

Spatial Analysis of Anthropogenic River Disturbance at Regional and Continental Scales: Identifying the Wild Rivers of Australia

By Nicole Pribyl

- **Summary of Paper and Study**
- **Methods**
- **Application: Characterizing the Anthropogenic disturbance of Australian Streams**
- **Results**

Summary of Study

- A method to spatially analyze anthropogenic disturbance of streams at regional and continental scales. This method is used to assist in the identification of Australia's remaining "Wild" rivers
- Method based on a continuum concept with disturbance ranked on the continuum from near-pristine to highly degraded
- Geographic Information System (GIS)
Geographic User Interface (GUI)

Methods

- Based on the assumption that
 - a) the intensity and extent of human activities within the catchment and
 - b) In-stream structures that alter the flow regime, provide surrogate indicators of the extent of disturbance of natural river processes

Many factors combined to create index

- First set of factor scores are computed for four major sources of catchment disturbance with potential to significantly alter river processes
 - 1) Land use activities
 - 2) Settlement and structures
 - 3) Infrastructures
 - 4) Extractive sources of pollution

Factors Continued

- Second set of factor scores computed to reflect direct alterations to the flow regime from impoundments, flow diversions or discharges and levee banks

All factors combined in a composite River Disturbance Index (RDI)

- RDI- Gives overall rating. A value at or near zero is at the undisturbed end of the continuum, at or near one is at the severe disturbance end of continuum

Application

- Development of a database that records the nature and location of human activities, catchment and surface flow characteristics and a surrogate for run-off
- Discusses how this database is used to characterize the Anthropogenic disturbance pressure for Australian streams

Developed by combining information gathered by;

- Drainage Analysis
- The Digital Elevation Model
- Surface Flow Direction
- Catchment Delineation
- Distributing flow between diverging channels
- Sub-catchment pour-points

- Compiling the catchment and river disturbance layers
- Computing the River Disturbance Indices
- The distance Decay Function
- Settlement factor
- Infrastructure factor
- Point Sources(of Pollution) Factors
- Land use factors
- Impoundment Factors
- Flow Diversions/Alterations factor
- Levee Bank Factor
- Sub-Catchment and Section Indices

Results

- More than 1.5 Million stream sections were assessed
- A list of essentially undisturbed or potential wild rivers was identified from those streams with a RDI score of not more than 0.01
- Very few large rivers remain undisturbed
- 80% of the undisturbed stream length fell within the monsoonal tropical north or the arid/semi-arid center of the continent