3. Glossary

Active Theme. In an ArcView view, the Active Theme (or Themes) are the themes that are selected so that they appear to have a raised box drawn around them in the view Table of Contents. Some types of tools and buttons only work on active themes, so the theme must be set to active before the tool or button will become available.

Add-On. See Extension.

Ancillary Data. Any data which is accessory or related to the main topic and not of remote sensing origin.

ArcView Project. In ArcView 3, a file for creating and storing documents for GIS work. All activity in ArcView 3 takes place within project files, which use five types of documents to organize information: views, tables, charts, layouts, and Avenue scripts. A project file organizes its documents and stores their unique settings in an ASCII format file with the extension .apr.

ArcScript. See Script.

ASCII (American Standard Code for Information Interchange). The de facto standard for the format of text files in computers and on the Internet that assigns a 7-bit binary number to each alphanumeric or special character. ASCII defines 128 possible characters.

Attribute Table. The attribute table of a spatial dataset is the table containing all the descriptive data that is associated with each spatial feature. ESRI Shapefiles are actually composed of multiple files, one of which contains the attribute table in a dBASE database file.

Basin. In the context of hydrology and related subjects this includes a drainage area of a stream, river or lake.

Basemap. A map depicting background reference information such as landforms, roads, landmarks, and political boundaries, onto which other, thematic information is placed. A basemap is used for locational reference and often includes a geodetic control network as part of its structure.

Blue Marble. A NASA project to present a true-color image of the land surface, without cloud cover, of the entire planet. The final composite image is based on satellite images taken between June and September, 2001. Efforts are currently underway to generate a new generation of Blue Marble images depicting the earth at monthly intervals (see http://earthobservatory.nasa.gov/Newsroom/BlueMarble/).

Bitmap. An image format in which one or more bits represent each pixel on the screen. The number of bits per pixel determines the shades of gray or number of colors that a bitmap can represent. Bitmap files generally have the extension .bmp.

Catchment. See watersheds.

Cell. Element of a data grid or data matrix. Each cell corresponds to a portion of the ground surface. The value associated to each cell represents either a thematic attribute or the average value of a parameter, associated to the corresponding surface.

Confidence Band. In regression analysis, the width of the confidence interval for a given confidence level changes in size over the range of the predictor variable. The region defined within the confidence levels is referred to as a confidence band. The confidence band is narrowest at the mean predictor value, and expands as you move away from the mean.

Confidence Interval. A statistical measure reflecting an interval between two numbers with an associated probability value. Statistical analyses generally produce numerical values which predict or explain something about a statistical population, such as the predicted potential fish yield from a waterbody. However, due to the nature of statistics, these predictions always have some level of uncertainty about them. Confidence intervals show the amount of uncertainty. For example, we may be able to predict that a waterbody may have a predicted potential yield of 1 000 tonnes per year, but this value does not tell us anything about the variation or uncertainty about that prediction. A confidence interval might say that we are 95 percent certain that the true potential yield is between 800 and 1 200 tonnes per year, which gives us much more information about the true potential yield of that waterbody, and will let us plan management strategies accordingly.

Confidence Level. The probability value associated with a confidence interval. A confidence interval with a confidence level of 0.90 should be interpreted to mean that, if an infinite number of samples were drawn from a particular population, and 90 percent confidence intervals were calculated for each sample, then the true population statistic would lie within the confidence interval 90 percent of the time.

Cross Table. A table in the AWRD archive which contains attribute values that correspond with codes in other AWRD datasets. For example, the AWRD Surface Waterbody dataset "africvr.shp" contains LCID codes for each waterbody, and the "Cross Table of Unique AfriCover Attributes" table contains descriptions for those LCID codes.

Database. One or more structured sets of persistent data, managed and stored as a unit and generally associated with software to update and query the data. A simple database might be a single file with many records, each of which references the same set of fields. A GIS database includes data about the spatial locations and shapes of geographic features recorded as points, lines, areas, pixels, grid cells, or TINs, as well as their attributes.

dBASE. A simple database format which is used by ArcView 3.x. Shapefiles use dBASE tables to store attributes.

Decimal Degrees. A method of defining locations on the surface of the earth using degrees, which are angular measurements where the vertex of the angle is located at the center of the earth. Locations are defined by Latitude on the Y-coordinate (ranging from -90° at the south pole to 90° at the north pole), and Longitude on the X-coordinate (ranging from -180° to 180°, where 0° is located at Greenwich, England). See also DMS (Degrees Minutes Seconds).

DEM (Digital Elevation Model). Represents a topographic surface using a continuous array of elevation values, referenced to a common datum. DEMs are used typically to represent terrain relief.

