18.3	2018
Uzbekistan	10	2003	26.1	2020	17.2	2018

Source: The World Bank Open Data and the United Nations SDG Indicator Database.

Volma fish farm, Cherven district, Belarus

Skadar Lake, Karuc, Montenegro

3.3.1. VOLUNTARY GUIDELINES ON THE RESPONSIBLE GOVERNANCE OF TENURE OF LAND, FISHERIES AND FORESTS IN THE CONTEXT OF NATIONAL FOOD SECURITY (VGGT)

Natural resources have been facing increased pressure from climate change, population trends, food habits, and conflicts. These pressures can lead to overutilisation and overexploitation of natural resources particularly when tenure systems do not provide security for legitimate tenure rights or when an adequate framework to manage competing land uses does not exist. Land tenure systems define who can use which land resources, for how long, and under what conditions (FAO, 2012). The governance of land tenure is a crucial factor for an enabling environment in the sustainable use of natural resources and to support the LDN hierarchy response. When land tenure systems are not well defined or are governed irresponsibly, land can be used and managed in a way that can lead to land degradation (FAO, 2002). Conversely, when land tenure systems are clear and land rights are secure, land users and owners are more likely to make investments in land and manage it in a sustainable manner.

In part as a response to the increased pressures on natural resources as well as the need to provide guidance on governance of land tenure, the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (VGGT) were developed. They were realised through a global, inclusive, and consultative process and finalised through intergovernmental and multi-stakeholder negotiations which included the participation of national governments, civil society organisations, the private sector, international organisations, research institutions, and academia. The VGGT are the first international instrument that set out principles for responsible governance of tenure. They were endorsed on 11 May 2012 by the Committee on World Food Security,[19] an inclusive international and intergovernmental platform for food security and nutrition.

As an acknowledgment to the "respect national sovereignty" principle of LDN, it is important to note that the VGGT are by nature "voluntary" and "should be interpreted and applied in accordance with national legal systems and their institutions" and "consistent with existing obligations under national and international law" (CFS, 2012, paragraphs 2.1, 2.2, and 2.5). They can be used as a reference and provide a framework for all stakeholders to assess governance of tenure, identify improvement and apply them (CFS- FAO, 2012, guidelines 2.3). The VGGT build on a set of 5 general principles and 10 implementation principles (see box 8) including gender equality, emphasising the need for equal tenure rights and land access of women and men (CFS, 2012).

The VGGT can play an important role as a reference for countries and LDN initiatives to include all legitimate tenure rights and right holders through participatory processes to achieve LDN targets while providing support to set safeguards to protect legitimate tenure rights.

[19] http://www.fao.org/3/md958e/md958e.pdf

BOX 7: GENERAL PRINCIPLES AND PRINCIPLES OF IMPLEMENTATION OF THE VGGT

GENERAL PRINCIPLES

States should:

1. Recognize and respect all legitimate tenure right holders and their rights.
2. Safeguard legitimate tenure rights against threats and infringements.
3. Promote and facilitate the enjoyment of legitimate tenure rights.
4. Provide access to justice to deal with infringements of legitimate tenure rights.
5. Prevent tenure disputes, violent conflicts and corruption.

PRINCIPLES OF IMPLEMENTATION

- Human dignity
- Non-discrimination
- Equity and justice
- Gender equality
- Holistic and sustainable approach
- Consultation and participation
- Rule of law
- Transparency
- Accountability
- Continuous improvement

Source: VGGT.

At the 14th COP of the UNCCD, parties to the Convention adopted decision 26 on land tenure (UNCCD, 2019b) where Parties to the Convention are encouraged to "follow the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security principles, taking into account the principles of implementation, in the implementation of activities to combat desertification/land degradation and drought and achieve land degradation neutrality". It also encourages parties to follow guidance provided in the VGGT when implementing activities to achieve LDN such as to recognize legitimate tenure rights, including customary rights, consistent with national legal framework as well as the enhancement of women's equal access to land and land tenure security and "to review and, where appropriate, adopt national land governance legislation and procedures to support sustainable land management and land restoration".

To support the implementation of this decision, FAO and UNCCD, with support from other partners, are jointly developing a technical guide on how to integrate VGGT into UNCCD implementation and LDN.

3.3.2. REGIONAL LAND TENURE PROFILE

Most countries in Eastern Europe and Central Asia underwent land reforms in the 1990s as part of their transition from centrally planned economies to market economies. This was done through restitution of land to former owners or users, or through distribution of agricultural land to rural populations. For many, the transformation involved a shift from collective use of large state-owned farms to individual use of smaller farms (Hartvigsen and Gorgan, 2020).

