

15 – Life on Land



Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and halt biodiversity loss



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Goal: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

EO data offer an invaluable opportunity for better-informing development policies and quantifying various targets. How can EO be used to help countries achieve specific targets? *Source: [ESA compendium of EO contributions to the SDG Targets and Indicators](#)*

Target 15.1: By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.

This target aims to ensure sustainable management and monitoring, and use of terrestrial ecosystems including freshwater ecosystems and their restoration. It is an ambitious target which considers the interrelatedness of life in different elements of terrestrial ecosystems - mountains, wetlands, arid lands and forests and that the health of one part impacts the other.

EO can play multiple roles in achieving the target as it is a crucial part of the monitoring strategies for conservation, restoration and sustainable use of terrestrial ecosystems. The availability of multi-decadal time series datasets of the (global) land surface from multiple satellite sensors means that there are fewer remote sensing data gaps and greater ability to monitor long term changes over greater areas. Multi-scale land-cover information can be retrieved over whole countries which, complemented with field data, can support integrated land use plans, including evaluation of the services provided by terrestrial and freshwater ecosystems. Remote sensing data coupled with modelling tools can support the identification of priority areas for ecosystem services provision that needs specific management activities. It can also be used to monitor the effectiveness of restoration activities planned for these sites or to assess their status over time. Optical or radar sensors, or a combination of the two, can detect not just forest cover area, but also other attributes as wetlands, lakes and to estimate their biophysical parameters, as well as surface and volume measures.

Existing indicators primarily report on the extent to which areas are conserved (15.1.2) or sustainably used (15.1.1), therefore, there is a gap for an indicator on the restoration of these ecosystems. For example, indicator 15.1.1 only includes forest areas – drylands and mountains are considered under indicators 15.3.1, 15.4.1 and 15.4.2. Similarly, freshwater ecosystems are monitored using indicator 6.6.1 – so are not considered under target 15.1. EO has a lot of potential here as it can effectively monitor land cover change over time with high accuracy both at very high to high spatial resolution. The identification of terrestrial and inland freshwater ecosystems which have been modified by humans paves the way for a tool that could identify areas for habitat restoration. Moreover, FAO is custodian of these SDGs and will work closely with other partners.

(eo services based on Monitor land use and land cover change on land ecosystems. Indicator 15.1.1: Forest areas)

Target 15.2: By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.

Forests are a key terrestrial ecosystem, providing various ecosystem services, including food, biodiversity, protection from soil erosion, climate change mitigation. This ecosystem is rapidly disappearing, “thirteen million hectares of forests are being lost every year while the persistent degradation of drylands has led to the desertification of 3.6 billion hectares”, and this indicates the need for effective strategies to reduce deforestation and implement sustainable forest and land management practices. Together with target 15.1, this target ensures that forests are efficiently managed, and a sustainable balance between conservation and the use of natural resources is achieved. EO can be used to assess the change in forest extent and quality (e.g. degradation), but also to plan for the effective implementation of activities aiming to achieve the sustainable management of forest. Satellite images and subsequent analyses can help to identify sites where to implement reforestation and afforestation activities, as well as areas that are at higher risk of deforestation because of past forest clearing for agriculture or because of the proximity to infrastructures such as roads, and their protection should be prioritised. Different types of EO sensor systems are available (optical, radar and LiDAR) and can be used to map forest change based on type of forest, climatic conditions, technical capacity available in the country. Mapping forest degradation and biomass change is generally more challenging than monitoring forest extent, but new promising methods are being developed and tested.

(eo services based on Progress towards sustainable forest management (biomass, area of change, etc) Indicator 15.2.1: Sustainable forest management)

Target 15.3: By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.

Land degradation, defined 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” (decision 3/COP.12, UNCCD, 2015a) is negatively impacting the well-being of billions of people (IPBES, 2018). Already at this point, there have been a number of global initiatives aiming to halt land degradation and restore degraded land. The global community’s efforts to halt desertification, maintain and restore land and soil productivity, and to mitigate the effects of drought are spearheaded by the United Nations Convention to Combat Desertification (UNCCD) which was adopted in Paris on 17 June 1994. As the dynamics of land, climate and biodiversity are intimately connected, the UNCCD collaborates closely with the other two Rio Conventions; the Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC). The vision of the UNCCD aligns in particular with the CBD’s Aichi Biodiversity Target 15, which aim to restore at least 15% of degraded ecosystems; the Bonn Challenge (2011) and its regional initiatives to restore more than 150 million hectares; and most recently, the UN Sustainable Development Goals (SDGs) (Sims et al. 2017). Target 15.3 is strongly aligned with the land degradation neutrality (LDN) target setting process of the UNCCD which is supporting interested countries (now) through a dedicated target setting programme (TSP), including the definition of national baselines, targets and associated measures to achieve LDN by 2030. While 120 countries are in the process of setting voluntary targets, 80 countries already have. As part of the TSP, the UNCCD has selected data partners to assist countries with data for target setting in the absence of national data. These include the ISRIC soil grids, the JRC Land productivity dynamics data layer and the ESA-CCI land cover. All of these global datasets are reliant on EO data as inputs thereby directly contributing to countries in the LDN Target Setting Program.

(eo based on Proportion of land degraded (land cover, productivity and carbon stocks))

Target 15.4: By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development.

Mountain ecosystems are hotspots of biodiversity and provide essential ecosystem services for population living in and beyond mountain areas. Accordingly, their safeguard is of primary importance to help achieving certain SGDs. This is explicitly recognized in SDG 15 through this target, which is fully dedicated to conserving mountain ecosystems so that their biodiversity and the services that flow from them are not in peril and are sustained in the long term.

EO can help support the conservation and sustainable management of mountain ecosystems through multiple ways. The applicability of EO to monitor land use dynamics and the drivers of land use change, such as expansion of human settlements or crop conversion, as well as their implications for biodiversity, has been extensively proven. EO data, such as Digital Elevation Models (DEMs) or data on climate and dynamic processes, can also be used to feed models that assess the supply of and demand for mountain ecosystem services. These models, in turn, could be combined with information derived from climate or land use change scenarios to assess how the provision of ecosystems services could be affected by them, allowing to identify priority areas to implement adaptation actions.

(eo based on Conservation & sustainable management of mountain ecosystems (protected areas, green cover) Indicator 15.4.2: Mountain green cover)

Relevant Success Stories

- Mapping long term trends in deforestation in tropical regions
- Forest Management in Sweden
- TerraSAR - X 3D mapping geological survey in Indonesia
- TerraSAR - X support to deforestation in Borneo
- Mapping and monitoring forest changes
- TanDEM-X & TerraSAR-X support to REDD+ MRV
- Implementing & managing agriculture projects
- EUROSENSE-Land cover monitoring
- EUROSENSE- Forest monitoring
- The GOS4M Knowledge Hub designed for end-users to assess the effectiveness of measures undertaken under the Minamata Convention on Mercury.
- Forest cover mapping in Cambodia
- Lidar data processing
- Supporting agricultural and food security decisions
- New UNESCO world heritage thanks to remote sensing and 4D GIS technology
- DMCii supports the fight with illegal logging in the Amazon