DCW (Digital Chart of the World). Worldwide dataset produced from data by the U.S. Defense Mapping Agency along with data from Australia, Canada and the United Kingdom.

Dialog. The customized applications described in the present publication.

DMS (Degrees Minutes Seconds). A method of defining locations on the earth using degrees (see Decimal Degrees). In this case, latitude and longitude values are each expressed using 3 numbers; Degrees, Minutes and Seconds. Degrees are integer values and represent 1/360 of the length of the ellipse defined by the line of latitude or longitude. Minutes are integer values equal to 1/60 of a degree, and seconds are decimal values equal to 1/3 600 of a degree.

Drainage basin. See watersheds.

Ellipsoid. The Earth surface is approximately described by an ellipsoid, a closed surface all planar sections of which are ellipses. In general, an ellipsoid has three independent axes, and is usually specified by the length of the three semi-axes. If the lengths of two axes are the same, the ellipsoid is called "ellipsoid of revolution" or spheroid. Due to the rotation around its axis, the Earth has the shape of a spheroid. Several spheroids are used to model the Earth surface and project it onto a two-dimensional map; the choice of the reference spheroid depends on the region of the Earth to be represented and the required precision. The spheroids quoted in this work are Clarke 1866, WGS72 and WGS84. Clarke 1866 is used to map the North America and the Philippines. The World Geodetic System (WGS) spheroids have been developed to be used for global mapping; the number indicates the year of calculation. WGS84 is the most recent version, and is also used by the Global Positioning System.

ENVISAT (Environment Satellite). ENVISAT satellite is an Earth-observing satellite built by the European Space Agency. It was launched on March 1, 2002 aboard an Ariane 5 into a Sun synchronous polar orbit at a height of 790 km (+/– 10 km). It orbits the Earth in about 101 minutes with a repeat cycle of 35 days.

ESRI (Environmental Systems Research Institute). The largest GIS software company, and the maker of ArcView 3.x, ArcINFO and ArcGIS.

Extension. In ArcView 3.x, an extension is a separate add-on tool that can be loaded into your ArcView project. Extension are composed of scripts, dialogs, menus, buttons and/or tools, and generally provide additional functionality to the standard ArcView tools. The AWRD is an example of an ArcView extension.

Feature Attribute Table. See Attribute Table.

FishBase. An extensive online database of over 28 500 worldwide species of fish, intended for researchers, fisheries managers, zoologists and anyone who is interested in fish. This database may be viewed at http://www.fishbase.org/home.htm.

Fuzzy classification. Any method for classifying data that allows attributes to apply to objects by membership values, so that an object may be considered a partial member of a class. Class membership is usually defined on a continuous scale from zero to one, where zero is nonmembership and one is full membership. Fuzzy classification may also be applied to geographic objects themselves, so that an object's boundary is treated as a gradated area rather than an exact line. In GIS, fuzzy classification has been used in the analysis of soil, vegetation, and other phenomena that tend to change gradually in their physical composition and for which attributes are often partly qualitative in nature.

Gazetteer. A list of geographic place names and their coordinates. Entries may include other information as well, such as area, population, or cultural statistics. Atlases often include gazetteers, which are used as indexes to their maps. Well-known digital gazetteers include the U.S. Geological Survey Geographic Names Information System (GNIS) and the Alexandria Digital Library Gazetteer.

Geocoding. Procedures applied to a satellite image to generate a new image with the projection and scale properties of a map. In particular, map coordinates are associated to the center point of each element (pixel) of the resulting image.

Geodatabase. A collection of geographic datasets for use by ArcGIS. There are various types of geographic datasets, including feature classes, attribute tables, raster datasets, network datasets, topologies, and many others.

GIS (Geographic Information Systems). A computer system for capturing, storing, checking, integrating, manipulating, analysing and displaying data related to positions on the Earth's surface. Typically, a Geographical Information System (or Spatial Information System) is used for handling maps of one kind or another. These might be represented as several different layers where each layer holds data about a particular kind of feature. Each feature is linked to a position on the graphical image of a map. In aquaculture, it has been used to assess the suitability of geographical sectors, and also to investigate the suitability of a species to an area.

Geostatistics. A class of statistics used to analyze and predict the values associated with spatial or spatio-temporal phenomena. Geostatistics provides a means of exploring spatial data and generating continuous surfaces from selected sampled data points.

GeoTIFF. See TIFF.

GIF (Graphics Interchange Format). A type of image file usually used for charts or graphs. It uses a lossless compression format which works well with images with few colors, but poorly with photographs (see JPEG, JPEG2000, MrSID, PNG and TIFF for image formats usually used with high-color photographs). GIF files generally have the extension .gif.

