DEVELOPING MEASURES OF SUCCESS FOR THE ETOWAH RIVER BASIN

Candace Stoughton and Mary Davis

AUTHORS: Etowah River Project Manager, The Nature Conservancy, Etowah River Office, 321 E. Main St., Canton, GA 30114 and Aquatic Ecologist, The Nature Conservancy, 1330 W. Peachtree, Ste. 410, Atlanta, GA 30309
REFERENCE: *Proceedings of the 2005 Georgia Water Resources Conference*, held April 25-27, 2005, at the University of Georgia, Athens, Georgia.

Abstract. The Nature Conservancy (TNC) works to protect the viability of ecological resources in conservation areas with high biological diversity. The Etowah River basin in north Georgia was chosen by TNC as a priority site based on the high aquatic biological diversity in the watershed. Sprawling suburban development from metro Atlanta is rapidly encroaching the watershed and results in major stresses to the aquatic life in the basin. Significant sources of stress in the Etowah include residential and commercial development, water supply development, and road and utility development. TNC develops a conservation area plan for each site where it works. The plan identifies targets that represent the biodiversity of the ecosystem, the stresses that negatively impact the targets, strategies to protect the targets, and measures of success to monitor the status of the targets and effectiveness of the threat abatement strategies. Measures of success are relatively new to the planning process, and the Etowah was chosen by TNC to be a case study to develop measures of success for head-water rivers of the Southeastern United States. Measures of success are being developed to determine status of resources and protection strategies in the Etowah River basin. The "resource" measures include physical/hydrological measures, biological measures, and landscape measures. Threshold levels are identified for each indicator including desired ecological condition and minimum viable condition. Protection measures are also being developed to determine the effectiveness of the strategies designed to protect the aquatic biodiversity in the Etowah River basin.

INTRODUCTION

Biodiversity of the Etowah

The rich aquatic biodiversity of the Etowah basin has drawn much attention to the basin. With 75 native species of fish it is estimated that the Etowah basin has more imperiled species (17 fish species and 16 invertebrate species) than any other river system of its size in the southeastern United States. Of particular concern in the Etowah River watershed are a number of fish and mussel species, including the Amber and Etowah darters (federally endangered), the Cherokee darter (federally threatened), and the federally endangered upland comb shell and the southern and ovate clubshell mussels.

The Nature Conservancy, as part of its conservation planning process, is developing measures of success for the Etowah River Basin. The goal is to develop a plan that will allow TNC to track: a) the status of the biodiversity and ecological resources in the basin that have been identified as focal conservation targets and b) the effectiveness of the identified conservation strategies at reducing the threats to those targets.

The Nature Conservancy Conservation Targets

Focal conservation targets reflect the ecoregional conservation goals, represent the biodiversity of the site and are highly threatened. Aquatic targets identified in the Etowah include:

1. Small stream fish assemblage (streams 2-15 meters wide)
2. Large stream fish assemblage (streams > 15 meters wide)
3. Mussels

Stresses

The Etowah watershed is experiencing rapid population growth due to its proximity to the Atlanta metropolitan area so most of the threats facing the watershed are related to growth pressures. Identified stresses to the biodiversity of the Etowah basin include 1)stormwater runoff, 2) primary home development, 3) development of roads and utilities, 4) water supply development, 5) industrial and municipal discharge, 6) commercial and industrial development, 7) faulty septic systems, and 8) agricultural practices.

Strategies

The conservation strategies that need to be implemented in order to protect the biodiversity of the Etowah basin include:

1. Develop and implement a marketing/outreach public awareness campaign.
2. Develop a sustainable development plan for the basin.
3. Develop regional greenspace plan goals for the Etowah basin.
4. Improve erosion and sedimentation control enforcement.
5. Pursue permanent protection in the high priority watersheds in the basin.
6. Promote the development of a regional water supply plan in the basin.
7. Research origin of nutrient contamination.

