Working at a Watershed Level

Design Document
for the interagency watershed training course

Interagency Watershed Training Cooperative

Note: This information is provided for reference purposes only. Although the information provided here was accurate and current when first created, it is now outdated.

August 1997

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Preface

The Interagency Watershed Training Cooperative (IWTC) was formed to improve cross-agency cooperation and develop and implement interagency infrastructure for watershed training. The IWTC members have a common interest in developing timely, comprehensive and economical watershed management training. By sharing scientific expertise, facilities, and other resources, federal agencies can make better use of the resources available for training. By receiving the same basic training courses, government agencies may improve their ability to communicate and collaborate more effectively on resource management and regulatory issues.

This document marks the beginning of an effort to create an introductory watershed training course based on principles of watershed ecology, analysis, planning, management and community involvement that are common across agencies, across governmental and nongovernmental watershed approaches, and across regional as well as local watershed scales. A design team composed of several IWTC members developed this document to represent their consensus on proposed course content and serve as an annotated outline for assigning course modules in the upcoming course development phase.

Working at a Watershed Level is a short course that will provide a basic but very broad foundation for the use of ecological, social and organizational management principles to guide activities to restore and sustain watershed condition. The course is structured for a wide variety of audiences ranging from informed citizens to watershed management practitioners, within and outside the ranks of government and at watershed scales large and small. The focus is on an interdisciplinary group involvement approach to working in watersheds that builds partnerships based on ecological science and social need. Although much is not yet understood, the scientific and social understanding of working at the watershed level is emerging, evolving and rapidly developing. The content of this course will be updated as our knowledge improves.

This design document outlines six training units and auxiliary information that will be developed into instruction modules and supporting materials for the course. The IWTC representatives from six federal agencies who developed this report and representatives from several additional agencies have been invited to join the development phase.

The goal is to begin offering ***Working at a Watershed Level*** in the Spring of 1998. In the interim, specific course modules and supporting materials will be developed, instructors selected, and agency resources identified to sponsor several sessions of the course during 1998 and beyond.

Course Background Information

Overview

This training course provides a basic but very broad foundation of scientific and social principles proven useful in guiding most watershed-level activities. The course encourages a multi disciplinary group approach that builds partnerships through a process based in sound science and social need. It seeks to establish a renewed understanding of watersheds as a network of linkages among lands and waters, people and environment, communities and ecosystems. It also serves as a conduit to further training in the several disciplines comprising the watershed approach. Although several federal agencies have co-developed this course, care has been taken to make the course content agency-neutral. The course utilizes the expertise, experience and the publications of many agencies but avoids having any one agency's policies or practices dominate. In fact, the course is about working in watersheds, not about working in government agencies.

The six training units move logically through the structure and function of watersheds, how change occurs in watersheds, methods to assess watershed condition and plan for management, watershed management practices, and the all-encompassing social and cultural context for watershed management. The first unit begins by introducing the overall benefits derived from working at the watershed level. The unit on watershed ecology broadly covers the biotic and abiotic watershed environment and how watersheds work. Following this basic description of watershed structure and natural processes, the next unit describes natural and human-made agents of change in watersheds and discusses how and when change in a watershed becomes change of serious concern. Then, in the unit on watershed analysis and planning, the course proceeds from how watersheds work and how they can be altered to how people assess watershed condition and use their findings to plan action. The fifth unit concerns actions and measures to restore or sustain watershed condition, and it describes how watershed efforts move from planning to implementing management actions. Unit six concludes the course by focusing upon the social, cultural, and institutional elements of watershed management, without which working at a watershed level cannot succeed. The course combines oral presentation with discussions, exercises, examples and case studies.

Target Audience

This course is structured for a wide variety of audiences ranging from the informed public to watershed management practitioners and agency staff. The course was designed to stimulate and revitalize watershed approach efforts within agencies and organizations of all kinds in both the public and private sectors, by providing basic but comprehensive watershed information relevant to their work. Therefore, four audience categories are primary targets: 1) entry-level staff without a watershed science background, or new technical staff who, although they may have training in one or many aspects of watershed management, lack breadth of knowledge and experience across scientific and social disciplines integral to the watershed approach; 2) experienced technical staff, who may seek a broader perspective than their narrow specialty or who may desire a refresher/review of watershed approach principles; 3) upper-level managers or decision-makers who cannot afford the time for in-depth technical training yet must direct

activities that require a sound watershed approach, and 4) informed citizens involved in working with their own watersheds. Because this target audience is very broad, the course will be designed with built-in flexibility to adapt to the specific audience at each session.

