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**POLICIES FOR SUSTAINABLE DEVELOPMENT: THE ROLE OF WATERSHED
MANAGEMENT**

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POLICIES FOR SUSTAINABLE DEVELOPMENT: THE ROLE OF WATERSHED MANAGEMENT

The basic points made in this policy brief are that:

- * Watershed management and upland conservation provide a means to achieve sustainable land and water resource management (see box 1).
- * Poor management of natural resources on watersheds is a major cause of land and water degradation and rural poverty in the world today.
- * The main cause of such mismanagement is lack of appropriate policies that encourage application of known watershed management principles and practices, including both structural and vegetation management options.
- * Because watershed boundaries seldom coincide with political boundaries, the environmental point of view that favors watershed boundaries often conflicts with the political point of view that logically favors political boundaries.
- * The main policy challenge is to move toward greater integration of the two points of view.
- * This involves establishing and implementing policies so that people become responsible for the impacts of their actions on others outside their normal decision-making context (internalize the externalities, as economists say).
- * We show several ways to internalize the externalities [note 1].

Box 1.

A "watershed" is the total land area that drains to some point on a stream or river. "Watershed management" is the process of guiding and coordinating use of land and water resources in a watershed. Management should provide desired environmental services and goods without adversely affecting resources upstream or downstream.

Degradation of Land and Water Are Global Problems

Degradation of land and water resources, such as erosion and loss of land productivity, affects millions of rural upland people. Eventually, it also impacts additional millions living downstream or down slope from degraded lands. In many parts of the world, degradation is increasing and spreading rapidly. Appropriate watershed management policies can contain these trends and help secure water supplies. They also can reduce flood damage and

increase land productivity and upland conservation [note 2].

Weak land use policies often cause land and water degradation. Sometimes unrelated policies end up encouraging land and water degradation (see box 2). By recognizing and reconciling potential conflicts among policies and their impacts on natural resources

we can:

- * contain land and water resource degradation,
- * enhance productivity of uplands in an environmentally sound and sustainable manner, and
- * comprehensively consider the environmental effects and values of land and water use decisions.

Box 2. How an export development project can encourage degradation.

An export development project includes price supports for certain agricultural exports. This can encourage farmers to clear forests and cultivate marginal lands to produce crops. Often these lands are steep and susceptible to erosion. After clearing, erosion and runoff increases, creating downstream problems of sedimentation, a reduction in irrigation capacity of reservoirs, and reduced flood protection. Institutional arrangements can prevent such degradation and secure benefits for future generations of farmers.

Developing and implementing policies for upland conservation and watershed management can help achieve these goals. We should give heavily-populated uplands special attention since they suffer from the greatest degradation and also can significantly impact people living downstream or downslope [note 3].

By understanding how watershed management can resolve land and water problems, we can develop policies that avoid the unsustainable programs of the past.

Managing Watersheds

We often confine development activities within political boundaries, with little regard for natural system boundaries. However, the forces of nature ignore political boundaries. Water flow, land-slides, erosion, fish migration, and water pollution take place within watershed boundaries. Hydropower, irrigation, and transportation systems influence and are influenced by the natural processes of watersheds.

Most upland activities in a watershed eventually have some impact downstream, often affecting different political units and

different countries.

Therefore, watersheds are logical planning and management units from an environmental viewpoint. However, political boundaries are logical from a political viewpoint. To achieve sustainable development, we must harmonize economic development and environmental protection. That requires realistically integrating the two viewpoints by adapting watershed management and upland conservation to economic and social realities (see box 3). That is the policy challenge.

Box 3. Polynesians organized political and economic systems by watersheds.

The Polynesians who settled the Hawaiian Islands organized their political and economic systems on the basis of watersheds. They defined these watersheds as areas extending from the highest mountain peaks to the coast and into the coral reefs below the watershed outlet. Chiefs had full responsibility for their watersheds. They considered each an economic, political, and environmental unit that provided food, water, and natural resources. They managed uplands for forests, used moderate slopes for upland crops, and planted lowlands in taro. They used streams to irrigate taro without polluting the fish-rearing coral reefs. They recognized that wise resource management and land use that avoided erosion and water pollution meant greater wealth for the political unit [note 4].

Policies should promote land use practices that "prevent land and water degradation in the first place." Rehabilitation costs more than protection and prevention. The "objectives" and "principles" of watershed management provide a framework for organizing development activities involving land and water resources.

This framework helps integrate the bio-physical and socioeconomic aspects of natural resources management that also helps avoid environmental problems. Land use management and soil and water conservation "practices" provide the tools for the framework.

These practices include nonstructural actions (changes in land use and vegetative cover) and structural measures that can achieve important objectives. For example:

To maintain or increase land productivity:

- * Encourage appropriate agroforestry and soil conservation practices.
- * Plant trees to meet fuel, fodder, and fiber needs.
- * Stabilize slopes and terraces.
- * Control salinity buildup and waterlogging.
- * Encourage appropriate forage species.
- * Build terraces.
- * Install and maintain irrigation facilities.
- * Develop water spreading systems.

