

Integrated Watershed Management Research for Developing Countries

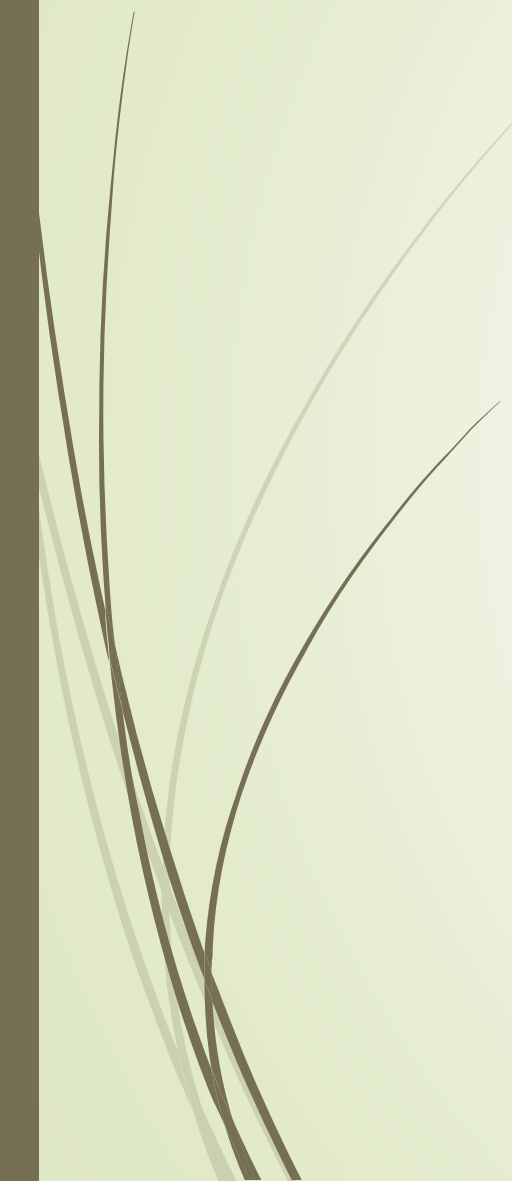


Serhat Nuri YAY

17110208



RESEARCH AND INFORMATION NEEDS

- ▶ Watershed management problems and associated research and information needs are grouped under two broad headings—planning and implementation—taken from the conceptual framework. Although some items overlap in each of these categories, the classification highlights the importance of problems encountered at the planning and implementation stages. Finally, several broad development and food policy issues related to watershed management are listed under a third category, policy research issues.
 - ▶ In the summary, a different classification is used. Issues are grouped to emphasize important common elements of research problems identified in both planning and implementation. This provides the reader with an alternative way to organize the research issues and brings out different complementaries.
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Planning

