

WATERSHED MANAGEMENT

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ABSTRACT

The Framework for Sustainable Watershed Management (Framework) was created to address a paradoxical issue many rural communities dependent on natural resources for economic stability face--how to develop sustainably. Using the Pocono Creek watershed as a “sustainability watershed laboratory,” the aim of the Framework is to create a mechanism that would allow for development while protecting water resources in the region using science based decision making.

Watersheds have superior water qualities that support trout due to the cold, abundant and well oxygenated water. These existing conditions qualify some tributaries in the Pocono Creek watershed for the highest level of water quality protection.

Watersheds face a range of degradation on challenges associated with human activities, such as pollution, deforestation and changes in sediment generation. The way they are managed has a profound cascading effect on natural resources and communities in the wider basin.

KEYWORD: Watershed, consortium, community, water, livelihood.

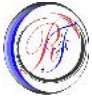
INTRODUCTION

The purpose of sustainable watershed planning is to protect the area’s water resources and habitat supported by those resources for future generations, while meeting present needs. Science, planning and educational outreach are the three pillars of a sustainable watershed management effort. Sustainable watershed planning utilizes science, which in turns influences the development of watershed management strategies. Implementing watershed strategies requires education and outreach within and beyond a specific watershed.

Local natural resource managers, watershed groups, and planners in Monroe County are actively seeking to find innovative approaches to protect the region’s water resources and are looking to apply the findings from this study throughout the area. This strong local interest was a major reason the Environmental Protection Agency Region 3 (EPA-R3) office selected the Pocono Creek watershed for funding by Collaborative Science and Technology Network for Sustainability, a grants program based on exploring innovative approaches to environmental protection that are systems-oriented, forward-looking, preventative, and collaborative.

The Framework for Sustainable Watershed Management (Framework) project arose out of the need for integrated long-term water resource management strategies for the Pocono Creek watershed. A systematic and transferable Framework for establishing sustainable watershed management programs in the Pocono Creek watershed was developed in response to the following concerns: diminishing streamflow’s, pollution from storm water runoff, streambank erosion, degradation of aquatic ecosystems, and the apparent disconnect between economic development and environmental protection.

The sustainable watershed management plan for this unique watershed goes beyond the traditional watershed planning approaches, and includes integration of water quality with water quantity. Technically, watershed planning must evolve from a superficial “top-of-land”



drainage basin model, to a dynamic system with the linkages between the subsurface aquifers and the landscape. Management strategies include not only selection of appropriate best management practices implemented at a local level, but also the integration of water resource decision making with local land use practices, economic development and infrastructure decisions. Ideally, funding mechanisms supporting these activities would be aligned.

History of Watershed Development Program in India : About 60 per cent of total arable land (142 million ha) in India is rain-fed, characterized by low productivity, low income, low employment with high incidence of poverty and a bulk of fragile and marginal land (Joshi et al. 2008).

Rainfall pattern in these areas are highly variable both in terms of total amount and its distribution, which lead to moisture stress during critical stages of crop production and makes agriculture production vulnerable to pre and post production risk. Watershed development projects in the country has been sponsored and implemented by Government of India from early 1970s onwards.

Managing watersheds and river basins : The IWRM approach works best when it manages to take the different scales of the river basin into account, embedding watershed management in river basin management. Experiences with watershed and river basin management show that both top-down and bottom-up management approaches are needed and that institutional arrangements must provide for linkages between the local and the national or regional levels.

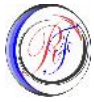
The importance of scale : The understanding and management of scales in watershed and river basin management is a challenge. When embedding watershed management into river basin management it is important to understand the differences in scale and the implications this has for management. There is a need to re-think scale of intervention, upstream-downstream linkages, temporal and spatial processes, biophysical and socio-economic linkages, and political issues.

The Framework's diverse partnership includes : Brodhead Watershed Association (BWA), Delaware River Basin Commission (DRBC), Environmental Protection Agency (EPA), Environmental Protection Agency's Office of Research and Development (EPA-ORD), Environmental Protection Agency Region 3 (EPA-R3), Monroe County Conservation District (MCCD), Monroe County Planning Commission (MCPC), Pennsylvania Department of Environmental Protection (PADEP), Pennsylvania Fish and Boat Commission (PF&BC), Pocono Arts Council (PAC), United States Geological Survey Pennsylvania Water Science Center (USGS-WSC) and, United States Geological Survey's Science Center in Fort Collins (USGS-Fort).

