Module 1 – (L1-L3) Introduction and Basic Concepts
Concept of watershed, introduction to watershed management, different stakeholders and their relative importance, watershed management policies and decision making.

WATERSHED MANAGEMENT

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Lecture No - 2
Watershed Management & Stakeholder Analysis
L2–Watershed Management & Stakeholder Analysis

- **Topics Covered**
  - Watershed system; Watershed Management (WM) - Objectives, Components & Benefits; WM- Multiple use, Multi disciplinary approach, Stakeholder analysis, Role of stakeholders in WM development plans; People’s participation; Case Study.

- **Keywords:** Watershed management objectives, Development plans, Multi disciplinary approach, Stakeholder analysis, People participation.

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Goals: Watershed System Integrity

- Environmental Objectives
- Resources/Standards / Conservation Goals
- Watershed Approach
- Natural Resources Management Programmes tools and resources

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Watershed Management at Different Levels

- Local Watershed Social Framework
- Individual Watershed Protection Project
- Statewide Framework
- Regional Framework

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Objectives of Watershed Management

- Wise use of soil, water & vegetation - optimum production - mini. hazard to natural resources
- Industrial utilization & development of lands: Conserve water, more income, reduce drought
- Prevention and retardation of floods through construction of reservoirs
- Provision of adequate water for agricultural, industrial and domestic purpose
- Abatement of soil, water and air pollution
- Creation of recreational facilities e.g. lakes
- Utilize natural resources - improving agriculture
Components of Watershed Management

1. Foundation Practices:
   - Engineering & biological measures for soil and water conservation
   - Contour farming, diversion bunds, grades of vegetative bunds, terraces, check dams etc.
   - Water storage structures: Nullah bunds, gully plugs, bunds, percolation tanks
   - Alternate land uses in the non-arable lands: Afforestation and plantation of fodder and fuel trees
Contd....

2. Improved Production practices

- In-situ water conservation
- Agricultural water management
- Improved crop and cropping systems
- Foundation practices depend upon financial assistance provided by the government
- Production practices depend upon the people participation
Benefits of Watershed Management

- Control flood, drought
- Reduce erosion and sediment production
- Maximize productivity per unit area, time & water
- Increase crop intensity
- Utilization of marginal or waste lands through alternate land use systems
- Ensure ecological balance
- Maximize combined income
- Stabilize income in unfavorable conditions
- Social upliftment

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Watershed Management Strategies

- **Preventive strategies** — preserve existing sustainable land use strategies.
  - Prevent problems in a watershed

- **Restorative strategies** — designed to overcome identified problems — to restore conditions in a watershed to desirable level.
  - To restore conditions once problems occurred.

- In most cases — WM between two extremes: Routine preventive strategies & some Restorative strategies.

- **Preventive strategies** — key to WM
### Watershed Management – multiple use

<table>
<thead>
<tr>
<th>Resources</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Irrigation, Municipal, Industrial, and Recreation</td>
</tr>
<tr>
<td>Timber</td>
<td>Pulp, Wood, Fuel, Recreation</td>
</tr>
<tr>
<td>Forage</td>
<td>Livestock, Wildlife, Recreation</td>
</tr>
<tr>
<td>Wildlife</td>
<td>Consumption, Recreation</td>
</tr>
<tr>
<td>Minerals</td>
<td>Depends on type of mineral</td>
</tr>
</tbody>
</table>

**Aim of multiple use:** To manage natural resources - most beneficial combination for present & future uses.

**Resource Oriented:** Production capabilities of natural resources.

**Area Oriented:** Based on dynamics of local, regional, and national demands.
Multi-Disciplinary Approach in WM

Scoping and data gathering
- Planners, Scientists, public outreach experts, stakeholders

Assessment
- Ecologists, Hydrologists, Engineers, Economists

Priorities and targets
- Stakeholders, Officials, Scientists, Planners

Plan Development
- Planners, Stakeholders, Officials, Scientists, Engineers

Implementation
- Stakeholders, Regulators, Technical support, experts

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Concept of Stakeholders

“Stakeholder” - Any group of people, organized or unorganized, who share a common interest or stake in a particular issue or system.

