Description of FAO AQUAmaps regional and global river layers

Rivers of Africa

The rivers of Africa (http://www.fao.org/geonetwork/srv/en/metadata.show?id=37333&currTab=simple) are derived from the World Wildlife Fund's (WWF) HydroSHEDS drainage direction layer and stream network layer. The drainage direction layer was created from NASA's Shuttle Radar Topographic Mission (SRTM) 15-second Digital Elevation Model (DEM). The raster stream network was determined by using the HydroSHEDS flow accumulation grid, with a threshold of about 100 km² upstream area.

The linework of the map was obtained by converting the raster stream network to a feature dataset with the Hydrology toolset in ESRI ArcGIS. The Flow Direction and Stream Order grids were derived from hydrologically corrected elevation data with a resolution of 15 arc-seconds. The elevation dataset was part of a mapping product, HydroSHEDS, developed by the Conservation Science Program of World Wildlife Fund. Original input data had been obtained during NASA's Shuttle Radar Topography Mission (SRTM).

The stream network dataset consists of the following information: the origin node of each arc in the network (FROM_NODE), the destination of each arc in the network (TO_NODE), the Strahler stream order of each arc in the network (STRAHLER), numerical code and name of the major basin that the arc falls within (MAJ_BAS and MAJ_NAME); - area of the major basin in square km that the arc falls within (MAJ_AREA); - numerical code and name of the sub-basin that the arc falls within (SUB_BAS and SUB_NAME); - numerical code of the sub-basin towards which the sub-basin flows that the arc falls within (TO_SUBBAS) (the codes -888 and -999 have been assigned respectively to internal sub-basins and to sub-basins draining into the sea).

As of **February 2014**, the attributes table includes a field named "Regime" with tentative classification of streams as perennial ("P") or intermittent ("I"). The regime classification builds on frequency distribution analysis of occurrence of intermittent and perennial streams according to Strahler order and Aridity Index. The African Water Resources Database (http://www.fao.org:80/geonetwork?uuid=cb123b20-f3c8-11db-adea-000d939bc5d8, published in 2007) includes a river network layer developed by FAO in the 90’ indicating hydrological regime of streams, which was used to analyze frequency distribution as shown in the graphs below, where frequency of permanent and intermittent streams for each Strahler

order are plotted against Aridity Index (annual precipitation divided by annual reference evapotranspiration) derived overlaying the river network with the FAO Global Map of Aridity (http://www.fao.org/geonetwork/srv/en/metadata.show?id=37040).

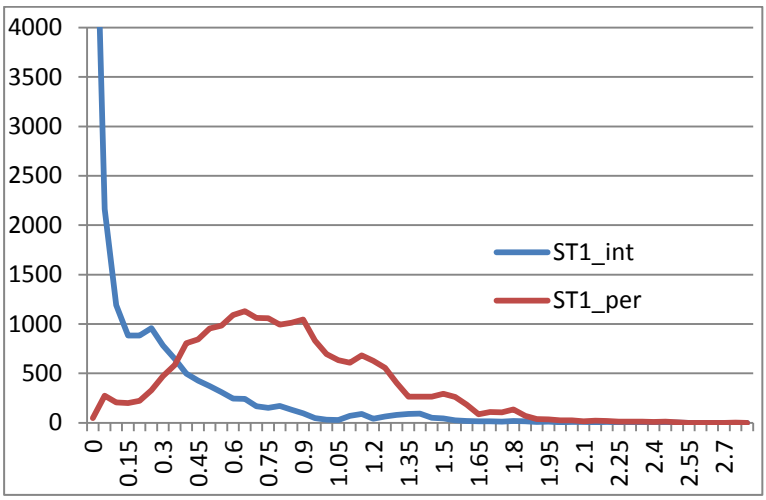


Figure 1: Frequency distribution of streams of Strahler Order 1 in Aridity Index classes.

