

## **FORESTRY PROJECTS AIMED AT WATERSHED MANAGEMENT.**

**Liaqath Mohammed Yunus Saleem. <sup>1</sup>**

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### **ABSTRACT**

*Background:* Academics and development agency personnel have often discussed the concept of watershed management as an integral part of forest management. When development projects are implemented, development agencies rarely include watershed management practices, and when they do, the benefits and other effects are rarely quantified. So what difference does it make if one does or does not consider watershed management in forestry and agricultural development projects? It may be argued that watershed management is an issue that has little relevance in actual projects. Because in practice, it cannot be implemented for several reasons. The urgent needs of the rural poor, the lack of appropriate institutions, and the fact that watershed boundaries do not coincide with political boundaries.

*Methods:* By providing a range of income producing alternatives to villagers, it is believed that both short term and long term effect would be decrease in opium production Specific objectives were to achieve self efficiency on rice production, increase real income without illegal drug production. improve living standards of watershed inhabitants,)improve environmental conditions, increase the capacity of local communities to plan and solve their own problems and, develop a working model of rural development - demonstration project.

*Results:* Increase the emphasis on research. Recognizing that we do not fully understand all the upland-downstream linkages and inter relationship of land use, watershed management practice, and impacts, researchers should seek to improve decision makers understanding of and ability to prescribe appropriate land-use remedies. Such research is particularly needed in the humid tropics.

*Conclusion:* Research components are not appropriate of feasible for all development projects, but research , including small - scale pilot studies, should be built into projects where considerable uncertainly exists and problems are evident. Increase consideration of sustainability issues in project planning and management, dissemination, and externalities associated with projects.

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### **Watershed Management A Key To Sustainability.**

Forest lands serve as an economic and environmental resource, with both perspectives needed to achieve sustainable development. the economic resource includes wood products (fuel wood lumber building poles, etc.), plus food animal. And other products from forest lands that are

consumed by humans. The environmental resource includes biodiversity, wildlife habitat, climate benefits, water quantity and quality, and aesthetics. Watershed Management provides a framework for Managing such multiple resources in an integrated manner.

"The ecological usefulness of forests is most readily observed in their beneficial effect on water catchment areas, where they have a regulatory effect on streamflows and where they protect soils from erosion and prevent silting of dams and canals." Although it may be argued that biodiversity and other ecological features are equally important, natural forests are hydrologically the most stable systems on earth. Forestry and related development projects should attempt to capture the hydrologic and erosion control benefits of natural forest systems.

Environmental components in projects, including watershed management, often have a low priority in developing countries because many environmental benefits are hard to measure, equity problems take a long time to accrue. However, it is in developing countries where environmental issues are foremost and need to be addressed in development projects. The Challenge is to protect upland watersheds, Which provide benefits to local, regional, and country wide economics.

With appropriate planning, design , and management , forestry and related projects can have tangible watershed benefits. But developing countries need operational guidelines and developmental strategies that help rural low-income groups without leading to the environmentally and ecologically destructive patterns of forest removal. These countries also need training, education, and forestry research that emphasize the environmental linkages and benefits associated with development projects.

In high-population areas, land degradation is directly linked with food security, both in terms of upland watersheds and downstream effects(FAO 1985). The loss of soil and productive capacity in uplands is directly evident, but the downstream effects may not be immediately apparent. However, sedimentation and excessive streamflow from uplands can disrupt downstream transportation systems and water resource facilities that are needed for irrigation, hydropower generation, and the like; these disruptions have social and economic implications.

Developing countries need to consider the multiple use of natural resources in uplands and downstream areas. The sustainable production of food, fuel wood fiber, forage, water, and other products requires the recognition of watershed boundaries and linkages, Because the multiple resources of land cannot be managed by individuals and agencies at cross-purposes institutional mechanisms are needed to achieve successful projects.

## **Concepts and Definitions**

Development agencies have had difficulty in transforming their recognition of the importance of environmental effects into meaningful actions that(1) lead to tangible environmental benefits and (2) improve productivity for rural inhabitants- both of which are needed for sustainable development.