Objectives

Upon completion of this training, participants will be able to:

1. describe the benefits and challenges of applying the scientific, social and organizational principles of the evolving watershed approach.
2. identify the interrelationships among basic biotic and abiotic components and processes of a watershed and how they vary in time and space.
3. describe effects of several types of human activities and natural events on watershed components and processes.
4. explain the role of watershed analysis and planning in support of comprehensive problem-solving.
5. list a variety of actions that can be applied singularly or in combination to restore or sustain watershed condition.
6. incorporate social and organizational elements into the watershed approach.

Prerequisites

No prerequisites are necessary for this basic course, but some environmental sciences course work or experience may significantly aid trainees. Typically, trainees will have significant experience or training in some of the topics covered and little or none in others.

Duration

Eventually, the curriculum may be adapted to a one-day overview session, a three- to five-day course, or a distance learning program. Five days of classroom instruction and exercises were envisioned as the basic design, but the design team has also recognized the value of having a shorter, three-day course. The team's estimates of run time for Units I through VI appear below:

Unit	Low	High
I	2.0	2.5
II	4.0	8.0
III	4.0	6.0
IV	4.0	5.0
V	2.0	4.0
VI	3.0	6.0
Totals	19.0 hours	31.5 hours

Assuming 6.5 hours of actual instruction time available in a full day (to allow for lunches and

breaks), a three-day version would require 19.5 hours and a full five-day version would require 32.5 hours. The initial estimates of the design team indicate that both options for course length are in a realistic range and a three-day or five-day course should be feasible, provided the course maintains its 'basic but broad' scope. A one-day version would not achieve all the learning objectives defined by the design team but could introduce the basic concepts effectively.

Eligibility

There are no limitations based on course content. However, course sponsors may use eligibility guidelines for individual training sessions to promote attendance by specific parts of the target audience. Preference for specific target audiences, such as (1) Federal, State and Tribal employees directly conducting or managing interagency watershed projects and programs, or (2) members of agencies or organizations supporting the course with funding or other resources, will be determined for each offering of this course on a case-specific basis.

Course Outline

Unit I: Introduction - Why work at a watershed level?

Unit II: Watershed ecology

Unit III: Agents of change in the watershed

Unit IV: Watershed analysis and planning

Unit V: Actions to restore or sustain watershed condition

Unit VI: Social and organizational elements of watershed management

Unit I: Introduction - Why work at a watershed level?

[Time: 2.0 to 2.5 hours]

Objective 1: be able to describe the benefits and challenges of applying the scientific, social and organizational principles of the evolving watershed approach.

Ideas for Instructional Techniques: See parenthetical text at the topic headings. Also: Basic watershed video like "Partnerships for watersheds" by CTIC. Develop icons standing for watershed processes, management principles and major structural features; repeat these as common threads throughout course. Slide show of diversity of watershed types and components.

A. Introductory information *(informal speaking format)*

Welcome and introductions

- introduce course instructors
- logistics: phones, bathrooms, copiers, restaurants, message boards, etc.
- instructors summarize what the specific audience in this session is like

Concept overview

The course provides a basic but very broad foundation of scientific and social principles proven useful in guiding most watershed-level activities. Discussion covers:

- the introductory level of this course, and what trainees can expect from it
- how agencies/orgs across country are coming to similar concepts and adopting/using watershed approaches
- where this course fits in with the real world

Course purpose and objectives

- the "learning tree" analogy: conceptually, this course is the trunk and main branches of the watershed training "tree", and the finer branches represent the numerous specialized and in-depth courses that cover small parts of watershed work. This course serves as a connection to these more advanced training courses as well as a basic training framework in itself.
- goals for course, including overall interest in providing a basic foundation and the six learning objectives we have stated

Agenda review

- review structure of the upcoming course; describe in terms of blocks of time addressing major themes they should take away from the course
- questions at this point

B. Challenges facing practitioners *(class participation format)*

Pre-course exercise *(written)*

- all trainees write on an index card their watershed name and location, and what "working at a watershed level" means to them
- turn these in and they're posted by lunchtime where all can read them
- although they'll vary widely, instructor explains, most are still watershed approach