Countries in Eastern Europe, with few exceptions, have incorporated private land as part of their tenure system, while in most Central Asian countries, farmers have been allocated use rights to agricultural land that remain in state ownership. Although gaps exist, land rights have been formally recorded in land registries and cadastre agencies (Hartvigsen and Gorgan, 2020) and levels of perceived tenure insecurity are low for most countries in Eastern Europe and Central Asia compared to other regions of the world (Prindex, 2020). In many countries however, women and girls, when compared to men, experience lower security of tenure rights and less access to land due to certain inheritance practices as well as a tendency for property rights to be registered only in the name of the husband (FAO, 2020).

The farm structures in most of the countries in the region are characterised by a large number of smallholders and family farms. A few countries have dualistic farms structures with many small farms (5 hectares or less) and few large-scale corporate farms (sometimes tens of thousands of hectares in size). A result of the land distribution and current characteristics of the farm structures is excessive land fragmentation which can hamper agricultural and rural development (Hartvigsen and Gorgan, 2020) and can lead to unsustainable land management and land use practices – major contributors to land degradation.

3.3.3. LAND DEGRADATION NEUTRALITY AND GENDER

Women constitute the majority of farmers in many of the regions most severely affected by desertification, land degradation and drought. Also, women tend to be excluded from participation and leadership in conservation and management of land, lack access to agricultural extension services and institutional credit, and encounter barriers to participation in development, planning and policymaking processes. Also, women are most likely to have less access to information, resources, and legal rights to land, natural and productive resources.

The UNCCD Science Policy Interface (SPI) further concludes that in "most developing countries, land degradation impacts men and women differently, mainly due to unequal access to land, water, credit, extension services and technology" (Orr *et al.*, 2017, p.73).

Many of the target entail co-benefits for sustainable agriculture and food security and link to the Sustainable Development Goals (SDGs) to advance gender equality, increase women's

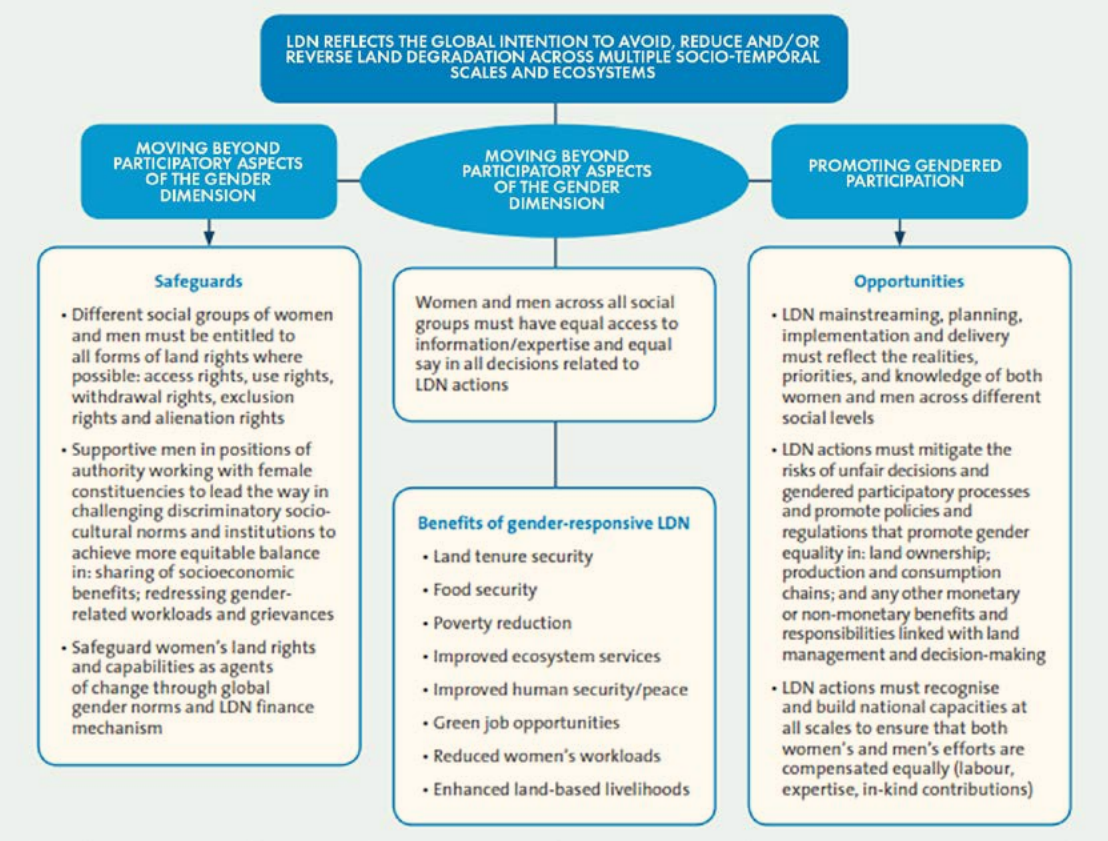
equal access to and control over land and natural resources, improve health and nutrition, reduce poverty, and restore ecosystems and climate change impacts.