The following definitions, taken from working group on Watershed Management and Development (1988) and Brooks et al (1991), point to the usefulness of such an approach:

A watershed is a topographically delineated area that is drained by a stream system (i.e., the total land area above some point on a stream or river that drains past that point) The Watershed is a hydrologic unit that often is used as a physical-biological unit and a socio-economic-political unit for the planning and Management of natural resources.

Watershed management is the process of guiding and organizing the use of the land and other resources on a watershed to provide desired goods and services without harming soil and water resources. The interrelationships among land use, soil and water and the linkages between uplands and downstream areas are recognized in this concept.

Watershed management practices are changes in land use, vegetative cover, and other nonstructural and structural actions that are taken to achieve specific watershed management objectives. These objectives can be rehabilitation of degraded lands; protection of soil and water systems for land being managed to produce food, fiber, forage, and other products of the land; and enhancement of water quantity or quality.

A watershed management approach incorporates soil and water conservation and land use planning into a broader, logical framework.

### **Causes of Watershed Problems**

Normally observed as evidences of watershed degradation are the physical manifestations of problems such as soil erosion, polluted water, evidence of frequent flooding, sediment-filled channels and reservoirs, and shortages of potable water. Natural phenomena, human activities, or some combination of the two often cause watershed degradation and resulting upland and downstream impacts. The causes must be understood so that appropriate measures are taken, and, conversely, so that inappropriate or ineffective measures are avoided. The main causes of watershed degradation are as follows (adapted from FAO 1986.)

#### 1. Natural causes

- Geologic instability
- High-intensity, long-duration rainfall
- Steep river gradients
- Shallow soils on steep slopes
- Fire

#### 2. Human causes

- Deforestation
- Unwise and poorly designed logging, usually carried out with no guidelines or requirements to protect the soil and riparian ( steambank ) systems. The cause of such practices sometimes can be traced to the need for log exports to deal with foreign debt.

Governments are unwilling or unable to impose controls or to enforce guidelines on loggers.

- Repeated shifting cultivation without adequate fallow periods, caused by high population densities in uplands . Alternative means of producing food and fuel wood are not available.
- Fuel wood cutting due to fuel shortages and under conditions of large rural populations.
- Conversion of Forests to grazing lands or cultivated croplands to meet the demand for food by an expanding population. Such changes can result from illegal encroachment or legal land settlement.
- Inappropriate farming practices
- Un controlled land-use changes
- Inappropriate cultivation practices
- Road construction of fragile lands.
- Overgrazing by livestock
- Improper collection, transportation, treatment, and utilization of water
- Socio-economic and institutional problems

Meeting the resource needs of the rural poor is also critical to the development of viable and sustainable solutions. After, all these people are the land users who can have the most widespread influence as managers of watersheds. Even projects that focus on downstream benefits - such as reconsider that means of meeting the resource needs of upland inhabitants otherwise there will be little incentive to carry out practices aimed at downstream protection. Thus Socioeconomic and Institutional issues as well as the restoration of the physical and biological system must be part of the solution.

### **A Watershed Management Approach**

It is important to adapt a watershed management framework to the political and economic realities of the world. Watershed boundaries are useful in planning and management because soil and water are basic ingredients in sustainable development and because the watershed is a logical unit for considering the effects of land use on soil and water.

Doolette and Magrath(1990) emphasized that " watersheds as hydrologic units provided appropriate units for conceptualizing and implementing development investments" This is key point , because forestry, water resource, and agricultural development projects can affect one another and therefore should not be developed in isolation.

### **Role of Forests and Trees in Achieving Watershed Management objectives**

Forests and Trees affect the hydrologic behavior of a watershed, including the quantity and quality of stream flow, erosion , and sedimentation. In general, natural forests yield the highest quality of water of any ecosystem. The lowest erosion and sedimentation rates are usually associated with forested watersheds in natural conditions (Books et al.1991) stream flow from forested watersheds tends to be more uniform, with peak flows lower than those from watersheds with other vegetative cover. Given this background , the role of trees and forests can be viewed in terms of watershed Protection enhancement of water resources, and watershed rehabilitation.

Watershed protection is an objective under special conditions, such as fragile, steep slopes, and for watersheds above municipal reservoirs. In some cases, may be prohibited on these watersheds, but they may provide multiple benefits in terms of wildlife habitat, aesthetics, recreation, production of high quality water for municipal use, and protection of biodiversity.

