

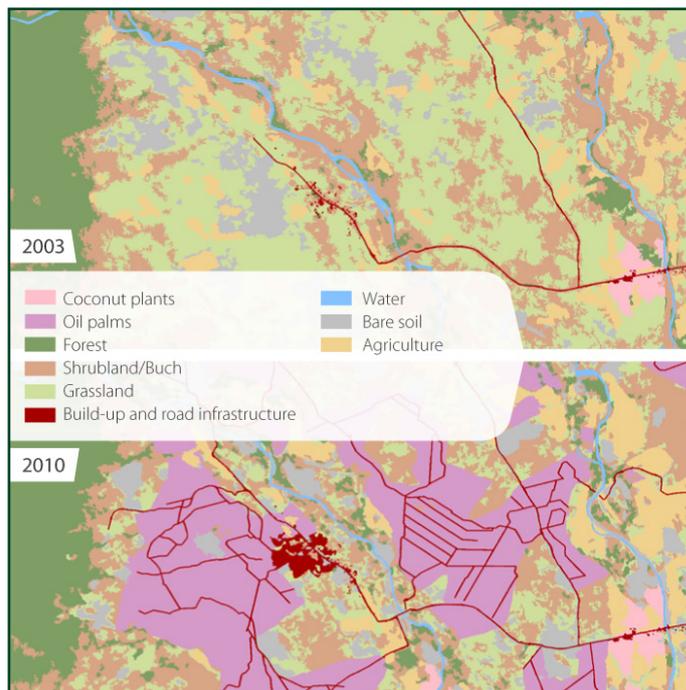
## Service summary and potential applications

The productive value of agricultural lands, in particular of marketed commodities such as food, fiber and fuel is well-established, in particular their potential for economic development and poverty reduction. The understanding of the environmental services that the agriculture sector can provide, such as absorbing carbon, managing watersheds, and preserving biodiversity, if production is well-managed, is also gaining an important momentum in development programs implementation.

Agriculture potential to sequester carbon emissions is an estimated 20% of all GHG emissions. Conservation agriculture can increase the resilience of ecosystems to weather- and climate- related shocks and increase yield outputs. This can be achieved by introduction of agro-forestry systems, rainwater harvesting, crop diversification and watershed planning, which contributes to protect soil from erosion and pollution, among others.

Earth Observation (EO) data supports integrated ecosystem management by determining the spatial extent and condition of ecosystems, associated trends and changes over time. A major contribution is the mapping of detailed, large-scale land cover and land use and its changes at watershed or sub-watershed level. This includes information services such as ecosystem mapping for biodiversity assessments, mapping of wetlands and their dynamics over time, or the assessment of ecosystem degradation (or recovery) based on land surface parameters. EO-based products and services include monitoring of the changes in the vegetation cover (land use, land cover, and change detection), soil erosion as well as land/water interactions related, for example, to water abstraction by irrigation or fertilizer use. In this context EO services allow to assess the benefits of sustainable landscape management (i.e. to measure how the shift to less intensive agriculture upstream produces cleaner water downstream, how the maintenance of ecologically sensitive areas or grasslands prevents erosion, or indicate the benefit of crop diversification over monoculture plantation in relation to improved biodiversity, food security and ecosystems resilience).

Moreover, as the frequency and severity of weather extremes (drought and floods) is increasing, the concern over the integrated, efficient, equitable and sustainable management of water resources is critical for the agro-system health and in particular for food production. Many landscape management decisions can have a impact on the ecosystem services provided to and by agricultural practices. This is in particular ly relevant when quantifying trade-offs as well as synergies in relation to the water resources management, e.g. water savings from water efficient agriculture that are channelled back into further agricultural production.



Satellite-based detailed land cover/use information shows changes in agricultural ecosystems. In this case, natural vegetation was transformed into oil palm plantations leading to increased sedimentation in a catchment of southern Palawan, Philippines. Such information supports integrated ecosystem management. Copyright: GeoVille for ESA/World Bank WAVES.

## EO information services

Information service	Content / Products
<b>Spatial extent and condition of ecosystem (including degradation and climate change impacts)</b>	<ul style="list-style-type: none"> <li>» Land cover (biophysical landscape)/ land use (productive land functions) in agricultural ecosystems (e.g. crop type and extent mapping, pastures mapping, agroforestry systems mapping)</li> <li>» Land surface parameters (e.g. soil moisture, vegetation greenness)</li> <li>» Drought indices</li> <li>» Terrain and watershed mapping</li> <li>» Soil erosion potential</li> <li>» Biomass/carbon stock</li> </ul>
<b>Trends/changes in ecosystem condition and services</b>	<ul style="list-style-type: none"> <li>» Land cover/use change detection (e.g. deforestation, changes in extent of wetlands) related to regulating, provisioning and cultural ecosystem services.</li> <li>» Biomass change/Carbon sequestration</li> <li>» Water quality monitoring</li> <li>» Nutrient cycling</li> <li>» Soil erosion</li> <li>» Agroforestry</li> <li>» Greening practices</li> <li>» Crop diversification</li> <li>» Maintenance of permanent grasslands</li> <li>» Maintenance of ecologically focused areas (crops/ crop groups, patches of forests, buffer zones etc.)</li> </ul>