To strengthen the role of women in SLM and to ensure that LDN interventions are gender responsive, the UNCCD Gender Action Plan (GAP) for implementation of its 2018–2030 strategy focuses on:

- Ensuring women´s participation in decisions taken during the design, planning, implementation and evaluation of initiatives to implement the Convention;
- Integrating women's economic empowerment in UNCCD implementation activities in order to eradicate their extreme poverty;
- Strengthening women's land rights and access to resources; and
- Enhancing women's access to improved knowledge and technologies that relate to effective UNCCD implementation (UN Women, 2018).

In advising governments on integrating gender perspectives in the development of LDN initiatives, gender-responsive LDN transformative projects and programmes strategically contribute to the achievement of LDN and address the needs of the most vulnerable groups, such as small farmers, rural communities and indigenous peoples, with a dedicated focus on women. It can also close gaps

Figure 17: Gender-responsive land degradation neutrality framework



Source: Okpara, Stringer and Akhtar-Schuster, 2019.

Women in Kyrgyzstan

in the unequal power relations and gender-based discrimination in legal and customary systems in many societies. Figure 17 provides a framework on Gender Responsive Land Degradation Neutrality and can be used by different stakeholders to guide gender responsive decision making.

3.4. MONITORING THE LAND DEGRADATION NEUTRALITY IMPACT PATHWAY

Combating land degradation and progress towards LDN and related SDGs is normally conducted at many different scales and with crossing activities. Bridging the scales and finding ways to expose those positive changes is very important for both monitoring progress and guiding further improvements. In the context of many GEF-funded projects in which FAO is partner, there is a concrete need to monitor the impact of diverse project activities, and it is of interest that those benefits could be used to feed national and subnational commitments and targets.

Normally, besides the national impact indicators linked to previous sections (**change of state indicators**), projects have components and activities that aim at building the enabling environment for LDN. A series of **process indicators** can be built for reporting this progress, for example:

1. Number of local authorities trained in LDN
2. Adoption/improvement of an LDN monitoring framework
3. Number of legislation or regulations created to support LDN or SLM
4. Number of people trained on SLM, restoration and landscape management
5. Number of intersectorial structures created

Direct actions on the ground are also a main activity that is carried out with a diverse set of local stakeholders. These activities normally impact the environment and the livelihood of the people and can be captured by **stress-reduction indicators** many years before the change of state indicators can react (Gonzalez-Roglich *et al.*, 2019), for example:

1. Number of hectares under improved SLM management
2. Number of farmers trained in Farmer Field Schools or with access to extension services
3. Number of hectares committed as grassland reserve or to a restoration activity
4. Increase in investment in SLM or access to finance for small-holder farmers
5. Increase in economic and environmental resilience through improved value chain
6. Amount of water harvested or saved with improved practices
7. Incentives/payments for ecosystem services
8. Watersheds restored

By considering the whole impact pathway of LDN (which includes process, stress-reduction and change of state indicators), field level interventions can be linked with enabling activities occurring

at national scale. These type a holistic approach, base on participatory/bottom-up and context-specific methods, are essential in LDN projects to allow consensus in the adaptative process of achieving both national and global commitments.