GPS (Global Positioning System). A constellation of twenty-four satellites, developed by the U.S. Department of Defense, that orbits the Earth at an altitude of 20 200 km. These satellites transmit signals that allow a GPS receiver anywhere on Earth to calculate its own location. The Global Positioning System is used in navigation, mapping, surveying, and other applications where precise positioning is necessary.

GTOPO30 (Global 30 Arc Second Elevation Data). A global digital elevation model (DEM) with a horizontal grid spacing of 30 arc seconds (approximately 1 kilometer). GTOPO30 was derived from several raster and vector sources of topographic information. GTOPO30, completed in late 1996, was developed over a three year period through a collaborative effort led by staff at the U.S. Geological Survey's Center for Earth Resources Observation and Science (EROS).

Grid. In cartography, any network of parallel and perpendicular lines superimposed on a map and used for reference. These grids are usually referred to by the map projection or coordinate system they represent, such as universal transverse Mercator grid. Grid also refers to a specific type of ESRI dataset, defined as a raster layer in which data values are arrayed across the landscape in square grid cells (analogous to pixels in a raster image).

HYDRO1k (Global Hydrological 1 kilometre database). Geographic database developed to provide comprehensive and consistent global coverage of topographically derived data sets, including streams, drainage basins and ancillary layers derived from the USGS' 30 arc-second digital elevation model of the world (GTOPO30). HYDRO1k provides a suite of geo-referenced data sets, both raster and vector, which will be of value for all users who need to organize, evaluate, or process hydrologic information on a continental scale. Developed at the U.S. Geological Survey's Center for Earth Resources Observation and Science (EROS), the HYDRO1k project's goal is to provide to users, on a continent by continent basis, hydrologically correct DEMs along with ancillary data sets for use in continental and regional scale modeling and analyses.

Image. A representation or description of a scene, typically produced by an optical or electronic device, such as a camera or a scanning radiometer. Common examples include remotely sensed data (for example, satellite data), scanned data, and photographs.

JPEG (Joint Photographic Experts Group). A type of image file best suited for full color images such as photographs. It is a highly compressed format, which makes it useful for data storage and transmission, but it is uses a "lossy" compression method (meaning that some data is lost when it is compressed), which limits its use for GIS purposes. JPEG image files typically have the extension .jpg or .jpeg.

JPEG2000 (Joint Photographic Experts Group). An updated version of JPEG which offers more efficient compression of images and can use both lossless and lossy compression algorithms. The lossless compression method makes JPEG2000 images very useful in GIS applications. This is a new format, however, and therefore ArcView 3.x requires an add-on extension to view them. This add-on extension is automatically loaded by the AWRD. JPEG2000 image files typically have the extension .jp2 or .j2c.

KML (Keyhole Markup Language). Grammar and file format for modeling and storing geographic features such as points, lines, images, polygons, and models for display in Google Earth. A KML file is processed by Google Earth in a similar way that HTML and XML files are processed by web browsers. Like HTML, KML has a tag-based structure with names and attributes used for specific display purposes. Thus, Google Earth acts as a browser of KML files.

Landsat. The U.S. Landsat satellites are the first series of Earth Observation satellites providing global, repeated coverage of the Earth surface. The sensors onboard these satellites operate in the visible up to middle infrared wavelengths, and in the thermal infrared. The first satellite of the mission, ERTS-1 (later renamed Landsat-1) was launched in 1972. The current Landsat-7 mission hosts the Enhanced Thematic Mapper sensor; of its nine channels, seven acquire data in the visible up to middle infrared, at 30 m resolution. More information on the Landsat-7 mission can be found in the USGS Web pages (http://landsat7.usgs.gov/index.php) and in the NASA Web pages (http://landsat.gsfc.nasa.gov/).

Layout. In ArcView 3.x, one of the five types of documents that can be contained within a project file. The layout is where users create maps for export or printing, and usually include legends, titles and north arrows.

Legend. A theme legend shows the symbols that ArcView uses to display the theme in the view. These symbols are generally coloured boxes, lines or dots, and they are occasionally graduated by size or colour. Legends are shown in the view Table of Contents and often included on printed maps.

Line. On a map, a shape defined by a connected series of unique x,y coordinate pairs. A line may be straight or curved.

Maps. Graphic representation of the physical features (natural, artificial, or both) of a part or the whole of the Earth's surface, by means of signs and symbols or photographic imagery, at an established scale, on a specified projection, and with the means of orientation indicated.

Megabasin. The largest delineation of watershed, representing the entire landscape that contributes water to the final outlet (i.e. either the ocean or an internal basin). Landscape features that separate megabasins are sometimes referred to as continental divides.