Capacity Building : Watershed development requires multiple interventions that jointly enhance the resource base and livelihoods of the rural people. This requires capacity building of all the stakeholders from farmer to policy makers. Capacity building is a process to strengthen the abilities of people to make effective use of resources in order to achieve their own goals on a sustained basis. Unawareness and ignorance of the stakeholders about the objectives, approaches, and activities are the reasons that affect the performance of the watersheds.

Development of Sustainable Watershed Management Strategies : The project planners have developed innovative approaches for watershed-based best management practices (BMPs) for on-the-ground projects, performed a review of the existing laws and regulations affecting water resource management, and established a long-term regional oversight group for water and natural resource protection that will integrate water resource concerns into land use and development decisions.

Watershed Management Areas : The management strategies address the “disconnect” between watershed planning and local land use decision making processes. In Pennsylvania, watershed planning must contend with the authority of “home rule,” where the state



constitution provides local municipalities full land use powers. Since watersheds are delineated by the geologic and geographic features of the terrain, a watershed often overlaps numerous municipalities. In response to this situation, Watershed Management Areas (WMAs) are established based on sub-watersheds that share similar natural, geographical and physiological characteristics as well as demographic and social conditions.

Education : When pursuing a fully integrated watershed management program, it is necessary to establish broad-based support throughout the community. The Brodhead Watershed Association (BWA) initiated an innovative watershed outreach program to inform the public about the relevance of watershed management, ecological flows and land use to their environment, economy and community. In order to convey a simple message about the complex topic of sustainable watershed management, the “Develop Right, Save a Trout” campaign was developed. Laying the groundwork for future strategic marketing campaigns, the BWA, Monroe County Conservation District (MCCD), Monroe County Planning Commission (MCPC), and the Monroe County Commissioners partnered with the Pocono Arts Council (PAC) and launched, “Trout Trails and Tales” a watershed based community art project.

The Framework : The Framework for Sustainable Watershed Management is a transferable methodology for using science based decision making for watershed management. As a planning model the Framework can be adapted to local situations using the fundamental assumptions of integrated watershed management, overall technological processes, planning elements and multi-sector watershed community outreach. Such methods applied in a well-coordinated watershed management effort can be used to protect water resources while managing growth.

Planning Products

Watershed Management Areas: This approach addresses the challenge of simultaneously engaging numerous municipal representatives within a watershed to collaborate on implementing watershed management strategies.

Watershed Communities: This includes a watershed-wide identity among municipalities and residents where a shared understanding of sustainable watersheds promotes partnerships through geographically linked issues.

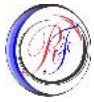
Issues and Management Strategies: These tools for multiple municipalities within geographic proximity are used to identify hydrologic issues within their WMA and collaborate on selecting and implementing appropriate watershed management strategies for their shared area in a watershed.

Regulatory Framework Analysis: Seeking consistency in water resource management is a challenge with the labyrinth of laws that address water uses. The analysis introduces the current juxtaposition of laws, policies, regulations, and rules of the different legislative sectors concurrently impacting water

Model Watershed Transfer of Development Rights: Through the Sustainable Watershed Stormwater Agency Model, watershed hydrologic integrity can be achieved more effectively by transferring development rights within a watershed so that urbanized areas can build at compact densities.

Water Data Analysis

The Act 220 and WUDS datasets provide the most complete database of water users for the study area. The databases provide numerous fields (attributes) of interest to this study, such as name, location, water source, category of water use, and monthly and annual total water withdrawals. The user inventory that was developed from the Act 220 and WUDS databases. Water demand was analyzed to explicitly consider the following components: • Annual Use • Monthly Use • Withdrawal Amount • Consumptive Amount • Groundwater Use • Surface Water Use



Pilot Study Watershed Goals

- Maintain water quality
- Preserve stream corridors and floodplains
- Maintain existing streamflow
- Coordinate watershed planning with all levels of government
- Establish an environmentally compatible economy
- Preserve open space
- Develop using village centers and conservation design

CONCLUSION

The potential for water conservation in the watershed can only be evaluated with additional information, such as a profile of the age of the housing stock and more detailed knowledge of the industrial and commercial activities that take place within the watershed. Plumbing fixtures and fittings in new construction must conform to federal, state and DRBC water conservation standards. These standards have been shown to reduce per capita water use, where the style of new construction is similar to old construction.

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