Photo, A.K. Singh, 2002

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Importance of stakeholders

- Stakeholders involvement - key aspects in the success to implement development activities
- Involvement of stakeholders helps - dovetailing of funds, supply of goods and human resources required for project implementation
- Involvement of stakeholders - leads to a confidence building process for community based projects
Stakeholder Analysis (SA)

- Stakeholder analysis - generate knowledge about relevant actors - to understand their behavior, intentions, inter-relations, agendas, interest and influence and resources they bring to bear on decision making process.

- Stakeholder analysis - tool for policy formulation and implementation.

- Developed - to challenge of multiple objectives and interests.
**Steps for Stakeholder Analysis (SA)**

- Stakeholder Identification
- Development of relevant issues and their characterization
- Discussion with regional and local subject matter expert (formal as well as non-formal interview)
- Focused group discussion
- Semi-structured interviews
- Development of Influence-interest matrix
## Stakeholders Identification

<table>
<thead>
<tr>
<th>Level</th>
<th>Examples of Stakeholders</th>
<th>Environmental Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>-International Agencies</td>
<td>-Climatic regulations</td>
</tr>
<tr>
<td></td>
<td>-Foreign Governments</td>
<td>-Biodiversity Conservation</td>
</tr>
<tr>
<td>National</td>
<td>-National Governments</td>
<td>-Timber extraction</td>
</tr>
<tr>
<td></td>
<td>-NGOs</td>
<td>-Tourism development</td>
</tr>
<tr>
<td>Regional</td>
<td>-Forest Departments</td>
<td>-Forest Productivity</td>
</tr>
<tr>
<td></td>
<td>-Regional Authorities</td>
<td>-Soil loss and degradation</td>
</tr>
<tr>
<td>Local</td>
<td>-Downstream communities</td>
<td>-Protected water supply</td>
</tr>
<tr>
<td></td>
<td>-Women fuel collectors</td>
<td>-Cultural sites</td>
</tr>
</tbody>
</table>
Developmental Issues & Methods

- Cross cutting system & stakeholder interests
- Multiple uses and users of the Resources
- Subtractability and temporal trade-offs
- Poverty and under-representation

Methods

- Focus group discussion – People’s opinion – Interactive – gives data & insight. Eg. Women group
- Semi-structured interviews: about natural resources, problems & solutions.
- Interest – Influence Matrix: to understand the relative interests and influence of the stakeholders
USEPA Approaches

- Stakeholder involvement is essential to the development – eg. Water pollution management
- USEPA – Two approaches
  - Traditional simulation and decision making approach – based on command & control - Stakeholders involvement – after most decisions made
  - Decision support system for stakeholder involvement - Involves stakeholders to make management decisions - Guides stakeholders through the decision making process – Fits the needs – Multiple options accessible.
- WARMF - Watershed Analysis Risk Management Framework - Data Module, Engineering Module, Knowledge Module - DSS
Stakeholder Analysis - road map

Module for stakeholders to
- Organize themselves
- Develop a work plan
- Identify water quality issues
- Learn about river basin
- Formulate alternatives
- Perform analysis
- Research Consensus

Carl and Joel (2004)

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SA in WM - People Participation

- Sustainability of WM programme is not possible if the people are bypassed in planning and decision making processes
- Role of project implementation agencies
- Community organizations and/or NGOs
- They should make efforts to ensure that people have control over entire process
- Entire process - planning and implementation, including financial and technical monitoring and evaluation
SA in WM - People Participation

- Promotion of sustainable economic development
  - Optimum utilization of land, water and vegetation to mitigate the adverse effects of drought
  - Provide employment and local capacity building to generate income
- Restore ecological balance through community participation
- Improving living conditions of the poorer through more equitable resources distribution

Photo, A.K. Singh, 2002
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SA in WM - People Participation..


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Case Study: Jhabua watershed

Catchment Area-1800 km²  Avg. rainfall ~750mm/ annum.