Challenges *(round-robin discussion)*

- working concepts of watershed approach vary as do the challenges; hear from trainees about their own watershed's biggest challenge to set the tone for course. People may opt to pass if they want.
- at end, instructor recaps and emphasizes the common types of challenges, and problems that have been encountered with past approaches: traditional media-specific (land-only , air-only or water-only), program-centered approaches, species by species mgt, difficulties caused by political, ownership, or other boundaries that have no natural landscape basis, etc.
- stress the complexities of relationships and interdependencies (message: complex, yes, but leaving out any of the essentials almost ensures failure. Therefore a holistic watershed approach is necessary)

Small group exercise

Give trainees a real world watershed problem and ask them to solve it. At end of course, revisit this exercise and have the same groups re-solve the problem and compare/contrast the "before" and "after" solutions.

C. Benefits of working at the watershed level *(lecture format)*

Provide brief overview of broad elements of a watershed approach

- history of the approach
- reliance on sound science
- focus on watershed as a unit that is hydrologically defined and bounded
- partnerships with involved parties and stakeholders
- sound management techniques
- integration of social, economic and ecological issues
- meeting human needs over the long term by sustaining a healthy watershed environment

Benefits of the approach.

- watersheds provide a management unit based on ecological processes and principles yet also widely understandable and relevant to human value systems. A watershed approach is based on aiming to meet human needs in concert with sustaining watershed condition. Interrelation of human needs and watershed health supporting many of these needs.
- a coordinated, multi disciplinary approach enables more varied skills and

viewpoints to enter into management decisions; result is that poorly informed decisions and actions are less frequent problems.
- understanding ecological principles is essential to restoring or sustaining watershed condition. Linkage between functional components of ecosystems inevitably includes humans because, even when we act in the interest of only human benefit, we are always subject to the laws of physics that control natural environmental processes
- watershed approach provides linkage between ecological components and interdisciplinary management efforts. Doesn't occur when scientific approaches leave out social elements or when socio-political approaches leave out the science.
- integration: of disciplines, involved parties, and interests/perspectives
- inclusion of stakeholders builds ownership and buy-in, increases chances of success

D. Wrap-up *(informal speaking format)*

Summarize benefits and challenges

- drawbacks as well as benefits: coordination and consensus take work and are very time consuming. multi disciplinary approach is complex, no one is sole source for all of this
- underlying premise: to build natural systems back to self-sustaining levels that accommodate compatible human uses to the best degree feasible
- stress cumulative effects and integrated mgt
- everyone is in a watershed; interconnecting principle

Where to get more information

- generally this part of the wrap-up addresses more advanced training courses and references related to the preceding lesson

Questions at this point

** end of Unit I **

Unit II: Watershed Ecology

[Time: 4.0 to 8.0 hrs]

Objective 2: be able to identify the interrelationships among basic biotic and abiotic components and processes of watersheds and how they vary in time and space.

Ideas for instructional techniques: Zoom approach (from very broad to backyard relevancy). Explain why watershed ecology is covered first: the natural system is basis for human activities; examine natural systems first.

A. Introduction

Describe the aims of this unit, formats that will be used, and the idea of recurring icons and examples throughout the lesson. Incorporate "zoom" approach, moving from very broad to backyard relevance--pyramid graphic. Begin with abiotic components as major shaping force of landscape, then overlay living, biotic components. Summarize with focus on concepts of watershed structure, function and health.

B. Major landscape-defining processes

Geoclimatic processes

- climatology
- hydrologic cycle and basic hydrology
- geology, soils drive geomorphologic process to produce physical setting

Changes in these processes across a continuum of temporal (days, seasons, years, decades+) and spatial scales(e.g, plots, fields, stream reaches, watersheds, landscapes)

Definitions

- Watershed
- Hydrologic units
- Ecosystem and system
- Structure
- Watershed ecology--as driver for the natural system, of which humans are a part

C. Biotic components that overlay the physical setting

Basic ecological principles

- Biotic/abiotic/habitat
- Sources, sinks and movement of energy, materials, and organisms
- Communities, guilds, populations, keystone species
- Food webs, trophic levels and interactions
- Mosaic stability, dynamic equilibrium
- Carrying capacity
- Biodiversity (genetic, population, species, habitat)
- Other basic ecology concepts

