FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI, NIGERIA
INSTITUTE OF EROSION STUDIES (IES)

PROCEEDINGS

1ST OF THE INTERNATIONAL TRAINING WORKSHOP

ON

EFFECTIVE WATERSHED MANAGEMENT FOR ENVIRONMENTAL HAZARD CONTROL/ MITIGATION IN NIGERIA

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LEAD PAPER 2:

EFFECTIVE WATERSHED MANAGEMENT STRATEGY

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WHAT IS A WATERSHED

A WATERSHED ...

- Refers to a Particular Location and a Spatial Extent, Gravitationally Draining Through that Location.
- A Topographically Delineated Area that is Drained by a Stream System
- A Hydrological Unit used for Planning and Management of Natural Resources
- Basin, Watershed and catchment are terms used interchangeably

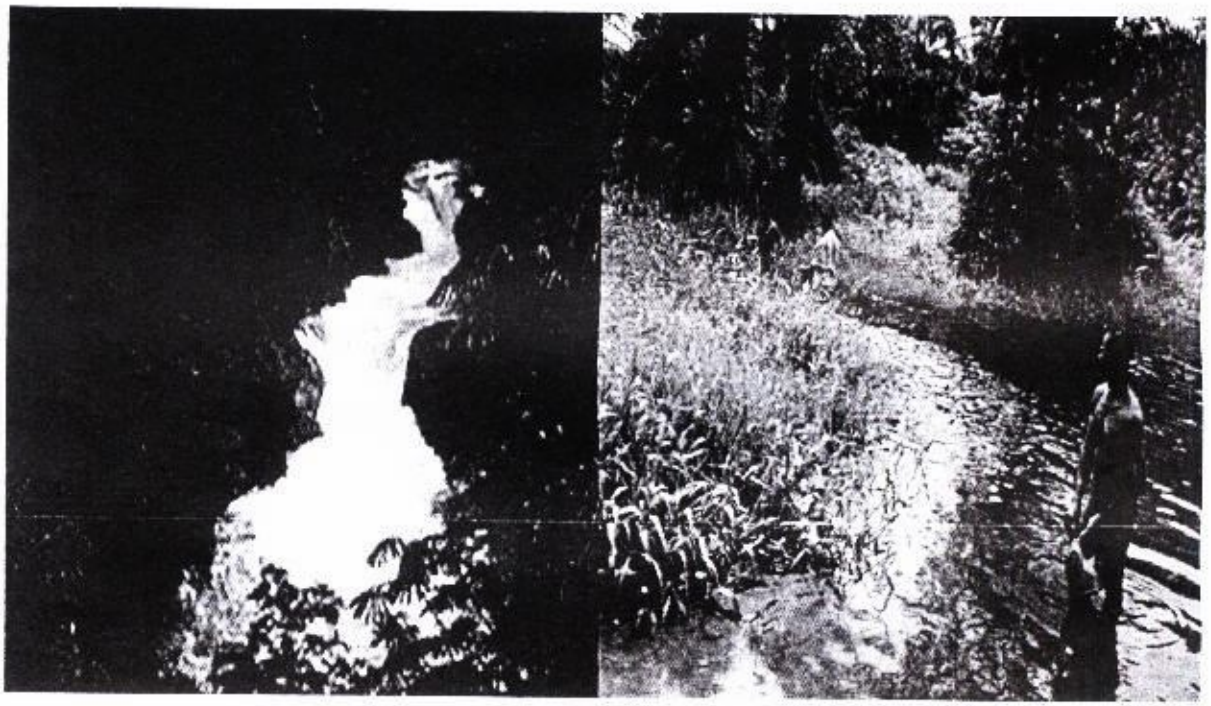


Fig. 1: Typical watershed

1.1 FEATURES OF WATERSHED

- The first of these is the size
- The second feature is the drainage divide or watershed boundary, such as a mountain range.
- The next feature is the topography or terrain of the watershed's land.
- The final feature of a watershed's physical landscape is its soil type. Sandy soils for example absorb water quickly, while hard, clay soils are less permeable.

Watershed has two distinct characteristics, physical and hydrological characteristics.