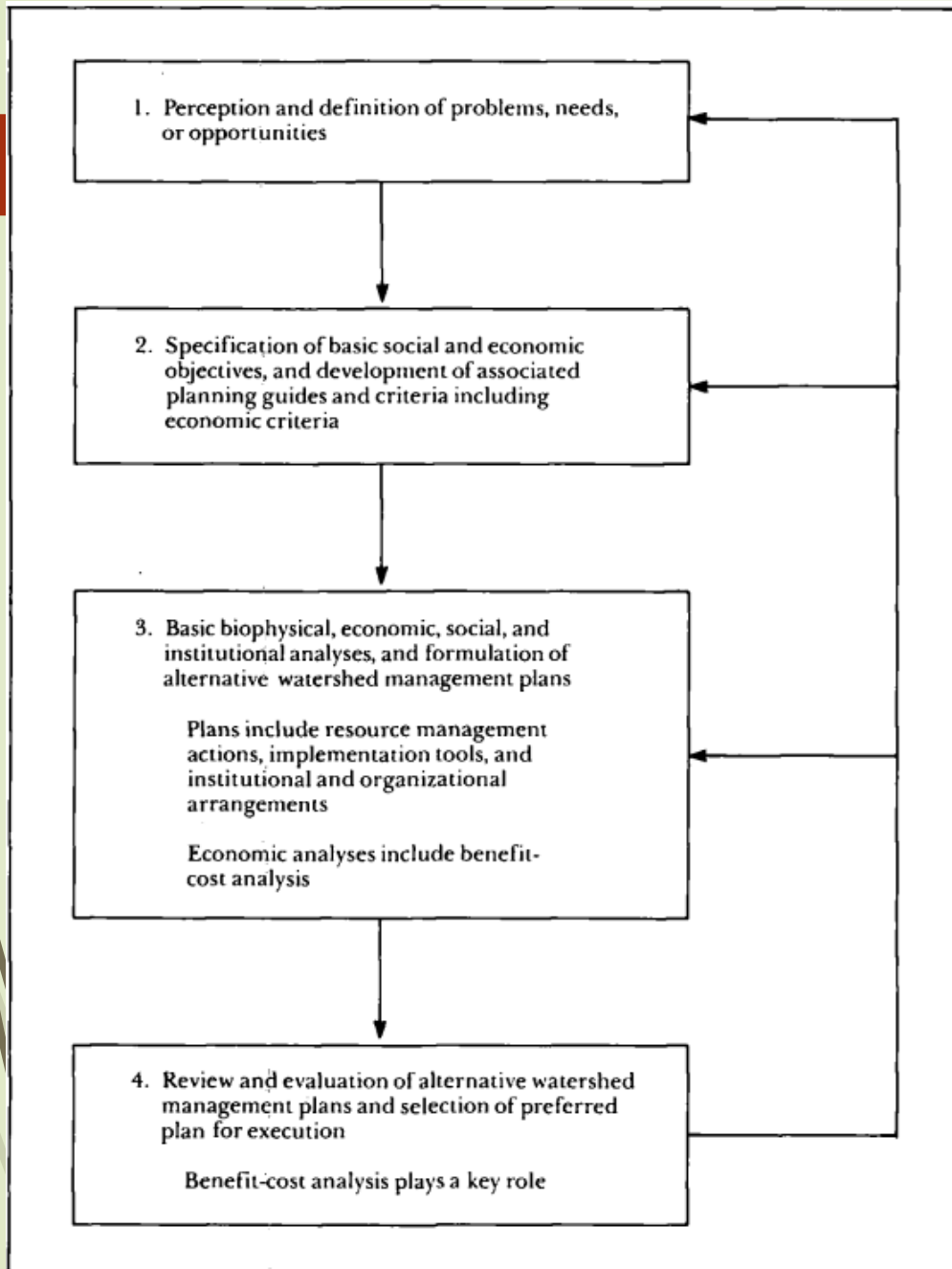


- ▶ Watershed management planning generally begins with the identification of a natural resource problem, need, or opportunity and the development of related social, economic, and natural system objectives to serve as a guide to planning.
- ▶ The planning process continues with the basic biophysical, economic, demographic, social, and institutional analyses required for the formulation of alternative watershed management plans.
- ▶ Effective planning is an integral part of successful rural development programs. Regional rural development planning that ignores watershed characteristics is likely to result in serious environmental problems.
- ▶ Watershed management problems encountered at the planning stage and the associated needs for research and information are grouped under seven headings.

A generalized watershed management planning process.

This process can be broken into three stages.

- **The first stage** includes uncovering concerns, gathering and analyzing information and data, defining challenges/opportunities, developing objectives, and documenting data and decisions.
- **The second stage** includes developing a game plan for addressing the objectives, selecting the best watershed management alternative(s), listing ways (strategies) for implementing the selected alternative(s), and determining how to measure progress.
- **The third stage** includes implementing and evaluating efforts.



Watershed Management Problems

- The Overall Planning Process

Local participation in planning. Watershed management projects usually involve the activities and interests of many people who occupy and use the land or who are affected by such land uses. This is especially true in many upstream watersheds where shifting cultivation is a common practice. Yet rarely are local groups brought into watershed planning because of the gulf that often exists between planners and watershed inhabitants.

- Land Use Assignments

Assignment of watershed lands to suitable uses requires information both on existing land uses and on the inherent capability of land for various uses. Such assignments usually involve a balancing of these two often competing factors. At one extreme, the inherent land capability of an undeveloped watershed based on biophysical factors such as geology, soils, climate, topography, and vegetation would be given great weight in making assignments to major land uses.

- On-site Resource Utilization Actions and Management Practices
- Off site Management Practices

- **Implementation Tools**

Many problems arise in the implementation of watershed management plans, which could have been anticipated so that solutions could have been developed at the planning stage. Specific problems associated with implementation tools, and related information and research needs are discussed in the implementation section.

- **Institutional and Organizational Arrangements**

Existing institutions, organizational arrangements, including administrative or political boundaries often impose severe constraints on implementation of watershed management plans. It follows that institutions and organizational arrangements should be considered as variables at the planning stage. In fact, if adequately understood and adapted, existing arrangements may offer important opportunities. The major institutional and organizational problems that require information and research are discussed in the implementation section.

- **Overall Plan Formulation and Evaluation**

Both the underlying theory and the application of approaches to plan formulation and evaluation have been well developed for natural resources in general and for water resources, including river basins, in particular. This is true for some developing as well as for developed countries.

UNCOVER YOUR CREEKS WATERSHED WISE

THE PROBLEM

1| When it rains or snows, urban stormwater run-off collects pollutants such as pesticides, heavy metals, animal waste and cigarettes from our driveways and city streets.