D. Natural systems concept

The nature of systems, system-level behavior
Types of systems
Structure and function
Scale hierarchies and interrelationships

E. Significant watershed processes and functions

Energy cycling
Ecological succession
Materials cycling and transport/delivery process
Fate and transport of pollutants or materials
Availability, detachment, transport, deposition, and integration into receiving water, air, or soil
Natural and introduced materials
Chemicals, sediment, salts, radionuclides, organic matter
Some example human uses described in ecological process terms

F. Structural elements (living and non-living) of watersheds

Water body types (streams, lakes, wetlands, estuaries, aquifers)
Watershed and stream corridor structure
Vegetation patterns
Land-use patterns and landscape mosaics
Humans in the system

G. Case studies and reports from practitioners

Demonstrate how structure develops and natural processes occur in some interesting watersheds. Could use a very natural example, and one in which human role is more prominent but yet the watershed ecosystem is healthy and sustainable

Examples: Salton Sea, salmon streams and odd/unexpected processes

H. Wrap-up *(informal speaking format)*

Introduce watershed health, condition, function, sustainability as summary concepts here

Where to get more information

- generally this part of the wrap-up addresses more advanced training courses and references related to the preceding lesson

Questions at this point

** end of Unit II **

Unit III: Agents of Change in the Watershed

[Time: 4.0 to 6.0 hrs]

Objective 3: be able to describe effects of several types of human activities and natural events on watershed components and processes.

Ideas for Instructional Techniques: See parenthetical text at topic headings. Also: Paleo case studies could be used to discuss change in time frames of decades, centuries and millennia that aren't intuitively apparent. Case study combined with prediction/outcome exercise (present real setting and problem; divide class into small teams to discuss expected outcome; contrast predicted with actual outcome).

A. The Concept of watershed change *(lecture format)*

Definition: What is change?

- Change is integral to ecosystems and watersheds because they exist in a dynamic state. Seasonal change, successional change, species population dynamics, climatic variation are just a few examples.
- Terms such as mosaic stability or dynamic equilibrium connote the idea that a certain amount of continually occurring change in watersheds is normal and healthy.
- However, when any change occurs there are winners and losers that react differently to the same change. Clearly, evaluating a change as good or bad is highly dependent on the evaluator and what they value about the watershed.

Characterizing change

- How do you characterize change? (magnitude, frequency, cyclical nature, accelerating/decelerating rate of change, intensity of change, abruptness, cumulative effects, synergy among multiple changes, significance to different organisms and value systems, episodic nature, resilience/recovery concepts)
- changes in surface water resources, ground water resources, and plant and animal communities
- management, land use, and land treatment measures
- Threshold concept that helps distinguish changes of special concern; how much can a watershed's structure be changed without causing significant changes in other structures or functions? Does change go beyond the normal range of variation?

Change of concern

- In working with watersheds, we find it necessary to try to distinguish changes of concern from other changes. This is extremely challenging and can be very value-laden and controversial when different opinions conflict with one another. The judgement call is crucial because recognizing and acting on changes of concern often drives the most important activities in managing watersheds.

- The goal of this section is to discuss the concept of change, the concept of change of concern, and the fact that there are many possible approaches to distinguishing between the two.
[Draft definition: "Change of concern" in a watershed is the significant alteration or loss of a primary watershed process or structural component that persists beyond normal cyclical change such as seasonal change. Change of concern may affect the ability of the watershed to recover and limit the watershed's potential ability to function after recovery.]
- Permanent or long-term change contrasts with common dynamic properties of many ecosystems as a rule. Time frame for recovery potential and degree of recovery possible are very relevant to identifying change of concern.
- ecological risk assessment and environmental impact assessment are a few of the more systematic approaches developed for evaluating the magnitude of a change or proposed change. In a way, assessment tries to distinguish change from change of concern. This course will address these topics in future lessons.

B. Agents of change *(lecture format)*

- Agents of change are both natural and human-made. In reality, changes are often a product of human and natural sources acting together. A natural catastrophe such as a flood might cause damage in an undeveloped watershed, but is likely to cause greater damage in a heavily developed watershed with substantial impervious surface. Before discussing the types of major changes that can occur in watersheds, below are several of the agents of natural and human-made change.