1.2 WATERSHED MANAGEMENT: SITUATION TODAY

- Independent actions
- Politically driven
- No regards for riparian concerns
- Disregards physical factors of a watershed and surrounding socio-economic and political realities

1.2.1 SO WHAT ARE THE CONCERNS?

- **Preventing:** The disruption of linkages existing between living things within the watershed with their common source of sustenance
- **Preventing:** Deterioration of existing relationships between the use of natural resources within a watershed
- **Restoring:** Sustainable relationships which had been destroyed due to past action

1.2.2. KEY CHARACTERISTICS OF WATERSHED MANAGEMENT

- Sustainable integration of land and water resources
- Understanding the link between upstream land and water use and downstream impacts
- Realizing the nexus between resources depletion and poverty (especially in developing countries)
- Multiplicity of stakeholders even at the local (Rural) level.

1.2.3. WATERSHED MANAGEMENT

- Is the integrated use of land, vegetation and water in geographically discrete area
- For the benefit of its residents with the objective of protecting or conserving the hydrologic services that the watershed provides
- And reducing or avoiding negative downstream or ground water impacts.

1.2.4. ULTIMATE GOAL OF WATERSHED MANAGEMENT

- resource conservation to safeguard resources for future use.
- Maintain ecological diversity for ethical reason and as an assumed pre-

requisite for the survival of mankind Achieve and maintain a balance between resources development to:

- Increase welfare of the population
- Increase

2.0 CAUSES OF WATERSHED DEGRADATION

Watershed is one of the most abused Resource, especially in the developing countries.

- Invasion of alien plants in rural watersheds
- Cumulative (Long Term) reduction of the quantity and quality of land and water resources in a watershed
- Changes in a range of anthropogenic factors such as farming, deforestation, sandmining, overgrazing and road construction
- Surface runoff and soil erosion – depletes water resources
- Pollution of water with various hazardous pollutants such as agrochemicals, e-waste and micro-organism

High rate of sedimentation

Sand dredging along Okulu stream watershed in Eleme, Rivers State

Commercial Sand mining activities along Okulu stream watershed in Eleme, Rivers State.

Collapse of River bank due to abuse of watershed

2.1. INDICATORS OF WATERSHED DEGRADATION

- Loss of its value overtime, eg recreation, reduction in fisheries and
- Change in hydrological behaviour of the river system as a result of interaction of physiographic features, climate, poor land use, disturbance of soil and slope by mining, improper diversions, use as waste dump etc
- On-site indicators – Soil consistency, texture, colour, Sedimentation, sink for municipal waste
- Off-site indicator – Groundwater electrical conductivity, tree cover
- Trend indicators – Stream pH, Turbidity, Total Suspended Solid, Soil electrical conductivity etc.

Excessive/Long term Sedimentation in the Amadi flat watershed (Basin) in

Sedimentation in the Amadi flat watershed /Basin

STRATEGIES/APPROACHES TO WATERSHED MANAGEMENT

Considering the sensitivity and importance of watersheds in Nigeria, communities and concerns habiting upland and lowland areas find themselves caught in a survival fix

- A balance between population growth and the environmental carrying capacity of the watershed must be pursued and achieved.
- Significant policy and programmes response must have time targets.
- National conservation strategies and Framework to achieve appropriate and comprehensive management of watersheds must be developed.
- National programmes must resolve inequities that result from imposing watershed management progammes
- Strengthen existing Institutional Structures to coordinate and effectively carryout the planning, funding, implementation and monitoring of watershed programmes.
- Effective watershed management rarely found in local government areas is hampered by a***lack of relevant training, insufficient applied***

research and limited demonstration projects. – UNESCO is partnering with the Regional Centre for Integrated River Basin (RC-IRBM) to address this serious gap

- Establishment of watershed health indicators is important in management of watersheds especially when the management is geared towards a catchment area such as Regional or National.

ENVIRONMENTAL PROBLEMS (HAZARD)

- **Pollution**

  Occurs in two (2) ways:

i. Point Sources:
   - Disposal site
   - Industrial discharge from pipe

ii. Non-Point Sources:
   - Pollutants or Runoff from farmlands
   - Other land usage
   - Oil pollution from oil and gas exploitation and production line

- **Decrease in River flow**

  Will occur under the following circumstances:
  - When water is extracted for irrigation and other city wide uses
  - With decreased flow natural river cycles such as flooding may not occur.
  - In turn could hurt ecosystems depending on the rivers natural cycles

- **Water quality degradation**

  Caused by:
  - Unplanned development project
  - Run-off from city streets
  - Improper farming and logging techniques
  - Poor residential and industrial chemical disposal