To assure adequate quantity of usable water:

- * Encourage or require low-water consuming species.
- * Develop water harvesting systems.
- * Construct dams for reservoir and water diversion for irrigation.
- * Use appropriate land use measures to protect reservoirs and channels.
- * Develop wells.

To reduce flooding and flood damage:

- * Revegetate or maintain the vegetative cover to enhance infiltration and reduce surface runoff.
- * Zone or regulate flood plain use.
- * Protect and maintain wetlands.
- * Construct flood control dams.
- * Construct levees.
- * Develop and encourage flood-proof structures.

To assure water quality:

- * Maintain or establish vegetative cover along stream channels and protect streambanks.
- * Treat/control disposal of waste-water.
- * Control grazing and develop guidelines for land uses in riparian zones.
- * Control human and livestock waste.
- * Develop water treatment facilities.
- * Develop alternative supplies.

Modifying land use can achieve economic benefits in upland and downstream areas (see box 4). Indirect benefits of environmental quality also can occur through protection and enhancement of biological diversity, wildlife and fish habitat, and water quality.

Box 4. Watershed management can provide high economic returns.

In northern Morocco, improved management of a watershed that drained into a major irrigation reservoir showed an economic rate of return of 15.9% [note 5]. Economic rates of return on investment in watershed management and soil conservation-related projects financed by the World Bank have been calculated between 15 to 21% [note 6].

In sum, we can move towards sustainable development if we can develop policies that apply watershed management principles:

- * Recognize the fundamental need to protect the environment and natural resource base on which all production ultimately depends.
- * Incorporate in decisions the values of environmental services not presently traded in the marketplace.
- * Reconcile the conflicts between natural and political boundaries.

* Provide for public investments, regulations, incentives, and taxes that recognize the links between upstream and downstream water and land use activities.

* Equitably distribute costs and benefits among political units, communities, and individuals according to who pays for and benefits from watershed management policies and resulting actions.

Policy Implications

Because political and tenure rights boundaries rarely coincide with natural watershed boundaries, local political institutions seldom consider watersheds as workable units for planning and action.

Development professionals and local people often are not aware of watershed relationships. This further limits the development and enforcement of policies that promote sound watershed management.

At the same time, it is possible to overcome barriers to adoption of policies that support watershed management. An increasing number of policymakers recognize that environmentally-sound projects must allow for the interrelationships between land and water uses in watersheds to achieve sustainable development.

They realize that ignoring the boundaries and interrelations set by the forces of nature in a watershed will repeat environmental problems of the past.

Policy Instruments

All levels of government need a number of policy instruments to encourage land and water users to adopt the watershed management practices discussed earlier (see box 5).

Box 5. Policymakers can use three kinds of policy instruments.

We can group policy instruments into three general categories:

1. regulatory (zoning, regulations, land and water rights, controls, permits, prohibitions, and license);
2. fiscal (prices, taxes, subsidies, fines, and grants); and
3. direct public investment and management (technical assistance, research, education, land management, installation of structures, and infrastructure) [note 7].

Taking Responsibility

We can resolve many problems if we can find ways within a watershed system to make groups more responsible for the impacts they have on other groups (internalize the externalities). Several methods can work:

- * Applying the "polluter pays" principle. For example, if upstream polluters have to pay for their pollution they will avoid/reduce polluting activities.
- * Negotiate payments from downstream land and water users for soil and water conservation measures provided by upstream land users [note 8].
- * Establish, within watersheds, cooperative or joint political units, such as river basin commissions and watershed districts.
- * Establish clearer property rights and land use regulations. People will understand and have concern for the impacts of their actions on themselves and on others.

Increasing Public Awareness

People are becoming more aware of environmental matters and concerned about the condition of the world for future generations. This concern translates into increased political awareness, pressure, and action. It helps create more effective and acceptable means of distributing the costs and benefits of watershed management programs. To expand this awareness, we need policies to improve and extend public education and training programs.

Improving Land and Water Management

Improving land and water management does not mean populating the world with watershed managers who direct the activities of people living in a water-shed. Nor does it mean establishing a great number of isolated watershed management projects.

Conclusions

"Rather, upland conservation and watershed management concepts and practices should become integral components of all rural, agricultural, forestry, hydropower, and irrigation development projects. We need policies to insure such integration."

Developing and implementing appropriate policies to achieve watershed management and upland conservation is a significant challenge. In some cases, appropriate policies may already exist, but they are not being implemented.

Thus, a first step is to assess the current situation to identify existing policy weaknesses. Then consider the options for overcoming the weaknesses for each particular case.

If those who plan and implement programs do not understand watershed management solutions, then they may need training and education. This includes people at various levels, from farmers to resource managers, planners, and policymakers.

We need to build upon local experience, recognizing that what works for one local agency or group of farmers and herders may not be feasible elsewhere.

Support from bilateral and multilateral agencies and non-governmental organizations is needed, but in a framework of local initiative and participation.

Our knowledge of what works and what is effective is growing. But we need to expand and build upon this knowledge in developing appropriate policies.

For policies to effectively achieve widespread land use improvements, clearly the social, economic, and political realities need to mesh with technical know-how. Potential solutions include many different technical and institutional measures.

Watershed management provides a comprehensive and practical bio-physical and institutional framework for policy formulation and for solving complex natural resource problems.

Notes

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