Major agents of natural change and what their usual impacts are

- fire
- flood
- drought
- ice jams, snow melt
- windstorm
- disease/pest outbreak
- earthquake
- volcanos
- climate change

Major agents of human-made change and what their usual impacts are

- urbanization
- forestry
- mining
- hydro-mod: dikes, levees, dams, channels, wetlands, etc.
- cropland
- grazing
- recreation
- fire, fire suppression
- all forms of waste or pollution release.

Course then covers examples of synergy between human and natural factors, explaining how human-made change often reaches levels of concern; examples:

- watershed land use effects on flooding
- exotic spp. invasions/introductions
- predator/prey imbalances
- disease in monocultures
- erosion: accelerated and natural
- climate change (proven on local scale, e.g. temperature; possible on larger scales)

C. Watershed Processes that are Vulnerable to Changes *(Alternating short lectures and brief case studies format)*

This part describes how change occurs in terms of the major processes and structure of typical watersheds. The intent is to continue to return to the major beneficial functions and processes of watersheds throughout the course.

Processes and how they change

- refer back to structure and function categories under Lesson II
- run through several and discuss how change occurs, what the agents can be, and what the effects on the watershed can be. Pos or neg examples, quick case studies

1. nutrient cycling
2. hydrology
3. habitat and life support, including humans
4. sediment transport
5. others ...

D. Field trip

Depending on location course is offered, a bus tour to various impacted and non-impacted sites could demonstrate much about the watershed processes and changes. Up to ½ day.

E. Wrap-up *(informal speaking format)*

Summarize:

- the nature of watershed change
- change of concern
- agents of change
- how major processes and structural components are changed

Where to get more information

- generally this part of the wrap-up addresses more advanced training courses and references related to the preceding lesson

Questions at this point

** end of Unit III **

Unit IV: Watershed Analysis and Planning

[Time: 4.0 to 5.0 hrs]

Objective 4: be able to explain the role of watershed analysis and planning in support of comprehensive problem-solving.

Ideas for Instructional Techniques: See parenthetical text at subject headings. Also: Keep the questions fundamental to emphasize link to routine daily activities. Exercises on: inventory of all institutional, ecological and socio-political resources/trends from a case study; analysis of stakeholders; watershed goal/objective setting, based on case study. Practice writing measurable objectives.

A. Perspectives on planning and analysis *(informal discussion)*

This section is a generic discussion of planning. This lesson intentionally does not use specific agency/institutional jargon, or label this as a federal planning process.

Need to understand that it is possible and necessary to use planning principles to help meet watershed management objectives and that elements of planning are continuous, not discrete.

Rationale for planning and analysis: what is planning and analysis and why do we need to do it? Intentions are to--

- Gain acceptance for planning
- Relate watershed planning to the personal planning that people do every day--it's not something dreamed up by institutions
- Clarify that planning is a process that educates, and builds trust and receptivity
- Define the scope and scale of possible planning actions
- Illustrate how planning sets the stage for intelligent, focused and efficient action, and prompts better solutions
- scales, scopes and time frames for planning and analysis -- relate to identified problems and desired solutions

B. A general planning and analysis framework *(lectures and exercises format)*

This framework is not any single agency's or organization's planning protocol. It is a general and logical framework indicative of the general planning and analysis process. We have used a sequence of questions, below, to lead trainees through general planning steps.

1. Where are we right now?

- This step involves describing current status, and then making a brief synopsis of the entire planning/analysis process before it is carried out at the proper level of detail

- Initial questions: Is the intent to solve specific acute or chronic watershed problems, or is main thrust to develop a long-term framework to restore qualities and functions and/or to serve as blueprint for future development?
- Identify players/stakeholders
- Delineate physical boundaries of watershed (or study area)
- Develop public involvement strategy
- Identify perceived issues, problems, opportunities and needs
- Communicate desire to plan and take action
- Discuss valued attributes of watershed, and goals proposed by all players
- Identify measures of success
- Identify potential resources
- Clarify initial concepts of the health/condition of the watershed

2. What do we need to know and how do we get it?

- Identify needed information and develop strategy for obtaining it
- Gather and clarify existing information (e.g., ecological, institutional, socio-political resources and trends) and identify ownership and costs of data collection
- Information and data collection begin at the start and vary in focus and detail throughout the planning process.
- Initial monitoring strategies are planned, to provide information to set and define goals, as well as to build on or compare during and after implementation.
- Reorganize information as needed to support actions or decisions
- Determine if information is adequate to identify stressors, responses, and potential effects on valued attributes of the watershed
- Identify and document any critical information still missing at end of data collection phase. Collect now if possible, or later when feasible.