- Soil erosion

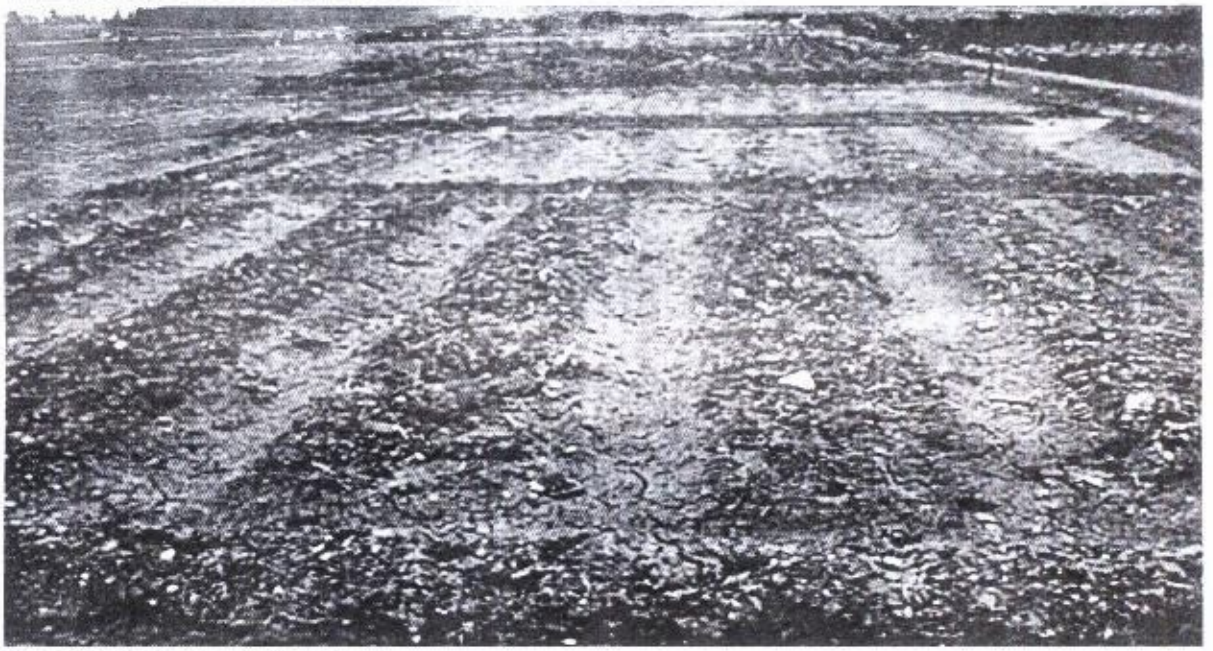
  Accelerated because of high water flow
  - Human disturbance (e.g. Construction) of land surrounding streams

MITIGATION

- Policies and environmental laws meant to protect the watershed from pollution activities

- Technology in monitoring and detecting pollution parameters
- Watershed management structures are available to: control erosion, intercept run-offs, bring sloping land into different level strips to enable cultivation; to promote in-situ moisture conservation
- Enjoy the following pictures