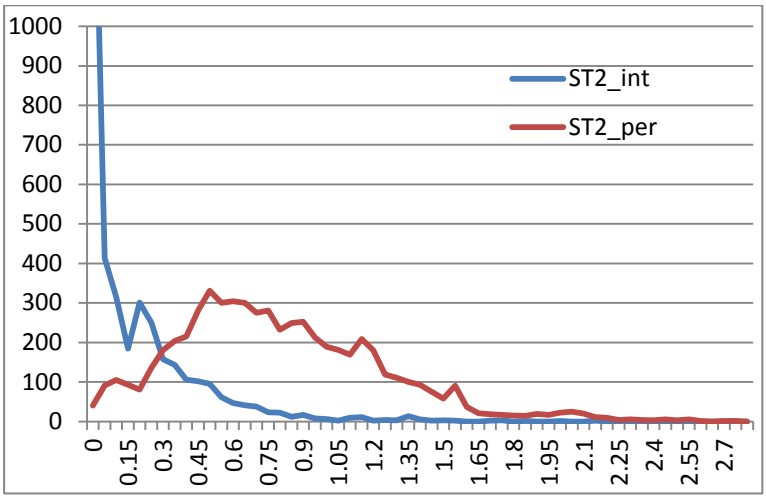


Figure 2: Frequency distribution of streams of Strahler Order 2 in Aridity Index classes.

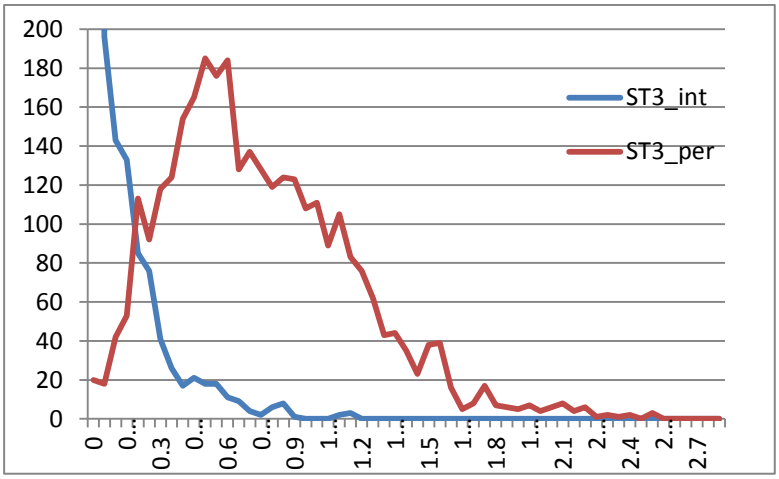


Figure 3: Frequency distribution of streams of Strahler Order 3 in Aridity Index classes.

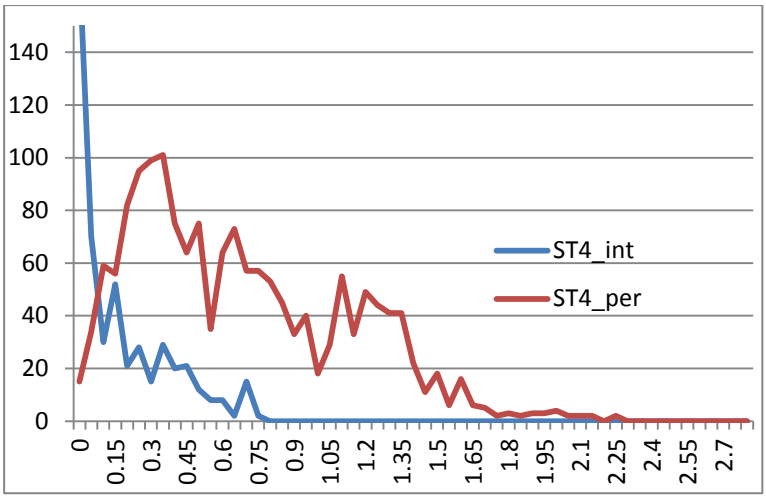


Figure 4: Frequency distribution of streams of Strahler Order 4 in Aridity Index classes.

The graphs helped identifying the Aridity Index threshold (A.I.), for each Strahler Order (S.O.), below which a stream is more likely to be intermittent, leading to the classification summarized in Table 1.

Table 1: Classification of hydrological regime based on Strahler Order and Aridity Index.

A.I./S.O.	1	2	3	4	5	6	7	8	9
0.35	P	P	P	P	P	P	P	P	P
0.30	I	P	P	P	P	P	P	P	P
0.24	I	I	P	P	P	P	P	P	P
0.17	I	I	I	P	P	P	P	P	P
0.09	I	I	I	I	P	P	P	P	P
0.00	I	I	I	I	I	P	P	P	P

The classification developed has then been applied to the river network of Africa, overlaying the FAO Global map of Aridity and results compared and calibrated with available information on hydrological regimes, including The Times Atlas of the World, the Digital Chart of the World and literature available through FAO database and reports.