3. What does the information mean and how important is it?

- Goal: analyze the data to develop action-relevant findings that indicate the risks of change and/or potential for improvement
- Discuss data analysis techniques (discuss common procedures including HGM wetlands assessment, HEP/HSI, land use/cover analysis, rapid assessment methods, PNW watershed analysis, ecological risk assessment)
- Identify pros and cons of the techniques
- Discuss commonalities of the techniques (emphasizing strong problem identification, stress/response focus, key indicators, driven by valued attributes, interpretation to aid action)
- Stress the importance of inventory, monitoring and baseline determination
- Departures from expected norms are explained or defined as representations of problems or the extent to which restoration is needed. The need for further or more detailed or selective data collection is determined; collect if possible. Modeling is a very important tool to make use of large amounts of site-specific data.
- Revisit initial problem/issue identification. Is the problem really a problem? New problems, needs or opportunities revealed? Any other information or analysis needed to deal with opportunities/problems/needs? Collect if possible.

4. What results are we looking for, and where should we go?

- Dialogue on desired future conditions/watershed health and condition (link to relevant Lesson VI topics--partnering, conflict resolution, etc)
- Revisit goal setting
- What problems or conditions will be treated and to what extent? This relates back to thresholds in terms of how much of the change in condition is needed in order to achieve the desired level of restoration or protection.
- Consider societal and ecological values, and optimizing combinations of both
- Identify/consider conflicting needs and incompatible uses

5. What are the different ways to get the results?

- List procedures for generating alternatives (single actions or measures which can be implemented separately or together)
- Potential alternatives should be identified in concept, no matter how far-fetched they appear at first glance.
- Potential alternatives should be based on fundamental changes in watershed structure and function. Using a flood control example, the focus of the initial alternatives should be on either reducing the stage and/or duration and extent of flooding events, or acting on the watershed elements that are damaged by flooding events.
- Identify actions which are dependent on other actions and/or which maximize or leverage other actions
- Give examples of alternatives and their interactions

6. What are the consequences of each of these alternatives?

- Evaluate pros/cons of each alternative, by quantifying and qualifying them descriptively. Initial effects of each alternative should be identified rapidly, in order to identify those with the greatest and least impact on the objectives. Later detailed analysis can further refine the extent to which alternatives address the conditions and their costs and environmental consequences.
- Include costs, NEPA and other laws and requirements
- Introduce concept of risk management

7. Which way should we go?

- Alternatives are arrayed with their beneficial and adverse consequences, and the watershed planners determine which one(s) are the most desirable from many different aspects.
- Describe techniques for decision-making (link to module VI, social/organizational elements)
- Assure that alternative comparisons are valid (e.g., compare apples to apples)
- Confirm that prior steps support the decision
- Clarify potential trade-offs--

between competing uses of resources, and for possible futures foregone in order to achieve current goal

8. Who's going to do what, when, where, and how?

- Develop Action Plan that will--

- o achieve stakeholder buy-in to the extent feasible
- o involve interdisciplinary teaming and will address accountability, responsibility, resources and schedules
- o define specific projects or actions
- o decide who pays for what

9. How will we know it's working? Is it working? Where are we now?

- Revisit measures of success; distinguish between closure offered by completing a successful management action versus a perpetual process
- The information and data collection process continues throughout the planning process.
- Describe need for monitoring overview/plan. Monitoring changes in social attitudes and perceptions, as well as measurable changes in watershed structure and the nature of problems reveal effectiveness of implemented actions and also the need for midcourse corrections (adaptive management).
- Emphasize feedback loop to step 1

C. Wrap-up *(informal speaking format)*

Summarize:

- why plan, why analyze
- types of assessment
- general planning steps

Where to get more information

- generally this part of the wrap-up addresses more advanced training courses and references related to the preceding lesson

Questions at this point

** end of Unit IV **

Unit V:
Actions and Measures to Restore or Sustain Watershed Condition
[Time: 2.0 to 4.0 hrs]

Objective 5: be able to list a variety of actions that can be applied singularly or in combination to restore or sustain watershed condition.