WATERSHED MANAGEMENT IN PICTURES

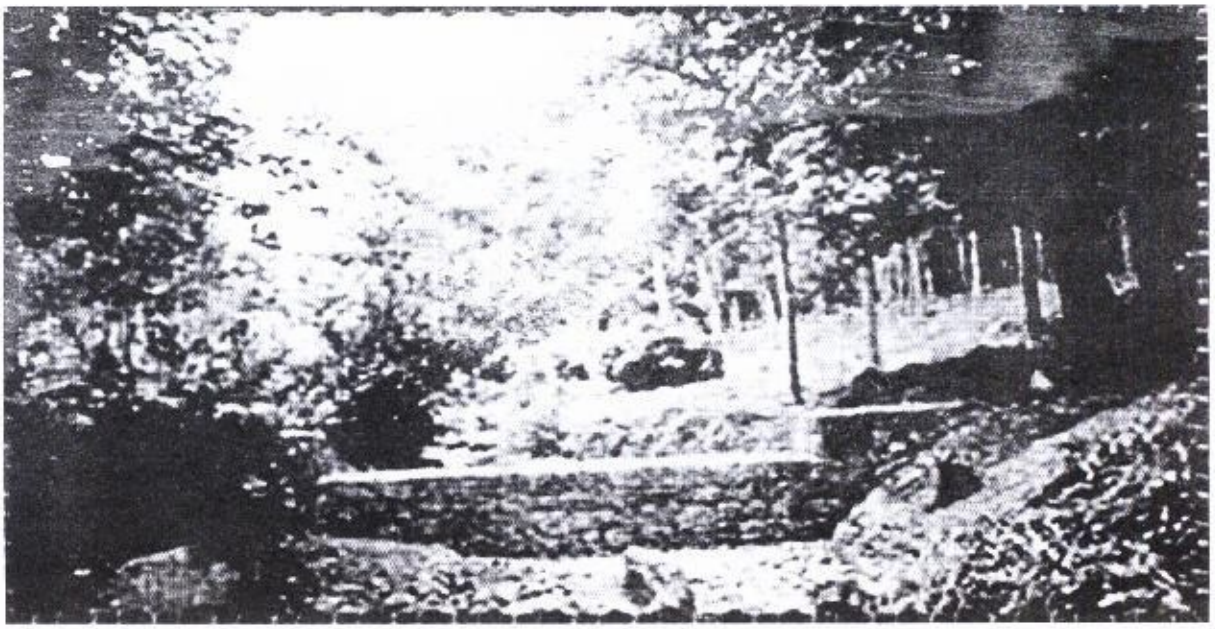


Broad Beds and Furrows

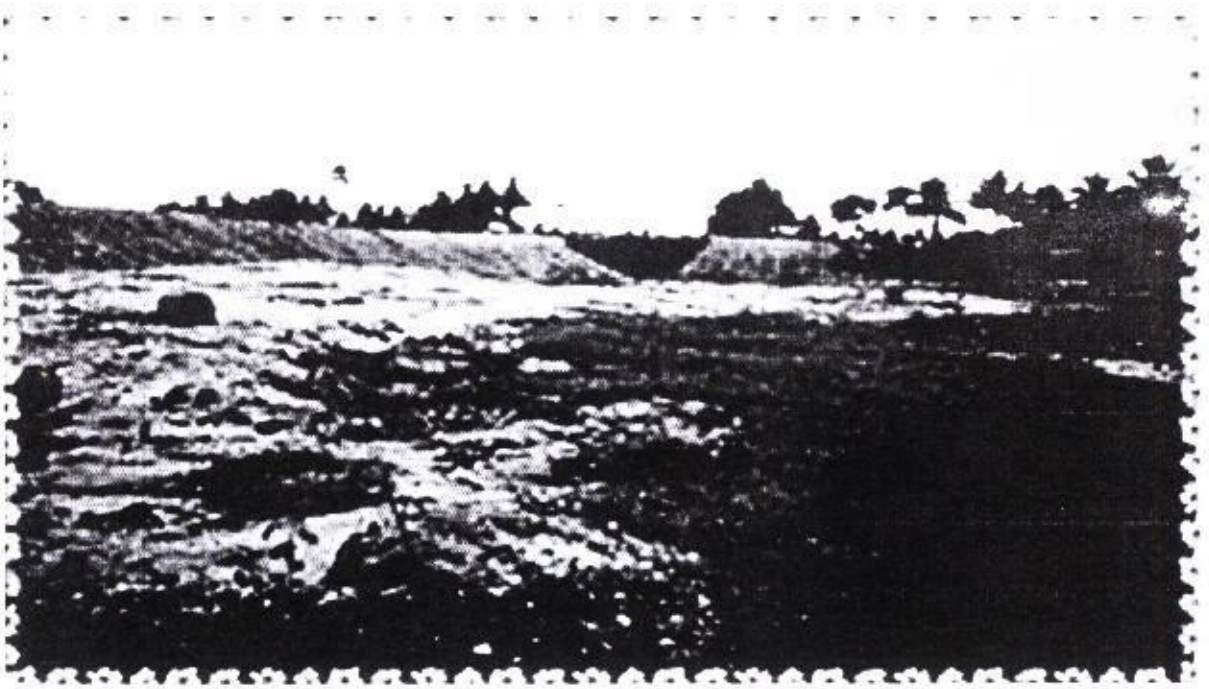
Contour bonding

Bench Terracing

Micro catchments



Check Dam



Percolation Pond

Stone Barriers (Good example exist on the Itu- Calabar Highway threatened by Erosion)