3.5. A LAND DEGRADATION NEUTRALITY DECISION SUPPORT SYSTEM FOR THE REGION

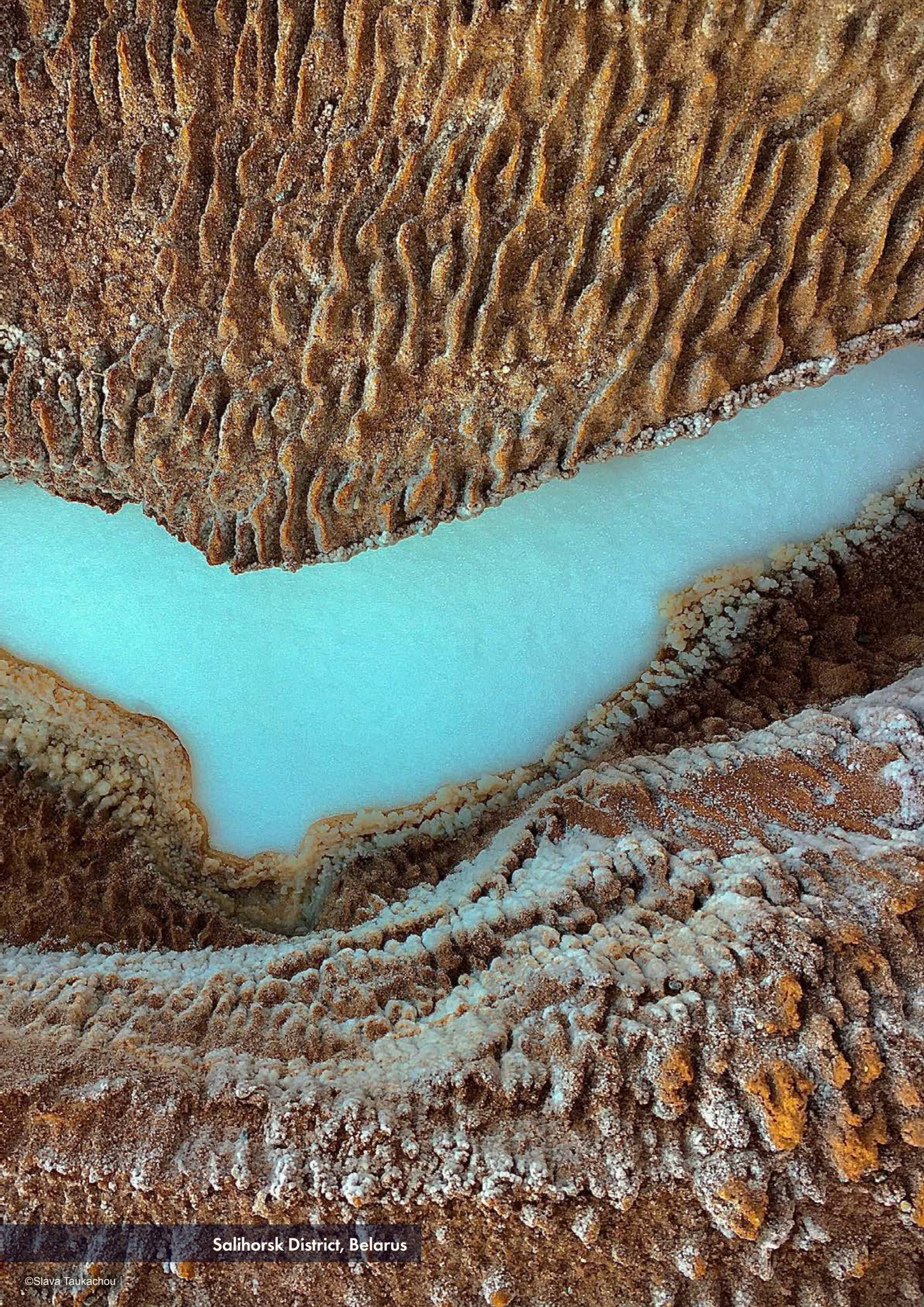
One of the main challenges to achieving LDN is to strategically select the areas where actions to conserve, sustainably manage and restore land will be implemented. Mapping land degradation then becomes necessary, to optimize investments and scale out SLMs, to eventually Avoid, Reduce and Reverse degradation.

To aid in this matter, a Regional LDN Decision Support System (LDN DSS) was developed to integrate meaningful information and facilitate the identification of target areas for different types of interventions in the landscape, to eventually balance the gains and losses of natural capital and achieve neutrality. The system is built on the principle of convergence of evidence presented in the World Atlas of Desertification (Cherlet *et al.*, 2018). The idea is to populate this framework to provide accumulated evidence on the status of land degradation but also on its causes and impacts and allows experts to derive explanations using local knowledge that make sense within the local context.

The Regional LDN DSS allows to easily visualize and compare spatially explicit indicators, such as the maps presented in Section 3.2, amongst others. The LDN DSS is a tool that allows any user to select a particular area of interest (e.g. a water catchment, and obtain summary statistics, charts and tables) integrating the available data. One of its key functionalities is the possibility to query and to show areas that meet certain criteria (Multi-Criteria Analysis toolbox) or are undergoing landcover transitions (Figure 18). The system allows decision makers, for example, to identify and obtain maps of forests that have been improving in terms of productivity and that have high levels of SOC, which could be areas to prioritize conservation measures for avoiding land degradation.

Alternatively, decision makers might be interested in identifying pasture and cultivated lands where land productivity is declining but that have a high potential to sequester SOC. These areas could be the target of improved sustainable land management practices. The LDN DSS facilitates the identification of these areas with just a few clicks and allows the user to download the resulting maps (as raster files) and numerous charts, tables and statistics.

The system is based on a Google Earth Engine (GEE) application. GEE is an innovative powerful tool that allows users to access a catalogue of public and free geospatial datasets and to perform analyses using Google computational infrastructure. GEE apps, such as the LDN DSS, are dynamic, shareable user interfaces for experts and non-experts alike to use. The LDN DSS is thus accessible from a specific URL and no Earth Engine account is required to view or interact with it.