MERIS (Medium Resolution Imaging Spectrometer). MERIS is a programmable, medium-spectral resolution, imaging spectrometer operating in the solar reflective spectral range. Fifteen spectral bands can be selected by ground command, each of which has a programmable width and a programmable location in the 390 nm to 1 040 nm spectral range. The instrument scans the Earth's surface by the so called "push-broom" method. Linear CCD arrays provide spatial sampling in the across-track direction, while the satellite's motion provides scanning in the along-track direction. MERIS is designed so that it can acquire data over the Earth whenever illumination conditions are suitable. The instrument's 68.5° field of view around nadir covers a swath width of 1 150 km. This wide field of view is shared between five identical optical modules arranged in a fan shape configuration.

Metadata. Information that describes the content, quality, condition, origin, and other characteristics of data or other pieces of information. Metadata for spatial data may describe and document its subject matter; how, when, where, and by whom the data was collected; availability and distribution information; its projection, scale, resolution, and accuracy; and its reliability with regard to some standard. Metadata consists of properties and documentation. Properties are derived from the data source (for example, the coordinate system and projection of the data), while documentation is entered by a person (for example, keywords used to describe the data).

MODIS (Moderate Resolution Imaging Spectroradiometer). is a key instrument aboard the Terra (EOS AM) and Aqua (EOS PM) satellites. Terra's orbit around the Earth is timed so that it passes from north to south across the equator in the morning, while Aqua passes south to north over the equator in the afternoon. Terra MODIS and Aqua MODIS are viewing the entire Earth's surface every 1 to 2 days, acquiring data in 36 spectral bands, or groups of wavelengths. These data will improve our understanding of global dynamics and processes occurring on the land, in the oceans, and in the lower atmosphere. MODIS is playing a vital role in the development of validated, global, interactive Earth system models able to predict global change accurately enough to assist policy makers in making sound decisions concerning the protection of our environment.

MrSID (Multiresolution Seamless Image Database). An image format very similar to JPEG2000, in which full color photographic images can be compressed using a lossless compression format and then displayed in a GIS. One image dataset in the AWRD archive is provided in MrSID format. MrSID image files generally have the extension .sid.

Multipoint. A geometric element defined by a set of points. The entire set is treated as a single object, and there are generally several multipoint objects in a single multipoint shapefile.

ODB (Object Database). A special type of file used by ArcView 3.x, storing Avenue "objects" in a text file on the hard drive. In regards to the AWRD Load Theme Database tool, the "objects" stored are theme references, graphics, legends and scales at which themes are viewable. Loading the ODB causes all these objects to be loaded simultaneously.

ONC. NOAA's 1:1 000 000 Operational Navigation Charts, these charts are the cartographic baseline for both the original DCW and any subsequent updates of the VMAP0 spatial data libraries

OrthoTM. Ortho-rectified or flattened imagery based on the Universal Transverse Mercator (UTM) projection system using the WGS84 standard datum and spheroid, Thematic Mapper LandSat satellite sensor

Pixels. (Picture elements). Cells of an image matrix. The ground surface corresponding to the pixel is determined by the instantaneous field of view (IFOV) of the sensor system, e.g. the solid angle extending from a detector to the area on the ground it measures at any instant. The digital values of the pixels are the measures of the radiant flux of electromagnetic energy emitted or reflected by the imaged Earth surface in each sensor channel.

Pixmap. An internal ArcView object that defines what is shown on the monitor screen. The AWRD Image Export and Base Mapping tools use the Pixmap object to export high-quality image files of maps and layouts.

Point. A geometric element defined by a pair of x,y coordinates.

Polygon. In a GIS framework, a polygon is a closed line (or a closed set of lines) representing a surface. The surface is generally homogeneous with respect to some criteria; for example, land use or type, administrative units, etc. Map coordinates (easting, northing and height) are associated to the vertices of the polygon.

Polyline. In a GIS framework, a polyline is a set of straight line segments (connected or not) representing a linear geographic feature, such as a road or a railway. The polyline may also connect points homogeneous with respect to some criteria, such as a contour line. Map coordinates (easting, northing and height) are associated to the vertices of the segments.

PNG (Portable Network Graphics). A type of image format using a high-efficiency lossless compression algorithm. PNG files can be much larger than JPEG files, but have the advantage of not losing any data in the compression. PNG files generally have the extension .png.

Projection. A method by which the curved surface of the earth is portrayed on a flat surface. This generally requires a systematic mathematical transformation of the earth's graticule of lines of longitude and latitude onto a plane. Some projections can be visualized as a transparent globe with a light bulb at its center (though not all projections emanate from the globe's center) casting lines of latitude and longitude onto a sheet of paper. Generally, the paper is either flat and placed tangent to the globe (a planar or azimuthal projection) or formed into a cone or cylinder and placed over the globe (cylindrical and conical projections). Every map projection distorts distance, area, shape, direction, or some combination thereof.