### **Watershed Management as an integral Part of Forestry and Related Projects**

Any Project that involves the manipulation of soil, vegetation, or water must contain built-in guidelines that minimize unwanted impacts on the environment and productivity of uplands and downstream area. Two situations can be considered.

1. Projects that concentrate on improving forest productivity, and
2. Projects that include trees for focus on improving agricultural and multiple-resource productivity, such as agroforestry practices (whereby trees can stabilize soil, enhance crop production by nitrogen fixation, etc.,)

In either case, the issue is how to meet production objectives in an environmentally sound manner. Management practices that sustain production by preventing excessive erosion and other environmental degradation include some practices that might not initially be thought of as watershed management-for example, maintaining livestock in numbers that do not exceed carrying capacities of rangelands, or specifying restrictions on types of logging-skidding operations for certain types of soil and slopes. Other practices include requirements that vegetation buffer strips be left along stream channels of wetlands to protect aquatic systems from logging without constraining production.

Guidelines for management that promote soil conservation and reasonable water resource management goals, with a theme of preventing losses over the long term, are referred to as best management practices (BMPs). In the United States, BMPs are aimed primarily at protecting water quality and related environmental characteristics of watersheds that are undergoing management. Such practices are legally the responsibility of each state, which is responsible for specifying environmentally sound management practices for forestry, agricultural, and mining activities, BMPs include logging guidelines, restrictions on use of riparian vegetation areas. Grazing management guidelines, road construction and road development guidelines and waste water treatment requirements. The enforcement of such practices can impose an increased cost in operations over the short term to avoid losses over the long term. It is important to emphasize that losses avoided have as much social and economic value as do increase in productivity.

### **Forestry Projects Aimed at Watershed Rehabilitation**

In formulating watershed rehabilitation projects with forestry components, analysts need to determine the biophysical potential of the uplands receiving watershed, management interventions, the potential to enhance downstream benefits, and the capability to implement the project. This does not mean that economically significant impacts downstream are essential in all cases, but there always must be tangible benefits in the project area. Furthermore, benefits must

accrue to the rural inhabitants of watersheds, usually subsistence farmers. Population pressures are considered to be a major determinant in developing an appropriate strategy.

The Next step in the analysis is to consider the capability to implement the interventions that have been identified in the proceeding step. The capability to implement a project involves aspects of three factors: (1). Policies, which reflect social, economic, and political needs. (2.) institutions, which reflect social, economic and political conditions and are determined by operational needs; and(3.) Operational capabilities, which relate to the resources available to implement the project and are influenced by policies laid down and institutions created to support a program.

The overall capability to implement a successful project is only as good as the weakest of the three factors. If there is a strong policy with the necessary strong institutions but a weak operational capability, the overall capability is weak . Similarly, if operational capabilities are good but institutions are weak, the overall capability is weak. Watershed projects need to consider strengthening the appropriate links as a matter of priority.

The major issues in terms of polices, institutions , and operational capabilities to carry out watershed management components of projects are as follows:

#### Policies:

- Natural resource management (Soil, land, water, forest, minerals, tenure, use rights etc.)
- Population
- Development (roads, markets, food and energy security, industries, etc.,)
- Fiscal
- Education

#### Institutions Within a country

- Interagency agreements to coordinate upland and downstream interventions.
- Extension and other capabilities to motivate farmers.
- Laws and regulations that promote best management practices and restrict or control overuse of natural resources.
- Training and educational opportunities and capabilities
- Planning, Monitoring, evaluation

#### Donor related

- coordination between and among bilateral and multilateral agencies, Non-government Organizations, and others
- Institution building versus local resource consumption
- Technology promotion, high-tech approaches versus local and traditional approaches.

#### Operational capabilities

- Technology
- Facilities
- Availability of maps, soil surveys, aerial photography, and the like
- Personnel
- Fiscal situation
- Sociological factors , such as the role of women and the participation of local people.
- Others

Problems of user rights to forests and land rights often lead to conflicts between local farmers and government agencies. Planners of reforestation projects for purposes of rehabilitation should fully consider tenure arrangements.

