

# Appendix - Summary of the African Water Resource Database

## Introduction

The African Water Resource Database (AWRD) is a Geographical Information System (GIS) analytical framework supporting natural resource planning with a specific focus on inland fisheries and integrated water resource management. The objective of the AWRD is to provide water and natural resource managers with tools which foster the sustainable use of water resources, as a means of promoting the responsible management of inland aquatic resources and increasing food security.

## Methods

The AWRD is an enhancement of the work contained in the FAO's Aquaculture for Local Community Development Programme's Water Resource Database (WRD) of southern Africa. This work has been extended to cover continental Africa and the island states. Currently, there are over one hundred and fifty datasets populating the AWRD data archive. The core data layers include: various depictions of surface water bodies; watershed models; aquatic species; rivers; political boundaries; population density; soils; satellite imagery; and many other physiographic and climatological data types. In general, the source scale of these data support analyses from 1:65 000 to 1:5 000 000 for vector data, and a nominal resolution of 1 to 5 kilometers for raster data.

## Results

In addition to greatly expanding the data that can be viewed and analyzed, the AWRD also encompasses a much tighter integration of the GIS decision support tools within the interface and now includes robust statistical and spatial locator functionality. Through the AWRD interface users have the ability to access tabular and spatial data viewers, while also gaining the ability to test and visualize complex spatial relationships and conducting robust statistical analyses concerning the spatial extent and distribution of such relationships. Most tools come with simple and advanced options and are fully described in help menus. A set of six applications illustrating various decision support scenarios using the AWRD are available as users aids and training examples.