Salihorsk District, Belarus

Another important use of the LDN DSS is the monitoring and evaluation of land degradation at different spatial scales, providing managers and stakeholders opportunities to optimize and adapt land management. It also allows the effective integration of different types and sources of information to prepare reports for different purposes. Progress towards LDN will also contribute to the achievement of multiple SDGs, including those related to climate change mitigation and adaptation, biodiversity conservation, food and water security, disaster risk reduction, and poverty reduction. The LDN DSS can be easily updated and other strategic indicators can be added to better integrate the multiple sources and types of data, including key biodiversity areas, socioeconomic indicators and climatic data.

This tool is very flexible and can be implemented and personalized with different data sources to build Country- or Project-specific Systems. Many countries in the region have already established versions of this system in the context of FAO-GEF projects. The best way to explain what the LDN DSS can do is to try it yourself, so please copy the following link: https://projectgeffao.users.earthengine.app/view/reu-ldn-assessment and have your own experience; you can explore and click as many buttons as you would like.

Figure 18: Layout of the LDN DSS

Source: https://projectgeffao.users.earthengine.app/view/reu-ldn-assessment . The system has three main panels: (1) Layer and Tool panel, where the users do most interactions, (2) Map view panel where cartographic responses are shown, (3) Statistic and Chart panel where information is updated according to the user choices. All charts, figures and tables can be zoomed and downloaded together with their data. In section (4) the user can choose Language and the query areas from Drop-Down Menu (Countries and Territories) or on-Click function (to select Basins and Sub-basins as well). The Layers are shown in section (5) for the user to choose, but extra layers can be found in toolboxes. The first toolbox is the Multi-Criteria analysis (6) which allows to combine specific layers in order to find areas of interest, and also provides statistic on the combination of three main LDN indicators: Land cover, Soil Organic Carbon and Land productivity dynamics. The second toolbox is the Land cover Transition analysis (7) where users can choose to compare changes (Gain/Loss) from different years. Finally, the system has a Drawing tool (8) that users can use to create layers to get statistics or share with others to provide feedback or submit.

Datça District, Muğla Province, Turkey

4

RECOMMENDATIONS FOR THE REGION

4. RECOMMENDATIONS FOR THE REGION

Driven by biophysical and socio-economic factors that are exacerbated by the impacts of climate change, degradation of land and natural resources is one of the greatest challenges faced by several countries in the region. Restoring degraded land is vital for countries to achieve multiple national and international priorities on mitigating climate change, improving livelihoods, reducing desertification, restoring ecosystems and conserving biodiversity.

Below are a few recommendations for the region on actions and initiatives to support countries in the process to achieve LDN. It would be important to:

INSTITUTIONAL CAPACITY AND KNOWLEDGE MANAGEMENT

- Support the national capacity to measure and monitor land-use changes, including land degradation and desertification, including the use of new information and communication technologies (cell phone-based applications, cloud-based services, ground sensors, drone imagery);
- Strengthen the national capacity to align countries' international restoration commitments across different conventions (usually located within different ministries);
- Raise awareness of national institutions on the relevance of secure tenure rights and implementation of the VGGT principles to foster SLM practices and participatory land use planning processes;
- Strengthen the capacity to develop new national and subnational indicators to find synergies amongst SDGs and commitments and facilitate holistic approaches;
- Promote capacity-building and technology transfer on LDN-related issues; foster an LDN community of practice and the creation of a multi-stakeholder expert workgroups;
- Strengthen dialogue amongst scientists, policymakers, and land users to find synergetic solutions that can help improve resilience of the whole value chain to the multiple challenges; and
- Raise awareness of, capacity building for and education about sustainable land management practices, agricultural extension and advisory services, and expansion of access to agricultural services to producers and land users.

POLICY PROCESS

- Promote gender-responsive actions when implementing the LDN framework;
- Enable an environment for cooperation amongst peers on LDN to exchange information and innovation;
- Identify entry points for strengthening stakeholder participation in the LDN targets implementation at the subnational level, including through gender lenses;
- Facilitate the diffusion of LDN into the economic policy to drive investment and improve access to alternative market dynamics;
- Reflect VGGT principles in national policies so that tenure rights are recognised, respected, and safeguarded;
- Identify and reverse policy drivers that lead to poor land management; and
- Strengthen the national capacity to align countries' international restoration commitments across different conventions (usually located within different ministries).

