Studies to Support the Scientific Basis for Land-Use Planning and Watershed Management

Overall goal is to provide a stronger scientific basis for the development of NJ land-use planning and watershed management strategies that mitigate the effects of urban development on aquatic ecosystems.

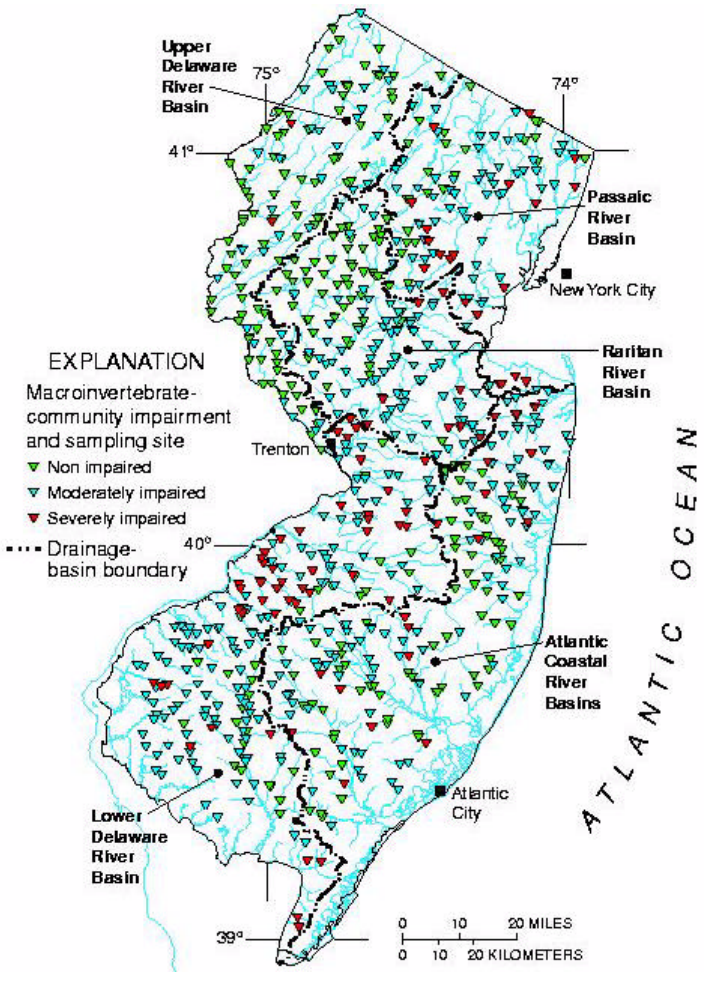
Cooperative study with the NJ Department of Environmental Protection (NJDEP)

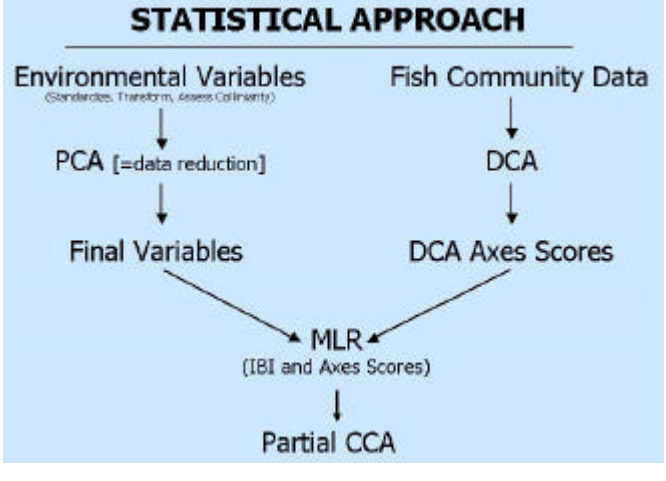
Title: Improving watershed indicators as a basis for developing realistic stream restoration goals

Problem: Over 500 of 800 AMNET biological monitoring sites have indicated impairment.