R^2 (or R-Squared). A statistical measured referred to as the "coefficient of determination", and which reflects the proportion of variability in one variable that can be explained by the corresponding variability in another variable.

RADARSAT. Canada's series of remote sensing satellites. RADARSAT-1 was launched on November, 1995; RADARSAT-2 will be presumably launched on 2005. RADARSAT-1 hosts a Synthetic Aperture Radar (SAR), an active sensor operating in the microwave portion of the electromagnetic spectrum at C-band in HH polarization. The SAR operates in seven different acquisition modes, with spatial resolution ranging from 6.25 to 100 m. RADARSAT-2 will carry an enhanced version of the same sensor. More details on RADARSAT-1 and -2 are available in the Canadian Space Agency Web pages (http://www.space.gc.ca/asc/eng/csa_sectors/earth/radarsat1/radarsat1.asp and .../radarsat2/radarsat2.asp).

Raster. A spatial data model that defines space as an array of equally sized cells arranged in rows and columns, and comprised of single or multiple bands. Each cell contains an attribute value and location coordinates. Unlike a vector structure, which stores coordinates explicitly, raster coordinates are contained in the ordering of the matrix. Groups of cells that share the same value represent the same type of geographic feature.

Regression. See Simple Linear Regression (SLR).

Remote Sensing. The gathering and analysis of data from the study area or organism that is physically removed from the sensing equipment, e.g. sub-water surface detection instruments, aircraft or satellite.

Residual. In regression analysis, the difference between the observed response value and the predicted response value from the regression equation.

Resolution. The area of the ground surface corresponding to a pixel in a satellite image.

Revised/Relational World Databank II. A collection of vector representations of land outlines, rivers and political boundaries, originally compiled by the U.S. Government in the 1980's and regularly updated.

River basin. Total land area drained by a river and its tributaries.

River Order. See Stream Order.

RWDBSII. See Revised/Relational World Databank II.

RWDBS2. See Revised/Relational World Databank II.

SAR (Synthetic Aperture Radar). An imaging radar is an active instrument that transmits microwave pulses toward the Earth surface and measures the magnitude of the signal scattered back towards it. The return signals from different portions of the ground surface are combined to form an image. A Synthetic Aperture Radar (SAR) is a special type of imaging radar. It is a complex system that measures both the amplitude and phase of the return signals; their analysis exploits the Doppler effect created by the motion of the spacecraft with respect to the imaged surface to achieve high ground resolution. As the source of the electromagnetic radiation used to sense the Earth surface is the system itself, it can be operated during day and night. The atmospheric transmittance in the microwave interval used by remote sensing SAR systems (2 to 30 GHz) is higher than 90 percent, also in presence of ice and rain droplets (except under heavy tropical thunderstorms); thus, SAR can acquire data in all weather conditions.

Scale. The ratio between a distance or area on a map and the corresponding distance or area on the ground.

Scatterplot. A statistical plot illustrating the relationship between two variables as measured on a set of sampling points. In regression analysis, each sample is plotted on the scatterplot such that the X-value is equal to the value of the Predictor variable and the Y-value is equal to the value of the Response variable. Regression scatterplots often include a regression line illustrating the best-fitting line that goes through the data.

Script. In ArcView 3.x, one of the five types of documents that can be contained within a project file. An ArcView 3.x script contains Avenue code, which can be used to automate tasks, add new capabilities, and build complete applications.

Selection. ArcView 3.x and the AWRD both offer extensive analytical functions which can be applied to your spatial data. By selecting certain features before the analysis, you can restrict the analysis to only the data you are interested in. Often determining the correct feature selection set is one of the more complicated parts of the analysis, and the AWRD offers extensive tools to select by query or by selecting on the screen, as well as modifying the current selection set by adding, subtracting or subsetting from it.

Shapefile. A vector file format for storing the location, shape, and attributes of geographic features.

SIFRA (Source Book for the Inland Fishery Resources of Africa). A compendium of information on the physical characteristics, limnology and fisheries in Africa, organized by Country. SIFRA was originally compiled in 1990 by Vanden Bossche and Bernacsek, and published by FAO as CIFA Technical Paper No. 18.1. It can be viewed online at http://www.fao.org/docrep/005/T0473E/T0473E00.htm.

Simple Linear Regression (SLR). A statistical technique to estimate the relationship between a predictor variable and a response variable. The relationship is defined using the equation of a line, $Y = a + bX$, where a is the Y-intercept and b is the slope of the line. Using this relationship, you may estimate what the response variable would be given any particular value of the predictor variable. The accuracy of any predictions depends on the strength of the linear relationship, and predictions should generally include confidence intervals.

