include: 4) agricultural intensification;[38] and 5) urbanization and transportation infrastructure development.[39] EO technology can assist sustainable soil management efforts by providing assessments of the quality of arable soils. To that end, EO data would be required on the following parameters: 1) moisture content; 2) mineral content and composition; 3) surface temperature; 4) salinity; 5) extent of erosion; 6) lands added to or abandoned from agricultural production, and changes in cropping systems, and; 7) fertilizer and irrigation use.

Biological Diversity

Biological diversity is a measure of variation in genes, species and ecosystems. Diversity is the base of stability and sustainable functioning of natural systems and thus is the basis for the survival of the human species. Further, biological resources are renewable and with proper management can support human needs indefinitely. These resources, and the diversity[40] of the systems which support them, are therefore the essential foundation for sustainable development. There is a large (and growing) body of evidence indicating that human activities are eroding biological resources and greatly reducing the planet's biological diversity. The main environmental changes responsible for biodiversity decline and loss are: 1) highly intensive, partially industrial forms of agricultural land use; 2) deforestation; 3) expanding urbanization and infrastructure development; 4) industrial pollution of water, air and soils, and 5) climate change. Estimating the current rates of loss or even current status of ecosystems is however challenging, because "no systematic monitoring system is in place and much baseline information is lacking."

To measure (and prevent) the decline in biodiversity EO technology might be of considerable help. It could provide data which could then be used to establish baselines for further monitoring of biodiversity status and trends, and which could also be used for detecting change. With respect to biological diversity, what needs to be observed for evidence of stress are the known ecosystems and habitats in general, with emphasis to be placed on the internationally and nationally-protected conservation areas and/or areas particularly sensitive to environmental change (i.e., polar regions). Baseline data is needed on habitat definition and on areas located in unaffected nature. Change detection data is required to identify landscape changes and to establish paths and patterns of habitat migration. Baseline data is also needed especially on land cover (for classification, characterization, inventory mapping and change detection of vegetation) and land use (for classification, inventory mapping and change detection) for both protected areas and areas located in unaffected nature. Continuous monitoring in both cases may also be required to keep track of urban encroachment and infrastructure expansion, and to detect and assess the impact of environmental damage resulting from mining operations (ground subsidence, tailings, chemical effluents and waste) and other industrial activities.

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[38] Agricultural clearing of land in addition results in habitat and species loss. Abandonment of fragile croplands, often followed by fire and/or overgrazing, strips the soil bare promoting severe soil erosion.

[39] This results in irreversible soil loss through sealing under constructions, such as urban/industrial premises and transport infrastructure, reducing soil use options for future generations. Road building leads to habitat fragmentation. Mining, quarrying, and excavation for landfills – industrial landscape modification – further leads to soil loss as well as soil and groundwater chemical contamination.

[40] Genetic diversity provides the variability within which a species can adapt to changing conditions. While this is important to all species, genetic variability in cultivated and domesticated species has become a significant socio-economic resource. Without the genetic variability which enables plant breeders to develop new varieties, food production would be far lower than it is at present, and far less able to adapt to inevitable changes brought on by global warming.