

# Land Cover Executive Summary

## Introduction

Land cover change is a pressing environmental issue, acting as both a cause and consequence of climate change.

Reliable observations are crucial to monitor and understand the ongoing processes of deforestation, desertification, urbanization, land degradation, loss of biodiversity and ecosystem functions, water and energy management, and the influence of land-cover changes on the physical climate system itself. A number of disciplines (i.e. geography, ecology, geology, forestry, land policy and planning etc.) use and refer to land cover and land-cover change as one of the most obvious and detectable indicators of land surface characteristics and associated human induced and natural processes.

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Current and future IPCC Assessment Reports are based upon an uncertain understanding of the land surface and related processes. Applications of land cover and land dynamics in climate change related Earth System Models and Impact Assessment Models should be better linked and coordinated. The importance of these issues requires continuous monitoring systems and data.

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## Definition of observation and the units

Land cover is defined as the observed (bio)-physical cover on the earth's surface. It includes vegetation and man-made features as well as bare rock, bare soil and inland water surfaces.

The primary units for characterizing land cover are categories (i.e. forest or open water) or continuous variables classifiers (fraction of tree canopy cover). Secondary outcomes of land cover characterization include surface area of land cover types (ha), land cover change (area and change trajectories), or observation by-products such as field survey data or processed satellite imagery.

## Available methods standards, protocol, and measures

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Land cover in different regions has been mapped and characterized several times and many countries have some kind of land monitoring system in place (i.e. forest, agriculture and cartographic information systems and inventories). In addition, there are a number of global land cover map products and activities. These activities have been building upon the availability of continuous global satellite observations since the 1980s.

With evolving technology, it has become increasingly efficient to derive land cover information from a combination of *in situ* surveys and earth observation satellite data at global, regional, and national scales. Inconsistencies exist between the different land cover map products or change monitoring systems complicating our ability to successfully synthesize land cover assessments on regional and global scales.

## Current data, products, and capabilities:

- Quasi-operational global land cover monitoring integrate information from three common observation scales: e.g. MODIS- or MERIS-type satellite sensor (moderate resolution satellite data), from LANDSAT- and SPOT-type satellite sensors (fine resolution satellite data), and *in situ* observations (or very high resolution satellite data). Continuity of observations and consistency for land cover characterization is required for all these scales.
- The UN Land Cover Classification System (LCCS) currently provides a comprehensive, internationally accepted, and flexible framework for thematic land cover characterization. LCCS uses classifiers enabling compatibility between existing datasets and for future global monitoring systems.
- Global mapping efforts (i.e. MERIS-based GlobCover and those from MODIS) are ongoing to provide consistent and validated land cover data and land cover change indicators worldwide at moderate-resolutions.
- Land cover change estimates require multi-temporal fine resolution satellite observations. Archived image data (i.e. global Landsat mosaics) and methods are available to implement a global land cover change monitoring system. Regional and national programs (e.g. CORINE, PRODES) and international initiatives such as the Forest Resources Assessment for 2010 of the FAO use multiple data sources for regional and global assessment of historical forest change processes.
- An independent accuracy assessment using a sample of ground-reference data is an integral part of any land cover monitoring effort. Standard methods for land cover validation have been developed by the international community.

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**Kommentar:** Better to say Moderate Resolution and then give the sensor examples.

Martin: lets leave since definitions of moderate resolution is not necessarily standardized

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## Recommendations

- Continuity and availability of data is required for all observations scales.
- Continuous monitoring of conditions is recommended over periodic mapping.
- The collection of ground reference data should be continuous and national agencies are encouraged to supply ground reference data in support of calibration and validation requirements.
- Further international development and adoption of land cover and land cover change mapping standards have started and are encouraged to proceed further.
- The international land observation community should coordinate and cooperate to provide useful and flexible land cover validation protocols.
- Internally consistent and synoptic data sets are required to represent global land cover ECV, requiring communication and cooperation between nations.

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**Kommentar:** can we be a bit stronger and more precise? ie something that can be followed up.

Martin: see my change

**Kommentar:** might be a bit biased?

Martin OK

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## Recommended action

Encouragement from the member nations to support and further enable continuity of existing measurement capabilities and to promote a broadening of monitoring abilities is encouraged. Promotion of these above recommendations should be undertaken via relevant national and international agencies and organizations.