Spatial Resolution. The area of the ground surface corresponding to a pixel in a satellite image.

SRTM (Shuttle Radar Topography Mission). is a joint project between the National Geospatial-Intelligence Agency (NGA) and the National Aeronautics and Space Administration (NASA). The objective of this project is to produce digital topographic data for 80 percent of the Earth's land surface (all land areas between 60° north and 56° south latitude), with data points located every 1-arc second (approximately 30 meters) on a latitude/longitude grid. The absolute vertical accuracy of the elevation data will be 16 meters (at 90 percent confidence). The SRTM obtained elevation data on a near-global scale to generate the most complete high-resolution digital topographic database of Earth. SRTM consisted of a specially modified radar system that flew onboard the Space Shuttle Endeavour during an 11-day mission in February of 2000.

SPOT (Système Pour l'Observation de la Terre). French Earth Observation satellites operating in the optical wavelengths. The first satellite, SPOT-1 was launched in 1986; the most recent satellite, SPOT-5, was launched in 2000. Among its instruments, the HRG acquires data in five channels useful to study land cover: a panchromatic channel (spatial resolution 2.5 or 5 m), three channels in the visible and near infrared wavelengths (spatial resolution 10 m) and one channel in the short-wave infrared (spatial resolution 20 m). More information on the SPOT satellites can be found at the SPOT Image Web site (http://www.spotimage.com) and at the CNES Web site (http://www.cnes.fr).

Stream Order. A method of ranking stream segments according to their location in the hydrological network. Stream segments that form the starting points of the hydrological network are assigned a stream order value of 1. When two stream segments with the same stream order value converge, they form a new segment with an incrementally higher value (i.e. two level-1 segments converge to form a level-2 segment, and two converging level-2 segments form a level-3 segment.). If stream segments with different order values converge, then the resulting segment has the same value as the higher of the two converging segments.

UTM (Universal Transverse Mercator). A commonly used projected coordinate system that divides the globe into 60 zones, starting at -180° longitude. Each zone extends north-south from 84° North to 80° South, spans 6° of longitude, and has its own central meridian.

TOC (Table of Contents). In ArcView 3.x, this is the list of themes available in a View. The TOC is located on the left side of a view. Themes in the view may be set to visible or invisible by checking boxes in the TOC.

Theme. In ArcView 3.x, a theme is a spatial dataset that has been loaded into a view, and is displayed with a customizable legend. Themes are analogous to Layers in ArcInfo or ArcGIS, and may be created from any type of spatial data.

TIFF (Tagged Image File Format). An image format commonly used for high-color digital photographs. TIFF images with embedded spatial information are referred to as "GeoTIFF" files, and are useful in GIS systems because they can contain a large amount of data. TIFF files tend to be large, however, and therefore are poor for data storage or transmission. TIFF files generally have the extension .tif or .tiff.

Vector. A data structure used to represent geographic features. Features are represented by points, lines or polygons. A line is made up of connected points (vertices), and a polygon of connected lines. Map coordinates (easting, northing and height) are associated to each point (or vertex) in a vector feature. Attributes are also associated with each feature (as opposed to the raster data structure, which associates attributes with grid cells).

Vector Map. A vector-based data product in vector product format (VPF) at several scales divided into groups, referred to as levels. For example, VMap Level 1 includes vector maps at a scale of 1:250 000 and VMap Level 2 includes vector maps at a scale of 1:50 000.

View. In ArcView 3.x, one of the five types of documents that can be contained within a project file. An ArcView View contains the actual map and themes, and is where spatial analysis usually takes place.

View Frame. The object in an ArcView Layout which displays the image from a View. View frames generally have live links to their respective view, such that changes in the view automatically are reflected in the layout.

Watershed. The area which supplies water by surface and subsurface flow from rain to any given point in the drainage system, and are most often delineated for distinctive points such as populations centers, lakes or river intersections. Watersheds provide a useful way to divide the landscape up into smaller hydrologically-related regions, which can then be analyzed in terms of in-flow and out-flow of moisture, energy and other parameters, such as nutrients and pollutants. Watersheds are also defined as the total land surface from which an aquifer or river system receives its water, and the term is synonymous with drainage basins, river basins or catchments.

Watershed management. (river basin management) Planned used of watersheds (river basins) in accordance with predetermined objectives.

Watershed model. A special type of vector dataset, in which the landscape is divided into watershed polygons and each polygon has attributes that identify its place in the overall hydrological network.