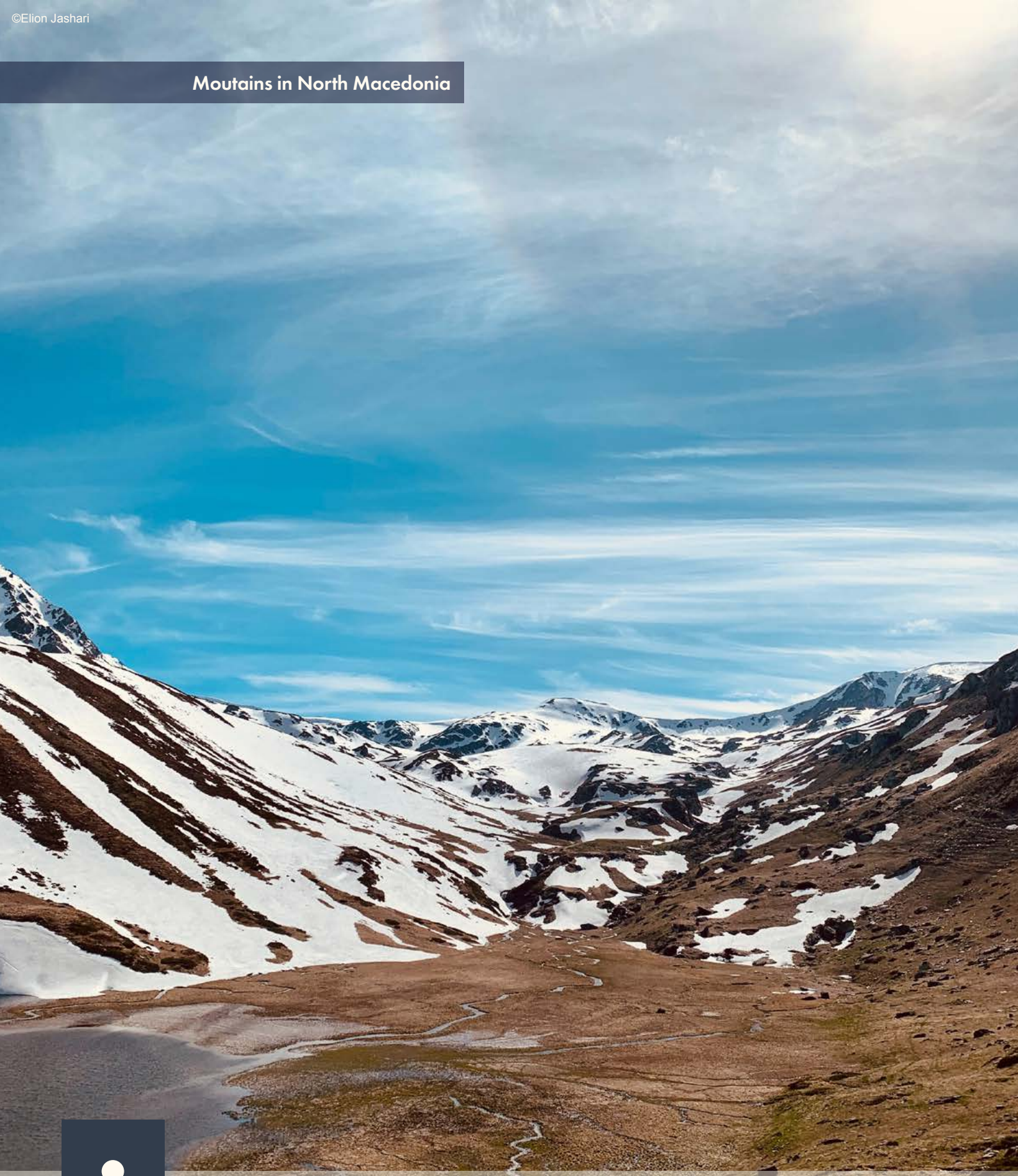
GOVERNANCE AND NATURAL RESOURCE MANAGEMENT

- Promote sustainable land management and integrated ecosystem management approaches that are central to achieving LDN and tailored to the region;
- Strengthen natural resource governance and tenure security to canalise land-use planning at the landscape level; and
- Mobilise innovative funding sources to support implementation of action towards LDN that impacts the livelihood of local stakeholders.
- Monitoring and evidence for LDN

MONITORING AND EVIDENCE FOR LAND DEGRADATION NEUTRALITY

- Help LDN proceed on the basis of adequate evidence and monitoring;
- Make data and information relating to the effectiveness, co-benefits, risks of emerging response options, and increasing the efficiency of land use available and accessible;
- Promote the creation of additional national and subnational indicators to monitor progress along the entire LDN impact pathway to accurately assess achievements at different scales;
- Develop locally adapted mechanisms to facilitate status assessment and improve decision making on socio-environmental issues; and
- Strengthen evidence for LDN achievement and impact of measures and investments at the different scales. Collecting, compiling and sharing information for awareness-raising on how the benefits of achieving LDN can be enhanced through sustainable consumption and production flows, patterns, practices and technologies (UNCCD, 2019b).