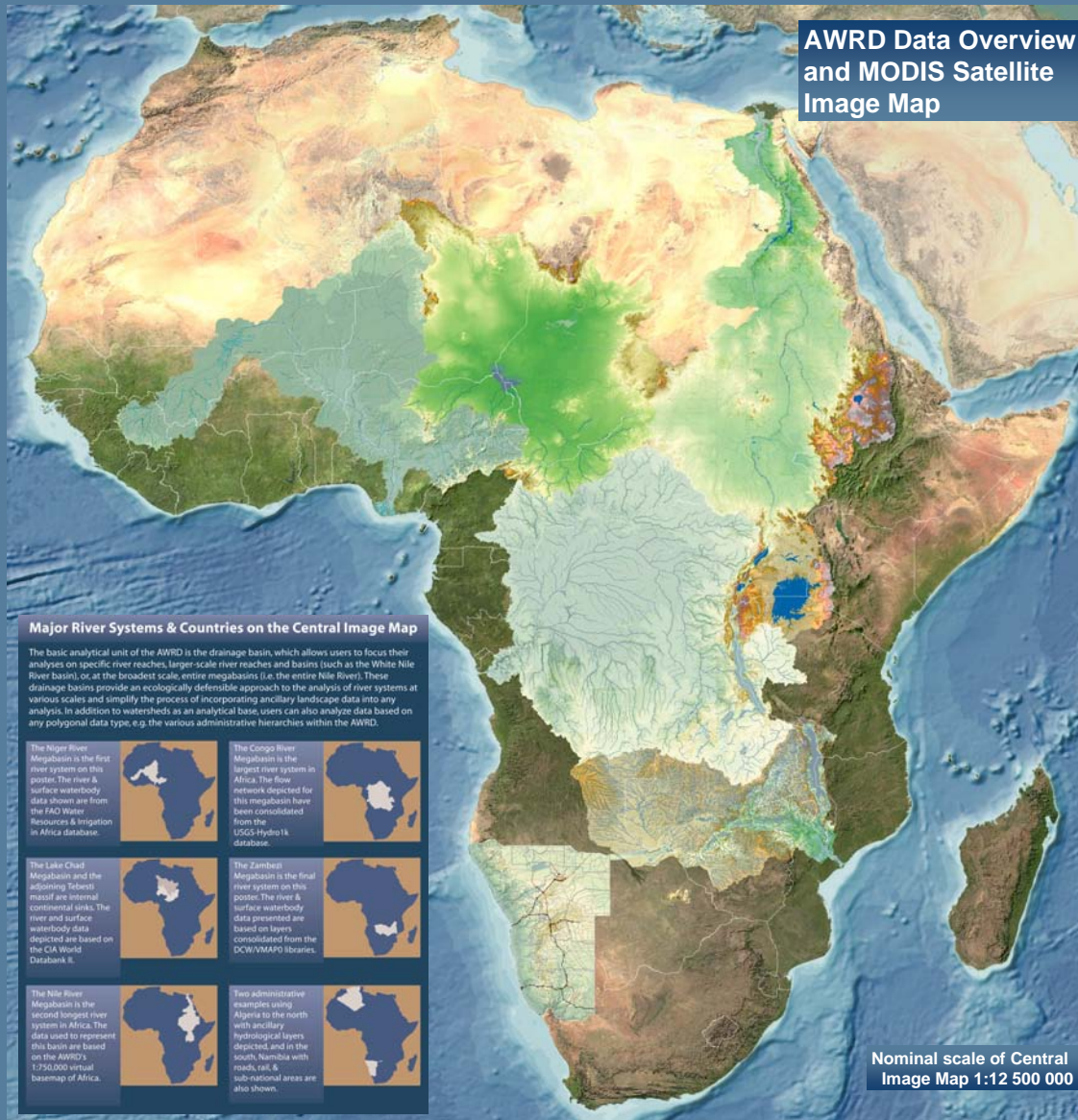
## Discussion

To display and analyze the datasets compiled, the AWRD contains an assortment of new custom-designed applications and tools. Currently, there are six analytical modules within the AWRD interface: 1) a surface waterbodies statistics module; 2) a watersheds statistics module & visualization tool; 3) an aquatic species module; 4) a data classification & statistical analysis module; 5) a metadata module; and 6) various customization & user enhancement tools.

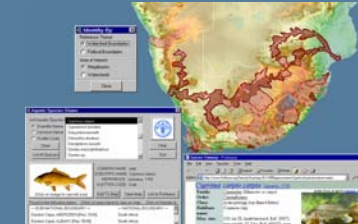
The Surface Waterbodies (SWB) Module is designed to give users of the AWRD quick and easy access to data on surface waterbodies in Africa. In addition, the SWB module provides users with the ability to predict potential SWB yields based on two possible models. The module is designed to work with both polygon and point feature types, and there are currently twenty-three SWB layers resident within the AWRD archive.



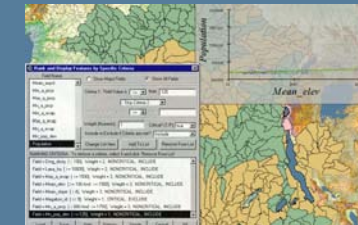
The Watershed Statistics Module and related analytical tools represent perhaps the most comprehensive and intensive programming development undertaken with respect to the AWRD interface. This module offers a wide variety of tools specifically designed to analyze and visualize watersheds. These tools take advantage of the hydrologic relationships between watersheds and use these relationships to identify which watersheds are upstream, which are downstream, and which make up the overall flow regime and/or megabasin.



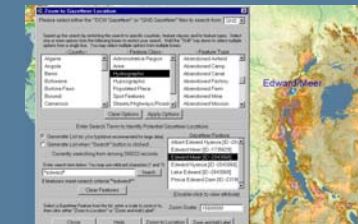
The Aquatic Species Module provides users with the ability to spatially represent and visualize the distributions of aquatic species, identify all species within a particular area, and to potentially access a large amount of descriptive information on those species via the internet. Thematically, this module provides users with species locations from the reference database, distribution maps based on a watershed model, and broader containment maps from an administrative data layer.



The Data Classification & Statistical Analysis module has four main analytical components which allow users to: generate summary statistics for any set of records; calculate a range of twelve probability distributions; classify and rank features according to a wide variety of simple and complex query functions; and provides a powerful method for analyzing relationships between data via linear regression.



In addition to providing an HTML based metadata documentation module meeting ISO international standards, the AWRD also contains several additional statistical, data visualization, and spatial referencing tools which enhance the overall analytic and data output capabilities of the AWRD.



## Conclusion

The AWRD is a GIS based analytical platform that allows users to visualize and analyze the complex hydrological and ecological relationships within specific river reaches, larger-scale river basins, or entire megabasins. Thus, the AWRD can help improve or ease fishery or integrated management decisions. The AWRD builds on an established body of work, and strategies are currently being developed to promote research, education, training and decision-making, using the AWRD. There are over one hundred and fifty data layers currently compiled in the AWRD data archive and great efforts were taken to make this data viewable and comparable. The AWRD includes three full continental-scale watershed models based on different minimum resolutions, and while users can analyze river systems based on a drainage basin approach, they can also choose to analyze additional models, feature data types, and ancillary data. Potential enhancements to the AWRD include: a river systems network module; a water demand and irrigation analysis; a run-off and flood predictor; and a base map viewer and output module. Other possible developments include: an on-line collaboration and data maintenance system; and the eventual global expansion of relevant data layers.