### **Forestry Development Projects with Primarily a Production Objective**

For Forestry projects that are aimed principally at improving productivity, the key watershed management considerations are to avoid unwanted environmental consequences and, in some cases, to consider how soil and water production can be enhanced, The following guidelines determine the watershed management components of a project.

1. For areas with proposed forestry/ agroforestry interventions, identify the watershed boundaries and evaluate the possible consequences of the project in terms of soil and water relationships.
2. Consider the implications of trees of watershed values and production of forest and agriculture products:
  - When, where, and under what conditions does the introduction of trees and forestry advance the opportunities for improving human welfare on a sustainable basis? (Consider erosion control and the provision of fuel wood, green manure, fodder, structural wood, poles, etc..)
  - Where should priority be given to protection? (Identify critical areas that cannot sustain intensive cropping., logging, grazing, and the like)
3. Consider whether the policies, institutions, and operational capabilities exist to introduce, promote, And sustain project elements:
  - What are the incentives that will motivate local farmers?
  - Do the project staff have the education, training, extension, and in some cases mechanisms to offset inequities that arise?
4. Concentrate on strengthening those components that offer the greatest obstruction to the achievement of a successful and sustainable project.

### **Barriers to Adoption of Watershed Management**

Ironically, the basic concepts underlying a watershed management approach also explain in part why this approach has not been more widely adopted.

Because the main effects of the water and land-use practices of one political unit often are felt by people outside that unit or by future generations who cannot vote now, there has been little incentive to consider the concepts of watershed management that account for these interactions. A common question from upstream land users is, why should we carry out watershed management practices to benefit those downstream? Indeed, why should developers expect them to, if they are not compensated for the costs of such activities?

An attempt to deal with the inequities of who pays and who benefits in a watershed Management project is described in example 3. Although the concept of taxing downstream beneficiaries to help pay for upland conservation works is a good one, the institutional capacity must exist to implement the programme.

- The lack of awareness or understanding of watershed management concepts and practices by development professionals and by the public has limited the application of watershed management practices.
- Technical experts in this field have not cooperated adequately with development practitioners and administrators. Only recently have technical experts made a concerted effort to explain, in language understood by the pragmatic development professional, how watershed management can aid in development programmes aimed at increasing food security, employment opportunities, economic growth, and poverty alleviation, all within a sustainable development framework.
- There has been skepticism about downstream benefits of watershed management, and projects have provided little quantitative information concerning downstream effects (and, in some cases, no information about impacts on productivity). Projects have not been monitored sufficiently so that effectiveness of land use changes can be evaluated.

### **Overcoming the Barriers**

These components have to be implemented and sustained by people other than professional watershed managers- by general project administrators, foresters, agriculturalists, sociologists, hydrologists, and, most important, by farmers and other land users. The Implication is that these types of people need to understand why and how watershed management should be incorporated into everyday activities.

Non-government organizations (NGOs) have taken a small - scale approach towards watershed management solutions with a strong emphasis on local people. For example, in Asia, such organizations have been promoting environmental awareness and encouraging local-level afforestation. Their projects have played a crucial role in representing local interests, and act as intermediaries between governments and local communities (FAO 1987)

Formulators of watershed projects should consider questions such as these about the socioeconomic and cultural setting: what are the indigenous abilities and potential of the rural farmers? How can local people become partners in the planning and implementation of Projects? What are the institutional or regulatory factors that can change land use practices? What are the financial resources of local people? What is the history of the use of mechanism such as educational programmes, subsidies, and other incentives to get changes in technology for the



local area, the region, and the country? What markets exist? What infrastructure is present? How can projects get the support of the local rural people.

### **Conclusions and Recommendations**

1. Development projects on forested watersheds and the introduction of trees into agricultural systems directly affect the welfare of people in the uplands and in downstream communities sustainable development depends on adoption of watershed management practices by local Farmers and other land users who ultimately are the true watershed managers.

2. Project planners should always consider the effects of upland forestry and agricultural development on water and sediment flow to downstream reservoirs, irrigation systems, floodplains and urban areas.

### **References**

Brooks, K.N., H.M.Gregersen, E.R Berglund, and M. Tayaa. 1982. " Economic Evaluation of watershed projects.

World Bank Technical paper No. 127 Washington ,D.C. World Bank

Food and Agricultural Organization (FAO) 1985, The Role of forestry in food Security. Rome.