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FAO programme for monitoring water productivity through an open-access, remote sensing derived database

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Achieving Food Security in the future while using water resources in a sustainable manner is a major challenge for the next generations and us. Agriculture is a key water user and careful monitoring of water productivity in agriculture and exploring opportunities to increase it will be required. FAO and partners maintain a publicly accessible near real time database using satellite data to provide evidence based data at world, national, basin and field level in support of the achievement of SDG target 6.4 to substantially increase water-use efficiencies.
By providing near real time pixel information, the database opens the door for service-providers to assist farmers in obtaining yields that are more reliable and improving their livelihoods. At the same time, irrigation authorities have access to information to modernize their irrigation schemes and government agencies are able to monitor the state of their natural resource base and use the information to promote a more efficient use of these resources.
The database is built on three levels: i) continental level, at 250 m resolution, covering the whole of Africa and the Near East, ii) national and river basin level at 100 m resolution covering 18 countries and four river basins and iii) irrigation scheme and watershed level, at 30 m, covering 5 areas of 100,000 ha each. The temporal span of the database ranges from 2009 to 2019, with possibilities of extend it over time and space through additional donors' engagements.
The methodology and algorithms used to derive the database variables are openly accessible. A dedicated FAO portal has been developed that builds on state of the art APIs and allows for direct access to a catalogue of more than 7 000 raster files, including: decadal actual evapotranspiration, decadal above-ground biomass production, decadal net primary production, daily reference evapotranspiration, daily precipitation, annual and seasonal land cover, crop calendars. These layers are used for on the fly computation of water and land productivity, calculated separately for rainfed and irrigated conditions. As significant computational power is required to perform the analyses, we have taken advantage of novel technologies in the field of cloud computing and developed ad-hoc algorithms that run on Google Earth Engine environment. The portal allows for data analyses such as time series and area statistics, whereas more complex or user-defined calculations are made available through dedicated python scripting. Furthermore, the database provides the information base for water balance analyses at basin scale, and thus allows for developing water accounts using tools such as Water Accounting Plus.
FAO and its partners are now seeking further collaboration with data users, including international and national development, knowledge and research organizations, ICT companies, and farmer advisory service providers, to broaden the range of applications building on this wealth of data and information base.