DEFINING INDICATORS

Scientists and experts familiar with the Etowah basin were gathered to identify two different types of indicators; those that could be used to assess ecosystem health, and those that could measure the effectiveness of strategies at reducing the threats to local biodiversity. The questions posed to the experts included:

1. What are the indicators necessary to measure to determine the ecological health of the basin?
2. What are the indicators necessary to measure to determine whether the threat abatement indicators are reducing the threats to the identified conservation targets?
3. Develop indicator ratings which define the ranges of variation of an indicator that define and distinguish Very Good, Good, Fair and Poor rating categories to provide a consistent and objective basis for assessing the status of each indicator.

Table 1. Resource Indicators

1. Physical/Hydrologic
- **a)** Extent of gravel patches (Lg stream)
- **b)** % Riffle (Sm stream)
- **c)** Riffle Fines
- **d)** *Podostemum* coverage (Lg streams)
- **e)** Hydrologic alteration
  1. ½ year flood
  2. Percent time exceedence
  3. Normalized channel stability index

2. Water Quality
- **a)** Base flow turbidity
- **b)** Water temperature
- **c)** Electrical conductivity
- **d)** Nutrients

3. Biological
- **a)** Index of Benthic Macroinvertebrate Integrity
- **b)** Index of Biotic Integrity
- **c)** Fish density
- **d)** Fish spp richness by stream size
- **e)** Utilized habitat

4. Landscape
- **a)** Land cover
- **b)** Road density

Table 2. Protection/Threat Abatement Indicators

5. Adoption indicators
- **a)** Adoption of model erosion &sedimentation SOPs
- **b)** Adoption of stormwater management/better site design guidelines
- **c)** Adoption of stream crossing SOPs
- **d)** Adoption of model stream buffer ordinance
- **e)** Adoption of model floodplain ordinance
- **f)** Adoption of greenspace goals

6. Implementation indicators
- **a)** Implementation of model erosion &sedimentation SOPs
- **b)** Implementation of stormwater management/better site design guidelines
- **c)** Implementation of stream crossing SOPs

7. Effectiveness indicators
- **a)** Stream cross section (effectiveness of stormwater management/better site design guidelines)
- **b)** Stream connectivity (effectiveness of stream crossing SOPs)
- **c)** Riparian Forest Cover (effectiveness of model buffer ordinance)
- **d)** Effectiveness of model floodplain ordinance
- **e)** Percent of land in greenspace goals under permanent protection
- **f)** Effectiveness of education/outreach campaign

The general consensus of the convened experts was that the identified indicators will be very useful as resource manager and the local governments follow trends in the ecosystem health of the basin. Additionally, as other Nature Conservancy watershed-based projects develop measures for their area, many will be able to use the indicators identified for the Etowah as a starting point

for their own efforts to track ecosystem health and strategy effectiveness.

While the majority of the scientific experts were uncomfortable defining numeric thresholds of Very Good, Good, Fair and Poor for many of the indicators identified for the Etowah basin, future monitoring efforts and additional data will allow us to follow the trends in ecosystem health and will eventually lead to the establishment of thresholds for each of the indicators.

Thresholds for the protection/threat abatement indicators will be much easier to establish.

DISCUSSION

The indicators identified for the Etowah River basin will be developed into a monitoring plan. As sampling efforts document trends in ecosystem health across the basin we will have the opportunity to work with our partners to refine conservation strategies within an adaptive management framework. The use of scientific information to help guide our strategy implementation will certainly improve our conservation efforts to protect the aquatic biodiversity of the Etowah basin.

ACKNOWLEDGEMENTS

We would like to thank the scientist and policy experts who helped us identify and refine our indictors for the Etowah including representative from the Etowah Habitat Conservation Plan, Georgia Conservancy, GA Department of Natural Resources, NARSAL, Tetra Tech, UGA Geography Department, UGA Institute of Ecology, UGA Warnell School of Forest Resources, US Fish and Wildlife Service, and the US Geological Survey. Many thanks as well to the Southeast Division of The Nature Conservancy for the funding to develop Measures of Success for the Etowah.