Ideas for Instructional Techniques:See parenthetical text at subject headings. Also: Develop table showing agents of change, effects, and management actions addressing the effects. BMP board game. Fill-in-the-result case studies.

A. Overview:

This unit covers a broad overview of the types of actions and measures used to restore or sustain watershed condition, and it describes how watershed efforts move from planning to implementing management actions.

What do we mean by the term management practices or tools?

- watershed tools have been defined as any method, approach, or technique used to evaluate, measure, correct or prevent a chemical, physical or biological impairment or threat to a watershed. As this course unit focuses on management actions, the tools of highest interest here include techniques to prevent or correct impairments or threats.

What are common types of actions?

- broadly, includes direct and indirect types of actions (also sometimes called passive vs active approaches). The distinction is made to emphasize that improvements can be made directly, by carrying out specific actions on the ground, or indirectly, by influencing communications, laws, common practices or public opinions that may lead to change on the ground .

Direct actions (on the ground action in itself)

- Best Management Practices and Management Measures
  - Context as typically part of voluntary non-point source control procedures
  - Relationship to water quality standards program
  - State and federal examples
- Emergency response
  - Federal (FS, BLM) response programs (e.g., Forest Service Burned Area Emergency Rehabilitation)
- Structural controls (retention ponds, lagoons, etc.)
- Non-structural controls (nutrient mgt, growth mgt, etc.)
- Other forms of treatment, mitigation

Indirect actions (remote action that leads to on the ground change indirectly)

- Education and outreach
- Laws, regulations, enforcement, ordinances, policies
- Incentives, financial assistance
- Technical assistance
- Temporal and spatial considerations to reduce impacts
- Mitigation banking
- State-level examples: OR Senate bill 108, NC no discharge rule, VT AAPs, WI cost-share program

Relate back to planning process for selecting individual and combinations of tools. This is key to using best mgt practices; a watershed assessment and plan is needed to guide cost-effective and technically appropriate selection and application of management measures.

B. Relationships between tools and watershed structure and function using case studies/experiences of practitioners *(mixed formats)*

Here the course unit reiterates the way management actions should address specific watershed structural characteristics and functions in order to accomplish improvements for the community and the environment that may be better suited to stand the test of time.

The proposed format to cover these ideas is:

- Watershed process/issue: (e.g., Flooding)
- Tools: (e.g., zoning, channel restoration, riparian zone mgt, BMPs aimed at infiltration/runoff)
- Measures of success, which should focus on sensible indicators of environmental condition not just 'bean-counts' of BMPs implemented.

Case studies used to make these points:

- Floodplain management example
- whole watershed management example
- micro-scale project example w/a terrestrial focus
- micro-scale project example w/a riparian/aquatic focus

C. Wrap-up *(informal speaking format)*

Summarize

Where to get more information

- generally this part of the wrap-up addresses more advanced training courses and references related to the preceding lesson

Questions at this point

** end of Unit V **

Unit VI:
Social and Organizational Elements of Watershed Management

[Time: 3.0 to 6.0 hrs]

Objective 6: be able to incorporate social and organizational elements into the watershed approach.

Ideas for Instructional Techniques: See parenthetical text at subject headings. Also: Case study(ies) staged to sections in the lesson (e.g., multiple use/limited watershed resources, then challenges, and then specific tools used to deal with the challenges)

A. Overview: looking at the watershed from a social perspective *(informal talk)*

Why do we need to integrate societal and individual needs into the watershed approach?
- Because without these considerations, even the best watershed science and planning cannot gain the community support it needs to succeed.

What are the main social and organizational elements this unit will cover?
- multiple uses of watershed resources
- challenges facing communities and watershed managers
- tools for overcoming these barriers
- in the wrap-up, audience will see in the closing messages how heavy an influence these social considerations have on watershed approach success or failure

B. Multiple uses, limited watershed resources *(informal group discussion)*

Review the multiple human uses that usually occur in watersheds. In a way the course returns to the beginning of the watershed approach and looks at watersheds from a community perspective, focusing on the full suite of human activity occurring in a few common types of watersheds. This discussion sets the stage for teaching trainees about the main challenges facing watershed management efforts and the tools available to overcome these challenges.

