WaPOR short data description

LEVEL 1	
Annual gross biomass water productivity	**Description** The annual gross biomass water productivity expresses the quantity of output (above ground biomass production) in relation to the total volume of water consumed in the year (actual evapotranspiration). By relating biomass production to total evapotranspiration (sum of soil evaporation and canopy transpiration), this indicator provides insights on the impact of vegetation development on consumptive water use and thus on water balance in a given domain. When the focus is on monitoring performance of irrigated agriculture in relation to water consumption, it is more appropriate to use transpiration alone as a denominator, as a measure of water beneficially consumed by the plant. This latter indicator, for which we use the term 'net water productivity', provides useful information on how effectively vegetation (and particularly crops) uses water to develop its biomass (and thus yield). **The unit** is the ratio of kg of dry matter per cubic meter of water consumed (ETa): kgDM/m³/year **Conversion factor:** the pixel value must be multiplied by 0.001 **Spatial resolution**: 250m (0.00223 degree) **Geographic extent**: Africa and Near East **Temporal extent**: 2010 to date **Temporal resolution:** year **Coordinate System**: EPSG:4326 - WGS84 - Geographic Coordinate System (lat/long) **Methodology** The calculation of gross biomass water productivity is as follows: $$WPb_g = AGBP/ETa$$ Where AGBP is annual above ground biomass production in kgDM/ha and ETa is annual actual evapotranspiration in m³/ha. The following data is used for calculating WPb_g - Annual AGBP - Annual ETa
Annual net biomass water productivity	**Description** The annual net biomass water productivity expresses the quantity of output (above ground biomass production) in relation to the volume of water beneficially consumed (by canopy transpiration) in the year, and

	thus net of soil evaporation. Contrary to gross water productivity, net water productivity is particularly useful in monitoring how effectively vegetation (and, more importantly, crops) uses water to develop biomass (and thus yield). **The unit** is the ratio of kg of dry matter per cubic meter of water transpired by vegetation (T): kgDM/m³/year **Conversion factor:** the pixel value must be multiplied by 0.001 **Spatial resolution**: 250m (0.00223 degree) **Geographic extent**: Africa and Near East **Temporal extent**: 2010 to date **Temporal resolution:** year **Coordinate System**: EPSG:4326 - WGS84 - Geographic Coordinate System (lat/long) **Methodology** The calculation of net biomass water productivity is as follows: $$WPb_n = AGBP/Ta$$ Where AGBP is annual above ground biomass production in kgDM/ha and T*a* is annual actual transpiration in m³/ha. Only areas with annual T of 100 mm or higher have been included in the computation. The following data is used for calculating WPb_n - Annual AGBP - Annual T*a* (obtained by applying the transpiration fraction to ETa)
Annual actual evapotranspiration	**Description** The Evapotranspiration (ET) is the sum of the soil evaporation (E) and canopy transpiration (T). The value of each pixel represents the annual actual evapotranspiration in a given year. **The unit** is mm/year, which can be converted into volume for a specific area, e.g. 1mm = 1l/m² or 1mm = 10 m³/ha. **Conversion factor:** none **Spatial resolution**: 250m (0.00223 degree) **Geographic extent**: Africa and Near East **Temporal extent**: 2010 to date **Temporal resolution:** year **Coordinate System**: EPSG:4326 - WGS84 - Geographic Coordinate System (lat/long) **Methodology** The calculation of the AET is based on the ETLook model described in Bastiaanssen et al. (2012). See Actual Evapotranspiration by dekad for further information. The annual total is obtained by taking the ETa in

	mm/day, multiplying by the number of days in a dekad, and summing the dekads of each year.
Annual transpiration	**Description** The annual transpiration is the portion of annual ETa due to canopy transpiration only (net of soil evaporation). The value of each pixel represents the total annual transpiration for that specific year. **The unit** is mm/year, which can be converted into volume for a specific area, e.g. 1mm = 1l/m² or 1mm = 10 m^3/ha. **Conversion factor:** the pixel value must be multiplied by 0.001. **Spatial resolution**: 250m (0.00223 degree) **Geographic extent**: Africa and Near East **Temporal extent**: 2010 to date **Temporal resolution:** year **Coordinate System**: EPSG:4326 - WGS84 - Geographic Coordinate System (lat/long) **Methodology** The annual T is obtained by applying the Tfraction in a dekad to ETa to get decadal transpiration and then summing the dekads of each year.
Annual above ground biomass production (land productivity)	**Description** The annual above ground biomass production expresses the total amount of dry matter produced over the year. It is calculated by dekad and summarized as annual total. Each pixel represents the amount of dry matter in kg per hectare per year. **The unit** is kgDM/ha/year **Conversion factor:** none **Spatial resolution**: 250m (0.00223 degree) **Geographic extent**: Africa and Near East **Temporal extent**: from 2010 to date **Temporal resolution:** year **Coordinate System**: EPSG:4326 - WGS84 - Geographic Coordinate System (lat/long) **Methodology** Annual AGBP is the sum of the AGBP by dekad in the year of reference (AGBP by dekad is the average daily value in a dekad multiplied by number of days in each dekad). AGBP is calculated by applying a unit conversion factor to net primary production (NPP) that converts carbon grams (gC) per m² into dry matter (DM) per hectare. Furthermore, a shoot/root ratio is applied that distributes DM into below ground and above ground production. The root/shoot ratio is linked to crop type at