Regional layers

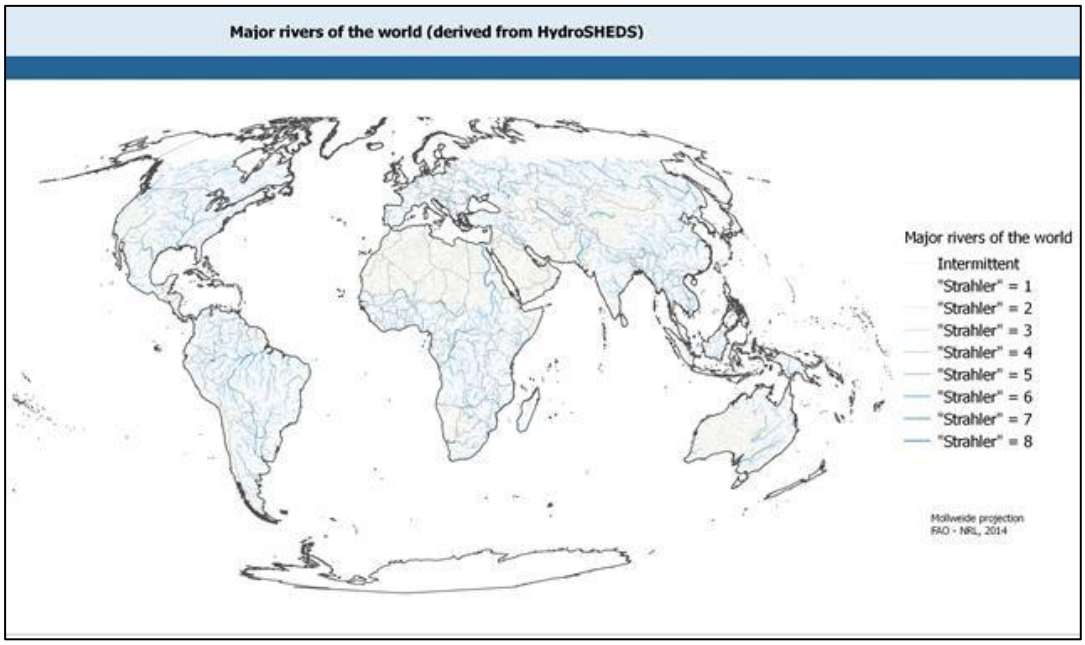
The approach developed and tested originally for the river network of Africa, was then replicated to other regions to produce the following:

rivers_australia	http://www.fao.org/geonetwork/srv/en/metadata.show?id=37252&currTab=simple
rivers_centam	http://www.fao.org/geonetwork/srv/en/metadata.show?id=37249&currTab=simple
rivers_europe	http://www.fao.org/geonetwork/srv/en/metadata.show?id=37253&currTab=simple
rivers_noram	http://www.fao.org/geonetwork/srv/en/metadata.show?id=37341&currTab=simple
rivers_samerica	http://www.fao.org/geonetwork/srv/en/metadata.show?id=37330&currTab=simple
rivers_asia	http://www.fao.org/geonetwork/srv/en/metadata.show?id=37331&currTab=simple
rivers_neareast	http://www.fao.org/geonetwork/srv/en/metadata.show?id=37340&currTab=simple

Global layer "Major Rivers of the World"

The raster stream network was determined by using the HydroSHEDS flow accumulation grid, with a threshold of about 1000 km² upstream area, then converted to line features and populated with attributes, including hydrological regime, following the same approach described for the regional layers.

http://www.fao.org/geonetwork/srv/en/metadata.show?id=47950



FAO encourages use and dissemination of its data products. Please include online links to relevant data on FAO GeoNetwork or AQUAmaps repositories:

http://www.fao.org/geonetwork/srv/en/main.home

http://www.fao.org/nr/water/aquamaps/

References

Jenness, J.; Dooley, J.; Aguilar-Manjarrez, J.; Riva, C., African Water Resource Database. GIS-based tools for inland aquatic resource management. 1. Concepts and application case studies. CIFA Technical Paper. No. 33, Part 1. Rome, FAO. 2007. 168p.

Lehner, B., Verdin, K., Jarvis, A. (2008): New global hydrography derived from spaceborne elevation data. Eos, Transactions, AGU, 89(10): 93-94. HydroSHEDS data and information are available at http://www.worldwildlife.org/hydrosheds

The Times Atlas of the World. Comprehensive Edition. London, 1994.