Goal: Assessment of the dominant environmental factors contributing to 'confirmed' impairment is needed to assist development of stream restoration goals statewide.

Approach: The significance of changes in hydrology require a modeling analysis of flow characteristics (TOPMODEL and impervious area) for the 800 sites. Then, a rigorous statistical evaluation (regression and multivariate) of major controlling factors contributing to impairment will be made at multiple levels of data stratification (land use, basin size, and physiography). This evaluation is needed to better link the spatial aspects of watershed sources with observed biological affects. Finally, an approach to translate these findings into viable management options will be developed and piloted.





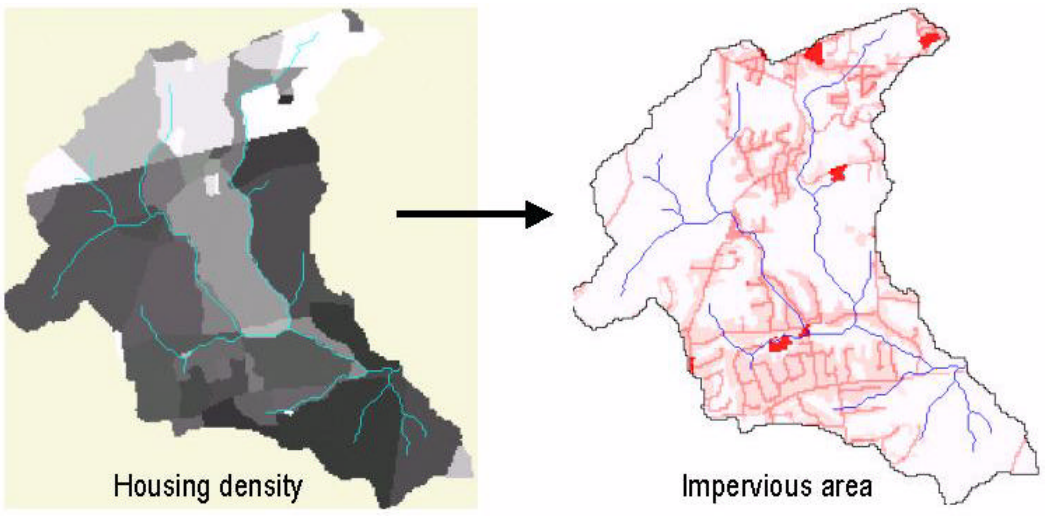
Cooperative study with the NJ Office of State Planning (OSP)

Title: Modeling changes in runoff and ecological characteristics of New Jersey watersheds in response to alternative land-use scenarios

Problem: OSP is looking to build a tool to help citizen planners to more effective use environmental information in their land-use planning process. The toolbox would provide (1) visualization of watershed concepts, environmental data and status, and information on how to prevent environmental impact, (2) point and click placement of future development by citizen planners using environmental information as a guide, and (3) a relative evaluation of potential effects of planned development with behind the scene linkages to scientific principles and findings. Hopefully, a stronger local buy-in to state regulations and increased development of effective local ordinances will result.

Goal: to integrate hydrologic and aquatic community research findings into OSP planning toolbox (decision support system).

Example environmental application: From a 2020 county or municipal plan, OSP model outputs of population and housing density can be used with current equations to predict impervious surface area. Stream flow changes (TOP-MODEL) and biological impacts (regression equations) can then be estimated from the location and amount of population and impervious area changes. The approach should be applicable to watershed areas greater than about 5 square miles in size and population growth greater than 5-10%. Feedback on relative impacts of different plans can be used to test local, region, or statewide policies. In later iterations, other water-quality aspects can be added.



Basis and approach: Integrate the results of the watershed indicators study above into the tool, assist in defining approaches for the presentation, visualization, and evaluation of the data generated in a manner that can be understood and applied by prospective users, and assist in defining those 'informational' maps that will help planners define, visualize, evaluate, and hopefully avoid or minimize the ecological, hydrologic, and other impacts of planned development.