

Definitions of land classifications¹

Global Calculator Project

Agricultural area

Agricultural area, this category is the sum of areas under a) arable land - land under temporary agricultural crops (multiple-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category. Data for "Arable land" are not meant to indicate the amount of land that is potentially cultivable; (b) permanent crops - land cultivated with long-term crops which do not have to be replanted for several years (such as cocoa and coffee); land under trees and shrubs producing flowers, such as roses and jasmine; and nurseries (except those for forest trees, which should be classified under "forest"); and (c) permanent meadows and pastures - land used permanently (five years or more) to grow herbaceous forage crops, either cultivated or growing wild (wild prairie or grazing land) ([FAO Statistics Division](#)).

Arable land

Arable land is the land under temporary agricultural crops (multiple-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category. Data for "Arable land" are not meant to indicate the amount of land that is potentially cultivable ([FAO Statistics Division](#)).

Arable land and permanent crops

Arable land and Permanent crops, this land category is the sum of areas under "Arable land" and "Permanent crops". Data are expressed in 1000 hectares ([FAO Statistics Division](#)).

Bioenergy production

Bioenergy refers to energy derived from the biological carbon fixation of plants or from biological tissues. Examples are biodiesel, derived from vegetable oils and animal fats, and bioethanol, produced by the fermentation of carbohydrates of crops like corn. The production of biomass for energy production has important effects on rural development, international policy and economy, and on the environment: it supports the rural economy creating jobs and gives farmers a source of income complementary to food production. Biofuels have also an impact on economy and trade, since they reduce the dependence on oil-producing countries. Being derived from plants, their production contributes to carbon sequestration. Biofuels production presents also some issues, such as the increased pressure on water resources, deforestation (to clear land to cultivate fuel crops), and the change in use of land originally intended for food production ([FAO Statistics Division](#)).

¹ Prepared by Nicole Kalas, Alexandre Strapasson and Jeremy Woods (all from Imperial College London), as a supporting document to the Global Calculator Project. This paper version is subject to further updates whenever necessary. See more information at: www.globalcalculator.org

Crop production

Crop production data refer to the actual harvested production from the field or orchard and gardens, excluding harvesting and threshing losses and that part of crop not harvested for any reason. Production therefore includes the quantities of the commodity sold in the market (marketed production) and the quantities consumed or used by the producers (auto-consumption). When the production data available refers to a production period falling into two successive calendar years and it is not possible to allocate the relative production to each of them, it is usual to refer production data to that year into which the bulk of the production falls.

Crop production data are recorded in tonnes (t). In many countries, crop production data are obtained as a function of the estimated yield and the total area. If such a compilation method of production statistics is enforced by the country, it must be ensured that the total area does not refer to sown or planted area, which would give then the 'biological production', but to the actually harvested area during the year ([FAO Statistics Division](#)).

Crop yield

Harvested production per unit of harvested area for crop products. In most of the cases yield data are not recorded but obtained by dividing the production data by the data on area harvested. Data on yields of permanent crops are not as reliable as those for temporary crops either because most of the area information may correspond to planted area, as for grapes, or because of the scarcity and unreliability of the area figures reported by the countries, as for example for cocoa and coffee ([FAO Statistics Division](#)).

Crop residues

Agriculture management practice that consists in returning to managed soils the residual part of the produce. The associated greenhouse gas emissions are nitrous oxide gas from crop residues' decomposition ([FAOSTAT – Environment](#)).

Deserts, ice, etc.

This category includes land areas unsuitable for agricultural production, including temperate, subtropical and tropical deserts, polar and high altitude ice sheets and mountains.

Forests

This category encompasses native and commercial forests. See below for the FAO definition of "Forest area".

Commercial forest – other

Managed forests that are commercially used for the extraction of non-timber products and timber products designated for uses other than construction and pulp and paper, e.g. bioenergy.

Commercial forest – pulp and paper

Managed forests that are commercially used for the extraction of wood for pulp and paper.

Commercial forest – timber

Managed forests that are commercially used for the extraction of timber for construction and materials.

Native forest

Forests that are free from significant disturbance by people (e.g. timber extraction, land conversion, settlements and infrastructure).

Forest area

Forest area is the land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use. Forest is determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 metres (m) in situ. Areas under reforestation that have not yet reached but are expected to reach a canopy cover of 10 percent and a tree height of 5 m are included, as are temporarily unstocked areas, resulting from human intervention or natural causes, which are expected to regenerate. Includes: areas with bamboo and palms provided that height and canopy cover criteria are met; forest roads, firebreaks and other small open areas; forest in national parks, nature reserves and other protected areas such as those of specific scientific, historical, cultural or spiritual interest; windbreaks, shelterbelts and corridors of trees with an area of more than 0.5 ha and width of more than 20 m; plantations primarily used for forestry or protective purposes, such as: rubber-wood plantations and cork, oak stands. Excludes: tree stands in agricultural production systems, for example in fruit plantations and agroforestry systems. The term also excludes trees in urban parks and gardens (Forest Resource Assessment (FRA), [FAO Statistics Division](#)).

Forest loss (Land use change of net forest conversion)

The net forest conversion is calculated as the difference of forest area for two consecutive years, consistently with IPCC approach 1. The term “net” indicates that no further specification on the underlying dynamics of the computed land area change is possible. Greenhouse gas emissions consist of the net contribution of CO₂ sources and sinks due to deforestation, reforestation and afforestation activities within countries ([FAOSTAT – Environment](#)).

Global arable land for bioenergy

Global area of ‘arable land’ dedicated to ‘bioenergy production’ as its main objective.

Global arable land for food crops

Global area of ‘arable land’ dedicated to ‘crop production’ with the purpose of supplying the food market, even though crop wastes and residues, including co-products and by-products, may be used for bioenergy purposes.

