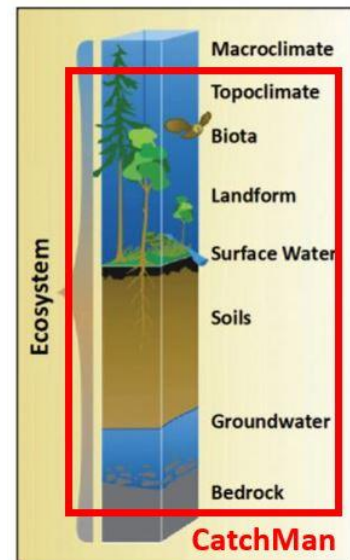


# CatchMan

## Applications Guide

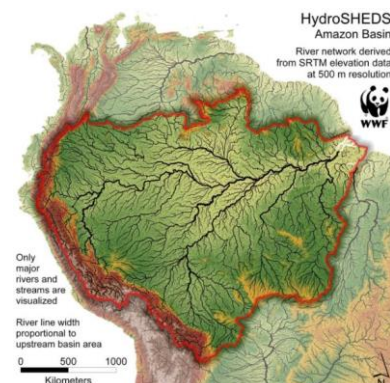
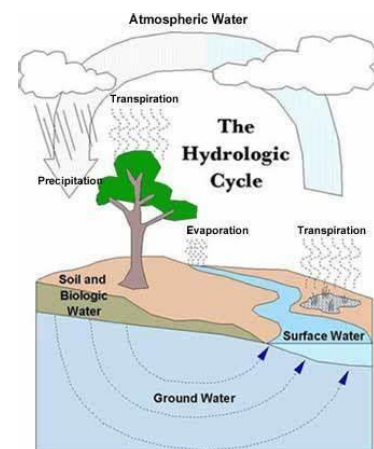
### Strategic Benefits

- Catchman and Stream Morphometry is more than a “database for rivers”.
- It supports a number of critical strategic initiatives such as:
  - Supports the objectives of **Catchment Management Authorities** worldwide.
  - Supports the processes which comprise the **hydrological cycle** (aka Water Cycle).
  - Supports two of the 4 sub-services which comprise ecosystem services, namely supporting services and regulating services. The four benefits obtained from the regulation of ecosystem services are all enhanced by use of Catchman.
    - Flood Prevention
    - Climate Regulation
    - Erosion Control
    - Control of pests and pathogens



### Alignment with International Standards

- Catchman is and will continue to be consistent with **Global Ecosystem Mapping** as defined by GEO (Group on Earth Observations). GEO is a partnership of more than 100 national governments and in excess of 100 Participating Organizations that envisions a future where **decisions and actions for the benefit of humankind** are informed by coordinated, comprehensive and sustained Earth observations. A recent ministerial declaration of “Full and open access to Earth observation data, information and knowledge is crucial for humanity as it faces unprecedented social, economic and environmental challenges.” is totally **consistent with the aims of Catchman**. We are currently refining our data mart design to **incorporate global ecological land units (ELUs)**. Ecological Land Units are created by classifying ecological and physiographic information about land surface features to form a **composite of geology, landform, and elevation zones**. ESRI and the USGS have developed the most comprehensive ELU repository in response to a GEO request. The four facets which drive the ELU 250 metre “cells” are **bioclimate, landform, lithology, and land cover**. Catchman metrics can be used to interpret each of these facets. The work is a classic example of a **physical geography approach to understanding ecological diversity**.
- Catchman has a global (and potentially interplanetary) scope which fully supports the aims of GEO and its supporting organisations such as WHO, NASA, USGS etc.
- Catchman catchment boundaries are supported by and consistent with the WWF HydroSHEDS Project. HydroSHEDS (**Hydrological data and maps based on SHuttle Elevation Derivatives at multiple Scales**) provides hydrographic information in a **consistent and comprehensive format** for regional and global-scale applications.
- **Catchman is GIS agnostic**. While our current development platform involves Pitney Bowes MapInfo , DataMine Discover , Safe Software FME and Microsoft SQL Server our Catchman product supports :-
  - GIS standards for metadata
  - GIS standards for GIS Services
  - OGC standards baseline
- ELU Raster to vector and ASCII conversion for **democratisation of data** and greater accessibility for practical utilisation using broadest IT infrastructure.
- This would enable any GIS platform including open source such as GRASS QGIS etc. to access ELU data .



## Morphometry Explained

- Quantitative study of a drainage basin.
- This provides a hydrological understanding of the drainage basin.
- Drainage Basin Analysis (DBA) is important in any hydrological study.
- Looking at underlying drivers to optimise catchment resource management.
- Basin scale systems analysis can be achieved by studying geology, relief and climate.
- Remote sensing and GIS analysis of satellite data is used to validate these same geology, relief and climate drivers of basin characteristics.

### Overview of Selected Catchman Applications.

CATHMAN METRIC GROUP	CATCHMAN METRICS	BENEFIT TO USER
Combined Dimensionless and Areal	Bifurcation Ratio v Drainage Density plot	Overall Flood Risk
Areal	Low drainage density favours coarse basin texture	Highly permeable sub-soil and thicker vegetative cover
Dimensionless	Relief Ratio, Ruggedness Number, Dissection Index	Erosion potential of catchment
Areal and Linear	Stream Frequency, Drainage Density	Run off potential
Dimensionless and Areal	High bifurcation ratio and long narrow catchment	Flood peaks are low and attenuated
Dimensionless and Areal	Lower bifurcation ratio and circular catchment	Higher and sharper flood peaks

## “KPI” analysis for River Catchments

- Just as KPIs in business management (Kaplan and Norton) help provide governance for enterprise strategic management., stream Morphology “KPIs” help provide **governance for strategic management of river catchments**.
- **Finrank’s innovative application of business performance management principles** to the study and **holistic management of catchment data** is a new approach.
- Just as alignment of business strategy with systems implementation is critical to delivery of business systems, we believe that a similar approach to natural hydrological systems will result in **efficient management of all resources** related to the management of river catchments using **Artificial Intelligence and Machine Learning on publicly available datasets**.
- The hydrological cycle requires proper understanding to deliver better catchment governance and Catchman facilitates and quantifies this in association to **Ecosystem Services provision**.

## Alignment of Catchman with Ecosystem Services

### Overview of Ecosystem Services and Catchman mapping.

ECOSYSTEM SERVICE	CATCHMAN ASSOCIATION	CATCHMAN METRIC GROUPS
<b>Provisioning Services</b>		
Food Fibre and Fuel	YES	Areal
Genetic resources	NO	
Nutrients	YES	Areal
Fresh water	YES	Areal Linear Dimensionless
<b>Cultural Services</b>		
Spiritual and religious values	NO	
Knowledge system, sense of place	YES	Areal
Education and inspiration	NO	
Recreation and aesthetic values	NO	
<b>Supporting services</b>		
Primary production	YES	Areal Linear Dimensionless
Provision of habitat	YES	Areal
Nutrient cycling	YES	Areal
Soil formation and retention	YES	Areal Linear Dimensionless
Production of oxygen	YES	Areal
Water cycling	YES	Areal Linear Dimensionless
<b>Regulating services</b>		
Invasion resistance	YES	Areal
Pollination	YES	Areal
Climate regulation	YES	Areal Linear Dimensionless
Disease regulation	YES	Areal
Natural hazard protection	YES	Areal Linear Dimensionless
Water purification	YES	Areal Linear Dimensionless
Herbivory	YES	Areal
Seed dispersal	YES	Areal
Pest regulation	YES	Areal
Erosion regulation	YES	Areal Linear Dimensionless