World File. A file associated with an image, defining the spatial attributes of that image. An image with a world file can be loaded into a GIS along with all other forms of spatial data. World files typically define the projection, coordinate system, ellipsoid and datum of the image, the spatial coordinates of one of the corners of the image, and the real-world size of the image pixels. The AWRD includes tools to export maps into a variety of image formats, and to create world files for these maps.

XML (Extensible Markup Language). A type of document format in which objects can be stored in a text file.

Glossary compiled from the following sources:

Anonymous. 1998. AQUALEX. Multilingual glossary of aquaculture terms/ Glossaire multilingue relatif aux termes utilisés en aquaculture. CD-ROM, John Wiley & Sons Ltd. & Praxis Publ., UK.

Art, H.W. 1993. The dictionary of ecology and environmental science. 115 West 18th Street, New York, NY 10011: Henry Holt and Company, Inc.; 632 pp.

Association for Geographic Information (AGI) GIS Dictionary (http://www.geo.ed.ac.uk/agidict/welcome.html)

Barnabé, G. (ed.) 1990 Aquaculture. Chichester, UK, Ellis Horwood. Vol.1, 528p. Vol.2, 584 pp. Transl. by L.M. Laird.

Center for Spatially Integrated Social Science (CSISS): http://www.csiss.org/cookbook/glossary.php

Choudury, K. and Jansen, L.J.M. 1999. Terminology for integrated resources planning and management. Rome, FAO. 69 pp.

Chrisman, N. Glossary for Exploring GIS, by: http://www.wiley.com/college/chrisman/glossary.html

Earth Sciences Sector of Natural Resources Canada. Canada Center for Remote Sensing (CCRS). Glossary of remote sensing terms (http://ccrs.nrcan.gc.ca/glossary/index_e.php).

ESRI. 2001. *The ESRI Press dictionary of GIS terminology*. Environmental Systems Research Institute, Inc. Redlands, California, USA (available at: http://www.esri.com/library/glossary/a_d.html).

FAO 2006. Glossary of Aquaculture. http://www.fao.org/fi/glossary/aquaculture/

FAO Fisheries Department. 2003 World Fisheries and Aquaculture Atlas. CD-ROM. Rome, FAO. 2nd ed.

FAO/IPTRID/ICID/ODA. 2001. Irrigation guidelines, land and water digital media series No 12. FAO, handbook on pressurized irrigation techniques.

Helms, J. A. 1998. The dictionary of forestry. 5400 Grosvenor Lane, Bethesda, MD 20814- 2198: Society of American Foresters. 210 pp.

Hoehn, P., and Lynette, M. Dictionary of abbreviations and acronyms in geographic information systems, cartography and remote sensing. (available at http://www.lib.berkeley.edu/EART/abbrev.html).

Perry-Castañeda Library Map Collection. Glossary of Cartographic Terms online at http://www.lib.utexas.edu/maps/glossary.html. The University of Texas.

Voser, S.A. Glossary of glossaries (available at http://www.geocities.com/CapeCanaveral/1224/terms/terms_txt.html)

UNESCO/WMO. 1992. International glossary of hydrology, 2d edition

United Nations (1997): Glossary of Environment Statistics. Studies in Methods, Series F, No. 67.

Wenger, K.F. Forestry Handbook. 2 ed. New York: John Wiley & Sons; 1984. 1 335 pp.

Wikipedia On-line encyclopedia (available at http://en.wikipedia.org/wiki/Main_Page)

References

Aguilar-Manjarrez, J. & Nath, S.S. 1998. *A strategic reassessment of fish farming potential in Africa.* CIFA Technical Paper. No. 32. Rome, FAO. 170 pp. (also available at http://www.fao.org/docrep/w8522e/w8522e00.htm).

Burkardt, J. 2001. PROB - probability density functions. Sample Fortran code for calculating density functions. [Web Page]. (available at: http://www.psc.edu/~burkardt/src/prob/prob.htm).

Corsi, F., Dunn, I. & Felicioni, E. 1986. Etude sous-sectorielle: Le pêches et la pisciculture au Burundi. Rapport de la mission Novembre–Decembre 1985. Projet PNUD/FAO BDI/85/U71 Mars 1986.

Croarkin, C. & Tobias, P. (no date)**.** Engineering and statistics handbook [Web Page]. (available at: http://www.itl.nist.gov/div898/handbook/).

de Graaf, G., Marttin, F.J.B., Aguilar-Manjarrez, J. & Jenness, J. 2003. *Geographic Information Systems in fisheries management and planning. Technical manual.* FAO Fisheries Technical Paper No. 449. Rome, FAO. 162 pp.

Draper, N.R. & Smith, H. 1998. Applied Regression Analysis. 3rd ed. New York, John Wiley & Sons, Inc. 706 pp. (Wiley Series in Probability and Statistics).

