Glossary

Term	Meaning
Actual Yields and Production	Actual yields and production from downscaling year 2000 and 2009-2011 statistics (mainly from FAOSTAT) of main food and fiber crops/crop groups. Results are presented separately by total cropland, rain-fed and irrigated croplands, for harvested area, production, and implied average production yields (i.e. production/harvested area).
Agro-Climatic Resources	Temperature regimes, radiation and soil moisture conditions determine the rates of net photosynthesis, which allows plants to accumulate dry matter and to accomplish their successive plant development stages. Data on climatic requirements of crop growth, development and yield formation are the basis for the compilation of GAEZ agro-climatic inventories. These inventories include agronomically relevant characteristics of prevailing thermal and moisture regimes and growing periods. Variables include for example temperature, precipitation, thermal growing period, length of growing period, multi-cropping class, etc.
Agro-ecological zones	Geographic areas with homogeneous biophysical characteristics of natural resources including climate (e.g. rainfall, solar radiation), soils (e.g. soil type, soil pH), and terrain (e.g. exposure, slope) conditions as determinants of crop-specific agricultural production potentials.
Agronomically attainable yield	A simplified representation of a limited part of reality with related elements.
Potential Evapotranspiration (PET)	Potential evapotranspiration (PET) or Reference Evapotranspiration (ET0) is defined as the amount of evaporation that would occur if a sufficient water source were available. GAEZ calculates PET from the attributes in the climate database for each grid-cell according to the Penman-Monteith equation.
Land and Water Resources	GAEZ provides a framework for establishing a spatial inventory of land resources compiled from global environmental data sets, providing the spatial characteristics required for the assessments of land productivity for location-specific agro-ecological conditions. The land and water resources inventory includes multiple spatial layers of climate, soil, terrain, water, land cover, protected areas, population density, livestock density and accessibility. Land resources data have been splitted between the terrestrial (land & water resources) and agro-climatic characteristics (agro-climatic resources).

Length of growing period (LGP)	A general characterization of annual moisture conditions is achieved through the concept of length of growing period (LGP), i.e. the number of days during the year when both moisture availability and temperature are conducive to crop growth. The quantification of the LGP is based on a water balance model comparing moisture supply from precipitation and soil moisture storage and reference evapotranspiration. Reference LGP assumes available soil moisture capacity of 100 mm per meter soil depth and a reference soil depth of one meter.
Model	The division of an area of land into smaller units, which have similar characteristics related to land suitability, potential production and environmental impact.
Phenological requirement	A crop requirement for certain environmental conditions to occur at times which are related to the crop growth cycle.
Potential yield	A LUT consists of a set of technical specifications for crop production within a given socioeconomic setting. Attributes specific to a particular LUT include agronomic information, nature of main produce, water supply type, cultivation practices, utilization of produce, and associated crop residues and by-products.
Soil mapping unit	An area of land delineated on a map with homogenous soil-related characteristics including soil type, soil texture and soil phase. A soil mapping unit may consist either of a single soil type, or of multiple soil types occurring as a complex or association.
Suitability and potential yield	The GAEZ modeling framework assesses land suitability, potential attainable yields and potential production of crops for specified management assumptions and input levels, both for rain-fed and irrigated conditions. The domain includes information about crop specific information about crop cycle (beginning, length), evapotranspiration, production constraint, yield, production, number of years without failure, accumulated temperature during growth cycle, water deficit, production constraint, crop suitability index, attainable yield.
Thermal regimes	Thermal regimes characterise temperature conditions relevant for crop growth. the characterization of temperature regimes includes thermal climates, representing major latitudinal climatic zones, thermal zones, representing actual temperature conditions throughout the year, temperature profiles, providing quantification of temperature seasonality; temperature growing periods representing the periods during which average daily temperatures exceed specified minimum levels, and accumulated

	temperatures or temperature sums quantifying available heat units.
Yield and Production Gaps	Yield gaps and production gaps have been estimated by comparing potential attainable yields and production (estimated in GAEZ) and actual yields and production from downscaling year-specific statistics of main food and fiber crops. Yield gaps provide important information for identifying causes and addressing rural poverty and food insecurity issues. Variables include information about apparent yield gap ratio, production gap and yield achievement ratio.
Input Levels	In GAEZ, three generic levels of input/management are defined: Low, intermediate, and high input level. Under a low level of inputs (traditional management assumption), the farming system is largely subsistence based. Production relies on the use of traditional cultivars (if improved cultivars are used, they are treated in the same way as local cultivars), labor intensive techniques, and no application of plant nutrients, no use of chemicals for pest and disease control and minimum conservation measures. Fallows are required to maintain soil fertility. Under an intermediate level of input (improved management assumption), the farming system is partly market oriented. Production for subsistence plus commercial sale is a management objective. Production is based on improved varieties, on manual labor with hand tools and/or animal traction and some mechanization, is medium labor intensive, applies some nutrients/fertilizer and chemical pest disease and weed control, and uses adequate fallows and some conservation measures. Under a high level of input (advanced management assumption), the farming system is mainly market oriented. Commercial production is a management objective. Production is based on improved or high yielding varieties, is fully mechanized where possible with low labor intensity and uses optimum applications of nutrients and chemical pest, disease and weed control
Water supply systems	Five water supply systems have been separately evaluated: rain-fed; rain-fed with water conservation; gravity irrigation; sprinkler irrigation; drip irrigation systems. Apart from evaluating crop production systems based on rain-fed cultivation and rain-fed with water conservation, specific soil requirements for three major irrigation systems have been established namely for gravity, sprinkler and drip irrigation.
Climate Models	A Land Utilization Type (LUT) consists of a set of technical specifications for crop production within a given socioeconomic

	setting. Attributes specific to a particular LUT include agronomic information, nature of main produce, water supply type, cultivation practices, utilization of produce, and associated crop residues and by-products.
CO_2 fertilization	The biomass calculation includes adjustment factors to account for different levels of atmospheric CO_2 concentrations. The "fertilization" effect of increasing atmospheric CO_2 concentration due to climate change depends on crop type and their photosynthetic pathway.
Land Utilization Types	A Land Utilization Type (LUT) consists of a set of technical specifications for crop production within a given socioeconomic setting. Attributes specific to a particular LUT include agronomic information, nature of main produce, water supply type, cultivation practices, utilization of produce, and associated crop residues and by-products.
Representative Carbon Pathways	A Representative Carbon Pathways (RCP) is a greenhouse gas concentration trajectory adopted by the International Panel of Climate Change (IPCC) for describing different climate futures. GAEZ estimates for agricultural production potentials under climate change accounts for the four different RCPs used in the IPCCs Fifth Assessment Report. They include: RCP 2.6: The emission pathway is representative for scenarios in the literature leading to very low greenhouse gas concentration levels. It is a so-called "peak" scenario: represents a strong mitigation scenario and is extended by assuming constant emissions after 2100 (including net negative CO_2 emissions), leading to CO_2 concentrations returning to 360 ppm by 2300. RCP 4.5: It is a stabilization scenario where total radiative forcing is stabilized before 2100 by employment of a range of technologies and strategies for reducing greenhouse gas emissions. RCP 6.0: It is a stabilization scenario where total radiative forcing is stabilized after 2100 without overshoot by employment of a range of technologies and strategies for reducing greenhouse gas emissions. RCP 8.5: It is characterized by increasing greenhouse gas emissions over time representative for scenarios in the literature leading to high greenhouse gas concentration levels. The underlying scenario drivers and resulting development path are based on the A2r scenario detailed in Riahi *et al.* (2007).