Global pasture for livestock

Global area of ‘permanent meadows and pastures’ (see ‘Pastures’).

Global remainder of productive terrestrial land after bioenergy and food

Global ‘arable land’ not dedicated to ‘crop production’ or ‘bioenergy production’.

Greenhouse Gas Removal (GGR) Technologies

Technologies capable to remove greenhouse gases from the atmosphere, also known as 'Carbon Dioxide Removals' (CDR) and 'Negative Emissions Technologies' (NETs). Technologies considered in the 2050 Global Carbon Calculator include biochar, Direct Air Capture, Enhanced Weathering - Terrestrial, Enhanced Weathering - Oceanic and Ocean Fertilisation. Not considered are Forestry, BECCS or Land Use Management /Soil Carbon, given that these issues are covered by other sectors in the calculator. The projections do not assume interdependencies between techniques.

Land for animals

See "Pastures".

Land for bioenergy (energy crops)

Arable and permanent crops land used for the production of energy, e.g., maize, sugarcane, oilseed rape, oil palm, miscanthus.Land for food crops

Arable and permanent crops land used for the production of food and animal feed.

Land for non-food crops

Arable and permanent crops land used for the production non-food, non-bioenergy crops, including fibres (e.g., cotton), tobacco and crops for speciality uses in industry or pharmaceuticals.

Land use

The type of activity being carried out on a unit of land. It is recognized that these categories are a mixture of land cover (e.g., Forest, Grassland, Wetlands) and land use (e.g., Cropland, Settlements) classes (IPCC, 2006; [FAO Statistics Division](#)).

Land-use efficiency

A lever designed to capture efficiency gains and 'land sparing' achieved through the integration of 'crop production', 'livestock production' and 'bioenergy production' (e.g. agroforestry schemes, agro-pasture), as well as farm intensification through multi-cropping schemes (e.g., co-cropping, double-cropping and triple-cropping), i.e., the production of several crops in a same area.

Livestock

Animals such as cattle and sheep which are kept on the holding or otherwise for agricultural production (FAO, 1996; [FAO Statistics Division](#)).

Livestock production

Livestock primary products include products from live and slaughtered animals. Products from slaughtered animals include meat, offals, raw fats, fresh hides and skins. Products from live animals include milk, eggs, honey, beeswax and fibres of animal origin.

All data shown relate to total meat production from both commercial and farm slaughter. Data are given in terms of dressed carcass weight, i.e. excluding offals and slaughter fats. Production of beef and buffalo meat includes veal; mutton and goat meat includes meat from lambs and kids, respectively; pig meat includes bacon and ham in fresh equivalent. Poultry meat includes meat from all domestic birds and refers, wherever possible, to ready-to-cook weight.

Cow milk production relates to total production of whole fresh milk, excluding the milk sucked by young animals but including amounts fed to livestock. The concept of production of buffalo, sheep and goat milk is the same as for cow milk; however, the coverage is probably less adequate.

Egg production covers all domestic birds which have contributed to egg production during the year, wherever they lay and the corresponding total production, including eggs intended to be used for hatching but excluding waste on farms ([FAO Statistics Division](#)).

Pastures (Permanent meadows and pastures)

(Land for animals)

Permanent meadows and pastures is the land used permanently (five years or more) to grow herbaceous forage crops, either cultivated or growing wild (wild prairie or grazing land) ([FAO Statistics Division](#)).

Permanent crops

Crops are divided into temporary and permanent crops. Permanent crops are sown or planted once, and then occupy the land for some years and need not be replanted after each annual harvest, such as cocoa, coffee and rubber. This category includes flowering shrubs, fruit trees, nut trees and vines, but excludes trees grown for wood or timber) ([FAO Statistics Division](#)).

Settlements and infrastructure

This category includes all developed land, including transportation infrastructure and human settlements of any size (IPCC 2006).

Sequestration

The process of storing carbon in a carbon pool (IPCC, 2006; [FAO Statistics Division](#)).

Surplus land (forest & bioenergy)

The land use dynamics in the calculator and potential increase in land use types are restricted to the total land available on earth, and therefore, it is necessary to have a zero-sum equation to meet all land uses. It was assumed that food security should be a priority over other uses. Any arable, permanent crop and pasture land that may not be used for the production of food (based on user inputs for the 'calories consumed', 'meat consumed', 'crop yields', 'livestock yields' and 'land-use efficiency' levers of the Global Calculator) is allocated to native forest regeneration and/or the production of dedicated bioenergy crops.

Total land (Land area)

Land area is the total area of the country excluding area under inland water bodies. Possible variations in the data may be due to updating and revisions of the country data and not necessarily to any change of area. Data are expressed in 1 000 hectares ([FAO Statistics Division](#)).

Wastes

Amount of the commodity in question lost through wastage (waste) during the year at all stages between the level at which production is recorded and the household, i.e., storage and transportation. Losses occurring before and during harvest are excluded. Waste from both edible and inedible parts of the commodity occurring in the household is also excluded. Quantities lost

during the transformation of primary commodities into processed products are taken into account in the assessment of respective extraction/conversion rates. Distribution wastes tend to be considerable in countries with hot humid climate, difficult transportation and inadequate storage or processing facilities. This applies to the more perishable foodstuffs, and especially to those which have to be transported or stored for a long time in a tropical climate. Waste is often estimated as a fixed percentage of availability, the latter being defined as production plus imports plus stock withdrawals (FAO, 1986; [FAO Statistics Division](#)).

Unused, productive land

A land use category in the Global Calculator which comprises the share of arable and permanent crops land not explicitly designated for the production of food, non-food and/or bioenergy crops.

References

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