FAO. 1995. Code of conduct of responsible fisheries. Rome, FAO. (available at http://www.fao.org/DOCREP/005/v9878e/v9878e00.htm#PRE).

Halls, A.S. 1999. Spatial models for the evaluation and management of inland fisheries, final report. 47 Prince's Gate, South Kensington, London SW7 2QA: MRAG Ltd.; FIR 1998 Plansys 23220 01 20. 90 pp.

ICES. 2004. ICES Code of Practice on the Introductions and Transfers of Marine Organisms 2004. Copenhagen, Denmark. 29 pp. (available at: http://www.ices.dk/reports/general/2004/ICESCOP2004.pdf).

Meaden, G.J. & Kapetsky, J.M. 1991. *Geographical information systems and remote sensing in inland fisheries and aquaculture.* FAO Fisheries Technical Paper. No. 318. Rome, FAO. 262 pp.

McLaughlin, M.P. 2001. Regress+, appendix A. A compendium of common probability distributions (version 2.3) [Web Page]. (available at: http://www.causaScientia.org/math_stat/Dists/Compendium.pdf).

Mikkola, H. & Lindquist, O.V. 1989. Report on a Project Mobilization Mission. Preparatory Phase: Lake Tanganyika Regional Fisheries Research Project, GCP/RAF/229/FIN, Rome, FAO.

MRAG Ltd. 1997. Technical Database Specification Document for the FAO Lakes and River Fisheries Database. Available in AWRD Docs folder.

Neter, J., Wasserman, W. & Kutner, M.H. 1990. Applied linear statistical models: regression, analysis of variance and experimental designs. 3rd ed. Burr Ridge, Illinois: Irwin; 1 181 pp.

Neter , J., Wasserman , W., Nachtschiem, C.J. & Kutner , M.H. 1996. Applied linear statistical models: regression , analysis of variance and experimental design. 4th ed. Burr Ridge, Illinois, McGraw-Hill/Irwin. 1 408 pp.

Press, W.H., Teukolsky, S.A., Vetterling, W.T. & Flannery, B.P. 2002. Numerical recipies in C: the art of scientific computing. 2nd ed. Cambridge: Cambridge University Press; 994 pp.

Skelton, P.H. 1993. A complete guide to the freshwater fishes of Southern Africa. Voorvelt, Dave and Tarr, Elizabeth, Illustrators. Halfway House, South Africa: Southern Book Publishers; 390 pp.

Vanden Bossche, J.-P. & Bernacsek, G.M. 1990a. *Source book for the inland fishery resources of Africa*: 1. CIFA Technical Paper. No. 18.1. Rome, FAO. 240 pp. (also available at http://www.fao.org/docrep/005/T0473E/T0473E00.htm).

Vanden Bossche, J.-P. & Bernacsek, G.M. 1990b. *Source book for the inland fishery resources of Africa*: 2. CIFA Technical Paper. No. 18.2. Rome, FAO. 411 pp. (also available at http://www.fao.org/docrep/005/T0360E/T0360E00.htm).

Vanden Bossche, J.-P. & Bernacsek, G.M. 1991. *Source book for the inland fishery resources of Africa*: 3. CIFA Technical Paper, No. 18.3. Rome, FAO. 219 pp. (also available at http://www.fao.org/docrep/005/T0361E/T0361E00.htm).

RECOMMENDED FURTHER READING

(Relevant papers not cited in the main document)

Abramowitz, M. & Stegun, I.A. 1972. Handbook of mathematical functions with formulas, graphs and mathematical tables. NewYork, Dover Publications, Inc., 1 046 pp.

Golub, G.H. & Van Loan, C.F. 1996. Matrix computations. 3rd ed. Baltimore: The Johns Hopkins Univerisity Press; 694 pp. (Johns Hopkins Studies in the Mathematical Sciences).

Jeffrey, A. 2000. Handbook of mathematical formulas and integrals. 2nd ed. San Diego Academic Press. 433 pp.

Isaaks, E.H. & Srivastava, R.M. 1989. An introduction to applied geostatistics. Oxford University Press. 561 pp.

Ott, R.L. 1993. An introduction to statistical methods and data analysis. 4th ed. Belmont, California, Duxbury Press. 1 051 pp.

Rogerson, P.A. 2001. Statistical methods for geography. Sage Publications, Ltd. 236 pp.

Stewart, J. 1998. Calculus concepts and contexts. Pacific Grove: Brooks/Cole Publishing Company; 991 pp.

Zar, J.H. 1999. Biostatistical analysis, 4th Ed. Prentice-Hall, Inc. 929 pp.