

# GROUND TO STAND ON

LAND DEGRADATION POSES AS HIGH A RISK AS CLIMATE CHANGE TO OUR SPECIES' SURVIVAL. A HOST OF INDEPENDENT SOFTWARE TOOLS NOW EXISTS TO MONITOR AND REPORT ON LAND DEGRADATION, BUT THERE IS CURRENTLY LITTLE-TO-NO INTEROPERABILITY BETWEEN THEM. **SIMON CHESTER** REPORTS ON THE OGC'S WORK IN DEVELOPING RELEVANT DATA STANDARDS THAT WILL IMPROVE THE INTEROPERABILITY BETWEEN THE DIFFERENT TOOLS AND TECHNOLOGIES

The process and effects of land degradation – land that through human exploitation has seen a decline in its utility, biodiversity, soil fertility and overall health – may receive less media attention than climate change, yet it poses just as high a risk to our (and other) species' survival.

Land degradation threatens our food security, changes and disrupts rainfall patterns, exacerbates extreme weather such as droughts or floods, and drives further climate change. Furthermore, it leads to social and political instability, which drives poverty, conflict and migration. Yet our current agricultural practices are causing soils worldwide to erode up to 100 times faster than natural processes can replenish them.

Due to its importance, the problem of land degradation is being addressed as part of UN Sustainable Development Goal (SDG) 15 – Life on Land; specifically, it is subgoal 15.3.1: proportion of land that is degraded over total land area.

The goal of avoiding, reducing and reversing land degradation is known as 'land degradation neutrality' (LDN). Any strategies for LDN will be most effective if they are based on a quantitative understanding of the rates and degree of land degradation as it changes over time and across the globe.

## Towards Land Degradation Neutrality

The UN Convention to Combat Desertification (UNCCD) was formed out of the 1992 Rio Summit as the global voice for land. The UNCCD promotes practices that



Land degradation underlies each prong of the triple-crisis humanity is facing: climate change, biodiversity loss and pollution

support the goal of LDN and are the driving force behind SDG 15.

The UNCCD's 197 parties (countries) work together to improve the living conditions for people in drylands, to maintain and restore land and soil productivity, and to mitigate the effects of drought. In 2015, the LDN Target Setting Programme (TSP) was established to support countries interested in defining LDN baselines and setting voluntary targets.

Countries participating in the LDN TSP report to the UNCCD every four years on how degraded their land is. They use three indicators – solid carbon content, biomass production, and land cover/use – as outlined in the Good Practice



Guidance for SDG indicator 15.3.1. The next reporting cycle ends in 2026.

To best align the reporting between countries, establish baselines and help build a global picture, the dedicated reporting platform Performance Review and Assessment of Implementation System (PRAIS) was developed, along with a set of guides, methodologies, tools, and minimum data requirements for each country to follow.

Further to this, the GEO-LDN Flagship was formed in 2018 as a stakeholder-driven initiative to strengthen land degradation monitoring and reporting using remote sensing and in situ data. The GEO-LDN brings together Earth observation data providers

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The continued degradation of our land's soils poses a direct threat to humanity's food security

the creation of data processing workflows or information systems that involve multiple tools, datasets and/or domains.

As such, OGC is now beginning work with the UNCCD and associated organisations, such as the GEO-LDN, to develop relevant data standards that will improve the interoperability between the different tools and technologies used in LDN monitoring and reporting. Scientifically, LDN standards could also enable more consistent baselines for comparing the rate of land degradation across the globe and thus more effective prioritisation of the responses to it.

OGC recently tackled an almost identical problem – where a proliferation of heterogeneous data and software within a domain was hindering data integration and analysis – as part of its Climate Resilience Pilot (see 'Building effective Climate Resilience Information Systems', *GeoConnexion International*, Winter 2022). The pilot successfully designed an open, multi-level infrastructure that integrates data spaces, open science, and local-to-international requirements and objectives.

By defining an open technology and governance stack, the pilot enabled the creation of Climate Resilience Information Systems that can easily integrate diverse data. The stack defined by the pilot addresses data-to-decision pipelines, data analysis and representation, and bundles everything into FAIR (Findable, Accessible, Interoperable, and Reusable) climate 'application packages' that serve as building blocks to be combined as needed via Standardised APIs, such as OGC APIs, to form more complex information systems. These application packages are conceptually the same as the SDG Toolboxes that already support LDN and other SDGs.

Similar work in geo-datacubes, analysis ready data and decision-ready indicators was also undertaken in OGC's Disasters Pilots (see 'Recipes for disaster (management)', *GeoConnexion International*, Spring 2022).

The knowledge and experience gained in those pilots will also help support the standardisation – and FAIRness (Findable, Accessible, Interoperable and Reusable) – of the data-to-decision pipeline that can transform the countries' raw data into actionable LDN information targeted towards the many different audiences that need it.

The complementary nature of these two pilots' goals and outcomes has not gone unnoticed, with OGC uniting the two for the pilot's next phase, the Climate and Disaster Resilience Pilot 2024. Indeed, the upcoming pilot will also prove valuable to the LDN domain as land degradation is one of the disaster scenarios being used for testing.

### Standards for sustainability

Having fully documented, open standards in place for the 2026 UNCCD LDN reporting cycle will give software tools an explicit target to comply with and improve the data that's submitted to the UNCCD for reporting, analysis, comparison between countries, and prioritisation of response.

Open standards also give different tools and systems the means to link together to form more powerful, FAIR LDN information systems that fuse diverse data to provide more useful, targeted, and actionable information. Stakeholders at all levels need such information to best understand, support, and realise the goal of LDN – and, in turn, support the sustainable use of Earth's finite resources by our and future generations.

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OGC's recent work in the disaster and climate domains can be used to support better monitoring and reporting of land degradation



Land degradation through overuse can cause extreme weather events, such as droughts, which further exacerbate its effects



Land degradation neutrality (LDN) can be achieved through projects and practices that avoid, reduce and reverse the degradation of soils

and governments to develop minimum data quality standards, analytical tools and capacity building. It provides an open-access toolbox, datasets, support and relevant resources for anyone interested in strengthening land degradation monitoring and reporting and to support policy, planning and investment decisions for sustainable land management.

### Better data for a better understanding

While a host of independent software tools now exist to help with LDN monitoring and reporting, there is currently little-to-no interoperability between them. This leads to differences in output between the tools and thus the inputs to the PRAIS database. These differences cause both scientific and technical problems: scientifically, it's harder to align and compare rates of degradation between countries; and technically, it impedes