2| Roads, parking lots and other impermeable surfaces prevent contaminated stormwater from naturally infiltrating into the soil where particles are removed.

3| Stormwater then travels through city storm sewers where it enters local waterways and degrades water quality for humans, plants and animals.

! Washing your car in the driveway or street leaves behind dirt, oil grease and soap.

WHAT YOU CAN DO

Build a Rain Garden | Built sunken into the ground using soft, loamy soils and gravel, rain gardens collect and clean rain water.

Install a Rain Barrel | Harvest rain water falling from your roof instead of letting it flow into storm sewers.

★ Use this water for your lawn and garden!

Plant Native Species | Native plants absorb more rain water than grassy lawns and require less maintenance. Plus, native plants attract pollinators like butterflies and bees to your garden!

★ For a list of plants native to your area, visit Evergreen's Native Plants Database online.

Go Green | Green roofs retain and purify rain water before it drains off the roof and into storm sewers.

Install Permeable Surfaces | Rain water filters through permeable surfaces, slowly soaking into the soil underneath and reducing stormwater run-off and water pollution.

★ For a quick fix, replace a section of your driveway with grass, gravel or pavers.

Implementation

Problems associated with implementation of watershed management plans result from a number of factors, including:

- ▶ (1) little or no local participation,
- ▶ (2) inadequate extension and technical assistance programs,
- ▶ (3) inadequate testing and development of resource management actions,
- ▶ (4) delays in the delivery of key inputs,
- ▶ (5) a fragmented government organizational structure,
- ▶ (6) conflicting interests among various actors,
- ▶ (7) inappropriate institutional arrangements,
- ▶ (8) political boundaries unrelated to watershed boundaries.

While this is only a partial list of reasons for inadequate watershed management, it highlights the difficulties facing government officials and the need for better information, which research can provide. To improve implementation of watershed management plans, research is needed in resource management actions, implementation tools, institutional and organizational arrangements, and evaluation and monitoring.

Resource Management actions

Watershed management programs involve a variety of resource management actions that are diffuse and generally occur over a long time period. In the simplest case, such programs involve a set of well-understood management practices. However, watershed management programs are often more complex and involve significant changes in land use. In many cases the projects must include practices that not only protect soil and water resources but also offer increased opportunities and income for farmers.

Implementation Tools

A task as important as selecting the appropriate resource management actions is to determine how each will be implemented. A range of implementation tools, or policy instruments, can be used (Hufschmidt 1971, Baumol and Oates 1979). These include regulations, prohibitions, taxes, subsidies, education, technical assistance, resettlement, increased off-farm employment, pricing, zoning, licenses, fines, grants, and direct public installation. The key task is to provide the appropriate incentives, economic and other wise, and then make sure the users understand the management action and the incentives. The use of implementation tools must be as carefully planned as the various management practices that are to be installed.



Institutional And organizational Arrangements

Institutions are collective conventions and rules that establish acceptable standards for individual and group behavior, reducing individual uncertainty concerning the actions of others (Bromley 1982). Organizational arrangements involve how firms or government agencies achieve goals; this includes how a central planning agency decides to implement an irrigation project or how a ministry of power and irrigation decides to allocate water for irrigation rather than for power generation. Institutions also help define organizations through laws and administrative decisions, which establish principles and guidelines for their formation and conduct.

Evaluation And Monitoring

If a "learning-by-doing" approach to project implementation is adopted, evaluation and monitoring (assessment) become a continuous process to provide feedback to field-level implementers and managers at headquarters. Implementation should not rigidly follow a set plan established at the planning stage but should change in response to information gained from assessment and evaluation.

► The Approach

Selected integrated case studies can be an effective approach particularly in the legal, policy, economic, institutional, and organizational fields. Research should be based on theory and not be merely descriptive. For the case study approach to be effective, the cases should involve five elements:

1. Refinement of conceptual frameworks, models, and methodologies for interdisciplinary analysis of the behavior and performance of biophysical, social, economic, institutional, and organizational elements of watersheds. The starting point could be the conceptual model discussed earlier in this report. 21
2. Formulation of testable hypotheses and researchable questions with respect to relationships among the physical, biological, social, economic, political, institutional, and organizational factors operating in the concerned watershed. Again, the section on research issues would be the starting point.
3. The collection, analysis, and interpretation of information on actual experience with resource management actions, implementation tools, and institutional and organizational arrangements in watersheds.
4. Devising measures to test the feasibility, adaptability, and transferability of resource management actions and implementation tools to particular watershed situations.
5. Devising appropriate measures for monitoring the performance of watershed management implementation, including ex-post analysis, and for obtaining feedback concerning changes in practices, tools, or institutions.



Thank You for Listening