Moutains in North Macedonia



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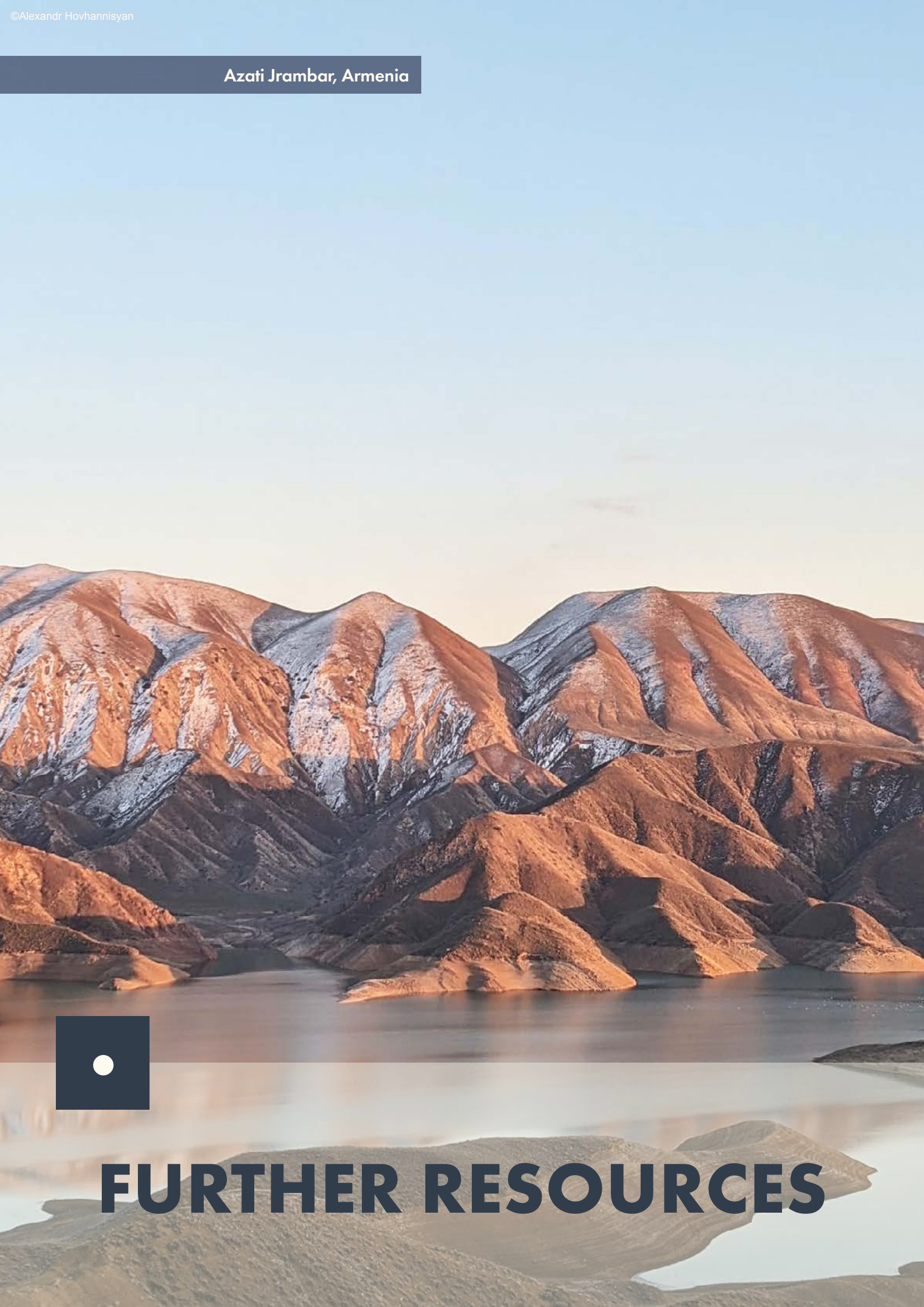
Azati Jrambar, Armenia



FURTHER RESOURCES

FURTHER RESOURCES

Further information can be found for each country in the Country Factsheets. Please find the link to the individual facts sheets below or by selecting a country in the publication's App (https://projectgeffao.users.earthengine.app/view/reu-ldn-assessment).

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DATA SOURCES FOR THE FACTSHEETS

All the data in the factsheets was taken from the following sources:

- **Population**: World Bank* variable SP.POP.TOTL
- **Total area**: World Bank* variable AG.SRF.TOTL.K2
- **GDP**: World Bank* variable NY.GDP.MKTP.CD
- **AFOLU**: World Bank* variable NV.AGR.TOTL.ZS
- **Poverty** (% of population below national poverty line):World Bank* variable SI.POV.NAHC
- **Key Biodiversity Area**:

KBA information comes from the World Database of Key biodiversity areas (BirdLife International 2021), and calculation of KBA for each country was done using the country borders displayed in the DSS App (https://projectgeffao.users.earthengine.app/view/reuldn-assessment). Please find in the App a detailed explanation of the data.