	Level 2 and 3, but it is assumed to be constant (0.65) at Level 1, where no crop specific information is available. $$AGBP = NPP * c$$ Where c is the conversion factor (0.65/0.045).
Actual evapotranspiration (dekad)	**Description** The Evapotranspiration (ET) is the sum of the soil evaporation (E) and canopy transpiration (T). The value of each pixel represents the average daily actual evapotranspiration for that specific dekad. **The unit** is mm/day, which can be converted into volume for a specific area (1mm = 1l/m² or 1mm = 10 m^3/ha). **Conversion factor:** the pixel value must be multiplied by 0.1. **Spatial resolution**: 250m (0.00223 degree) **Geographic extent**: Africa and Near East (bounding box 30W 40N, 65E 40S) **Temporal extent**: from April 2009 to date **Temporal resolution: d**ekad (approximately 10 days) **Coordinate System**: EPSG:4326 - WGS84 - Geographic Coordinate System (lat/long) **Methodology** The calculation of the AET is based on the ETLook model described in Bastiaanssen et al. (2012). It uses the Penman-Monteith equation, adapted to remote sensing input data. The Penman-Monteith equation (Monteith 1965) predicts the rate of total evaporation and transpiration using commonly measured meteorological data (solar radiation, air temperature, vapour content and wind speed). It has become the FAO standard for calculating the actual and reference evapotranspiration (see FAO Irrigation and Drainage paper 56, Allen et al. 1998). The following data is used for calculating AET: - Daily: incoming solar radiation and weather data (temperature, humidity, wind speed and precipitation); - Dekadal: NDVI, surface albedo and soil moisture stress; - Seasonal: Land Cover; - Static: Digital Elevation Model.
Transpiration fraction (dekad)	**Description** Transpiration fraction ($\boldsymbol{T_{frac}}$) is an additional, complementary data layer that is provided with the AET data component. Each pixel of this data layer indicates which % of AET is made up of transpiration for that specific dekad. Combined with AET, it can be used to derive the contributions of Evaporation and Transpiration. **The unit** is percentage (%).

	Spatial resolution: 250m (0.00223 degree) **Geographic extent**: Africa and Near East (bounding box 30W 40N, 65E 40S) **Temporal extent**: from April 2009 to date **Temporal resolution: d**ekad (approximately every 10 days) **Coordinate System**: EPSG:4326 - WGS84 - Geographic Coordinate System (lat/long) **Methodology** Transpiration fraction is calculated by dividing the transpiration by the sum of evaporation and transpiration: $T_{frac} = {}^{T}/_{(E+T)} * 100$
Net primary production (dekad)	**Description** Net Primary Production (NPP) is a fundamental characteristic of an ecosystem, expressing the conversion of carbon dioxide into biomass driven by photosynthesis. The pixel value represents the mean daily NPP for that specific dekad. **The unit** is gC/m^2/day. **Conversion factor:** the pixel value must be multiplied by 0.001. **Spatial resolution**: 250m (0.00223 degree) **Geographic extent**: Africa and Near East (bounding box 30W 40N, 65E 40S) **Temporal extent**: from April 2009 to present **Temporal resolution:** Dekadal (approximately every 10 days) **Coordinate System**: EPSG:4326 - WGS84 - Geographic Coordinate System (lat/long) **Methodology** The core of the methodology for deriving NPP is detailed in Veroustraete et al. (2002), whilst the practical implementation, as developed for the MARS Crop Yield Forecasting System, is described in Eerens et al. (2004). These methodologies were improved within the framework of the Copernicus Global Land Component, the most important change being the incorporation of biome-specific light-use efficiencies (LUEs). The FRAME project applies this updated methodology, adding improvements which include the addition of a reduction factor to account for reduced water availability (i.e. soil moisture stress). The following data is used to calculate NPP: - Daily: incoming solar radiation and temperature data (Tmin/Tmax); - Dekadal: fAPAR and soil moisture stress; - Seasonal: Land Cover.
Precipitation (daily)	**Description**

	Precipitation data is delivered on a daily basis. The source of this dataset is CHIRPS (Climate Hazards Group InfraRed Precipitation with Station) quasi-global rainfall dataset, starting from 1981 up to near present. The value of each pixel represents the amount of precipitation in mm/day. For details see http://chg.geog.ucsb.edu/data/chirps/ **The unit** mm/day **Conversion factor:** the pixel value must be multiplied by 0.1. **Spatial resolution**: Approximately 5km (0.05 degree) **Geographic extent**: Africa and Near East **Temporal extent**: from April 2009 to date **Temporal resolution:** Daily **Coordinate System**: EPSG:4326 - WGS84 - Geographic Coordinate System (lat/long) **Methodology** Information on the methodology applied to produce CHIRPS data can be found at http://chg.geog.ucsb.edu/data/chirps/.
Reference evapotranspiration (daily)	**Description** Reference evapotranspiration (RET) is defined as the evapotranspiration from a hypothetical reference crop and it simulates the behaviour of a well-watered grass surface. Each pixel represents the daily reference evapotranspiration in mm/day. **The unit** is mm/day, which can be converted into volume for a specific area, e.g. 1mm = 1l/m² or 1mm = 10 m³/ha **Conversion factor:** the pixel value must be multiplied by 0.1. **Spatial resolution**: 20km (0.17857 degree) **Geographic extent**: Africa and Near East **Temporal extent**: from April 2009 to date **Temporal resolution:** Daily **Coordinate System**: EPSG:4326 - WGS84 - Geographic Coordinate System (lat/long) **Methodology** As for Actual Evapotranspiration, it is derived using the Penman-Monteith equation, with the distinction that most of the variables are predefined. The following data is used to calculate RET: – Daily: incoming solar radiation and weather data (temperature, humidity, wind speed)