~ 57% arable land
~ 16% notified as forest land.

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Watershed Related Problems

- Economically among most backward regions in India
- Forest cover - sparsely distributed on sloping lands
- Watershed has poor soil depth - 0.30-0.40 m in hilly areas and 1-2 m in valleys
- Classified as drought prone based on agro-ecological classification
- Socio-economic characteristics - users of natural resources categorized below poverty line
- Seasonal migration (50%) to nearby urban centers in search of jobs

Major crops: Maize, Cotton, Peanuts, Soyabean; Gram, Black beans, Oil seeds.
Developmental Interventions

Developmental interventions taken place at Jhabua Watershed – NGOs (1990s & 2000s)

- Water harvesting for supplementary irrigation
- Soil and water conservation
- Joint Forest Management
- Community participation and local capacity building
- Women empowerment
- Water regulation
Community participation and local capacity building

- People in Jhabua watershed - involved in developmental activities - conception, planning, financing and maintenance
- Eg. Social mapping & resources mapping was undertaken together with village community, & community organizers (CO).
- Efficient utilization of funds
- 10-15% is spent on administration
- 85-90% are used for actual project implementation activities
Water Regulation & Forest Management

- Self-regulation: community based watershed monitoring system
- Local people - developed system of water management
- Accounting uncertainties of rainfall and retaining the runoff from the watershed
- Sharing of water - family size & location of fields close to source
- Water use priorities had given to – Life supporting system than needs- during drought
- Joint Forest Management – Forest committees - concept of “Social Fencing”
Impact Assessment

- Forest development – in 10 years (1991-2000) – from 16% to 25-30% forest cover.
- Water availability improved considerably - About 2-4m water level increase is observed in selected wells.
- Improved agricultural output: 30-100% increase
- Drought proofing
- No migration
- Children go to school
- Women empowerment
- Overall social & economical improvement
## WM Case Study – Lessons Learned

- Integration- appropriate technical & managerial measures
- Successful technical aspects:
  - Systematic watershed development work,
  - Prioritization of water conservation measures
  - Harvested water for supplementary irrigation
- Stakeholder analysis in WM
- People’s participation from inception to implementation
- Restoration of ecological balance through community participation & sustainable development of natural resources
- Encouragement of available low cost affordable technologies for easy acceptance

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References


- [http://www.fao.org/docrep/x5307e/x5307e00.htm#Contents](http://www.fao.org/docrep/x5307e/x5307e00.htm#Contents)
  - “The community’s toolbox: the idea, methods and tools for participatory assessment, monitoring and evaluation in the community forestry”

- [http://www.sas2.net/tools/social-analysis-techniques](http://www.sas2.net/tools/social-analysis-techniques)
  - SAS2 Social Analysis Techniques
Tutorials - Questions!

A) Discuss the watershed management issues at different levels.

B) Illustrate watershed management as a multi disciplinary approach.

C) Discuss the USEPA approaches of Stakeholder analysis.
Self Evaluation - Questions!

- A) What are the important components of watershed management practices?.
- B) What are the important benefits of watershed management?.
- C) In stakeholder analysis, discuss the developmental issues with examples.
- D) Illustrate Stakeholder analysis within the perspective of “People participation”?.

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Assignment- Questions?

- A) What are the important objectives of watershed management?
- B) Discuss watershed management within the perspectives of “multiple uses” of resources.
- C) Describe the watershed management strategies with examples?
- D) With the help of a case study, show the importance of Stakeholder Analysis in Watershed Management.
Unsolved Problem!

- Consider a hypothetical situation of canal water supply for a village in India, where water is drawn and regulated from medium size irrigation tank to both u/s and d/s command areas. Draw various stakeholders formal and informal involved for it, their individual interests and interest-influence matrix for them.

- Hint: Formal stakeholders
  A. Governmental agency; B. Village Electoral Representative
  C. Formal Associations; D. Association of industries
  A. Research organization / team

- Informal stakeholders
  1. Farmer’s group; 2. Village level community group

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