Citation: BirdLife International (2021) World Database of Key biodiversity areas. Developed by the KBA Partnership: BirdLife International, International Union for the Conservation of Nature, American Bird Conservancy, Amphibian Survival Alliance, Conservation International, Critical Ecosystem Partnership Fund, Global Environment Facility, Global Wildlife Conservation, NatureServe, Rainforest Trust, Royal Society for the Protection of Birds, Wildlife Conservation Society and World Wildlife Fund. March 2021 version. More information: http://www.keybiodiversityareas.org/.

- **Land productivity dynamics (LPD)**:

Maps of Land productivity dynamics were calculated for the period 2001–2020 by the authors of this report (see section 3.2.1), based on the developments of Ivits y Cherlet (2013) and Ivits *et al.* (2013) applied in the World Atlas of Desertification (Cherlet *et al.* 2018). The method combines calculations of linear trends of time series of annual NDVI (MODIS MOD13Q1 v6 product with 250m resolution) with a linear regression and with the Multi Temporal Image Differencing (MTID) algorithm. These trends are further classified considering the changes in temporal performance (by establishing a 15 year baseline and its comparison to current state) and also the initial biomass value. The script (code) used is provided in this link to review, modify or export a different region. An advanced version of the script to tailor the algorithm to local contexts and modify more parameters is available in this link. Calculation of area for each country was done using the country borders displayed in the DSS App (https://projectgeffao.users.earthengine.app/view/reu-ldn-assessment). Please find in the App a detailed explanation.

Citation: García C.L. and Teich I. 2021. LPD 2001–2020, Google Earth Engine Script. In: Overview of land degradation neutrality (LDN) in Europe and Central Asia. Food and Agriculture Organization of the United Nations, 2021.

- **Land Cover**:

The Copernicus Global Land Service (CGLS) 2019 data was reclassified in the 7 categories (proposed by UNCCD) using the conversion of this table. Data was processed in Google Earth

Engine and if you wish to review, modify or export a different region, you can do so using this script: https://code.earthengine.google.com/4d08df292c3f27e678a73f7035bd14d8 Citation: Buchhorn, M. ; Lesiv, M. ; Tsendbazar, N. - E. ; Herold, M. ; Bertels, L. ; Smets, B. Copernicus Global Land Cover Layers—Collection 2. Remote Sensing 2020, 12Volume 108, 1044. doi:10.3390/rs12061044.

- **Money allocated by the GEF through the STAR**: This data was obtained for each country from the GEF database and calculations where performed accounting for the GEF-6 and GEF 7 cycles. Source of data: https://www.thegef.org/

*World Bank data and its source for every country can be found in the following Table a1.

Table a1: Table with all data coming from the world bank for each of the country and link to the source.

COUNTRY	Population SP.POP.TOTL	Year	Poverty (%) SI.POV. NAHC	Year	GDP (billion USD) NY.GDP. MKTP.CD	Year	AFOLU (%ofGDP) NV.AGR. TOTL.ZS	Year	Total Area (km2) AG.SRF. TOTL.K2	Year
Albania	2 837 743	2020	14,3	2012	14,80	2020	19,25	2020	28 750	2018
Armenia	2 963 234	2020	26,4	2019	12,65	2020	11,71	2020	29 740	2018
Azerbaijan	10 110 116	2020	6	2012	42,61	2020	6,93	2020	86 600	2018
Belarus	9 398 861	2020	4.8	2020	60,26	2020	6,83	2020	207 600	2018
BiH	3 280 815	2020	16,9	2015	19,79	2020	6,2	2020	51 210	2018
Georgia	3 714 000	2020	21.3	2020	15,89	2020	7,37	2020	69 700	2018
Kazakhstan	18 754 440	2020	4,3	2018	169,84	2020	5,32	2020	2 724 902	2018
Kyrgyzstan	6 591 600	2020	25.3	2020	7,74	2020	13,51	2020	199 950	2018
Republic of Moldova	2 617 820	2020	26.8	2020	11,91	2020	9,51	2020	33 850	2018
Montenegro	621 718	2020	24,5	2018	4,78	2020	6,39	2019	13 810	2018
North Macedonia	2 083 380	2020	21,6	2018	12,27	2020	9,09	2020	25 710	2018
Serbia	6 908 224	2020	23,2	2018	52,96	2020	6,5	2020	88 360	2018
Tajiskistan	9 537 642	2020	26,3	2019	8,19	2020	23,79	2020	141 380	2018
Turkey	84 339 067	2020	15	2019	720,10	2020	6,6	2020	785 350	2018
Turkmenistan	6 031 187	2020			45,23	2019	10,79	2019	488 100	2018
Ukraine	44 134 693	2020	1,1	2019	155,58	2020	9,27	2020	603 550	2018
Uzbekistan	34 232 050	2020	14,1	2013	57,71	2020	26,07	2020	448 924	2018

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