C. Challenges that watershed managers and resource users face *(lecture with case studies, videos)*

This section describes many types of common challenges that must be addressed in watershed work. Instructors will use a few case studies in this lecture as brief examples of these challenges. Later, under the tools section, instructors will return to the same case studies to show how the tools were used to solve the problem.
- Resource limits are the initial constraint. This includes limits to water quantity, land,

and living resources in both land and water
- Competition for resource use is the next level of challenge faced. Uses cannot all co-occur and therefore compete.
- The nature of human behavior is a special challenge. Several typical behavior patterns are discussed (e.g., opinion leaders' role, participants vs. nonparticipants, NIMBY, fear of the unknown, etc.)
- Limits to our knowledge, scientifically/technically, on impacts, cause/effect relationships, and ability to predict outcomes. Influences our communications with public and officials
- Societal values present guiding principles for part of what a watershed approach should try to accomplish, but also force many challenging decisions when conflicting aims occur.
- Ownership, public interest, and private property and water rights all provide yet another level of challenge to effective watershed management.
- Laws (e.g., National Environmental Policy Act, Clean Water Act, Endangered Species Act, Safe Drinking Water Act, Farm Bill, Water Resources Development Act, ISTEA, etc.) as basic institutional frameworks that challenge and limit as well as guide and facilitate watershed management. Address state and local acts as appropriate for the area where each course session is offered.

D. Tools for overcoming barriers *(lecture with case studies, videos)*

- Stakeholder ID processes (ID non-participants as well and determine ways to inform or include them)
- Foster establishment of watershed councils/coalitions or other partnerships
- Statewide watershed management approach, linkages to local watersheds
- Networking (combine expertise and funds to plan and implement)
- Conflict resolution techniques, consensus building, decision process techniques
- Outreach and public information strategies
- Fundraising, grantsmanship, statutory sources of watershed support

E. Course wrap-up: Recapping the six course units, the three C's, and other closing messages *(informal talk, some group discussion)*

Because each unit has had a closing section individually, the course does not need a thorough review and recap of all units. This final wrap-up unit is reasonably brief and focuses on perspectives and closing messages to take away from the course. Two are described here, but there could be others added during course development.

Recapping the six course units: bottom-line messages from each unit
- Unit 1: Although it is challenging to take a watershed perspective, the benefits of working in watersheds are considerable and have been demonstrated in many ways.
- Unit 2: Watersheds are a type of ecosystem that has a characteristic physical structure, interacting biotic and abiotic components, and a set of natural processes that are beneficial to humans and the environment in general.
- Unit 3: Natural events and human activities are capable of causing change in watershed

structure and natural processes, and changes of a high magnitude can be reason for serious concern.
- Unit 4: Given that watersheds function in certain ways and significant changes can threaten the benefits we get from these functions, there are methods for analyzing the condition of watersheds and for planning specific actions to address watershed problems.
- Unit 5: Watershed management and restoration techniques include direct, on-the-ground actions such as stream corridor restoration treatments and indirect actions such as landowner easements and incentives.
- Unit 6: Many social, economic, legal, and institutional considerations must be addressed in the watershed as well as the scientific technical issues in order to implement a successful watershed approach.

The three C's
- Connectedness. Everything is connected to everything else; everything influences everything else. These connections are reinforced by cycles.

- Choices. We make choices which are a reflection of our interests. The diversity of our interests combined with the finite amount of resource and time to use that resource result in conflict, demanding more or different choices. It is important for watershed studies be collaborative efforts so that these potential conflicts are identified and trade-offs are understood. The uses, users, impacts and consequences of choices on watershed resources need to be identified.

- Change. Change is constant in watersheds, our communities and ourselves. Systems are evolving, our understanding of watershed ecosystems is expanding and modifications to the physical environment and our socio-political structure are continually being made. Because everything is connected and cyclical, because there are choices and conflicts resulting from those choices, there is always change. Nothing is static, nothing can be "fixed" for all time. Perhaps the best we can do is choose for now and predict and prepare for the future. That is, develop a management plan with immediate, short-term and long-term measures and goals and contingencies. A plan that adapts to change will have a greater chance of success.

Principles of Watershed Protection and Management

1 Watersheds are ecosystems that
- benefit and sustain life in human and biotic communities alike
- have interrelated, dynamic processes that we can often work with, not against
- are practical units for management

2 Effective resource management
- is never ending
- involves those affected by decisions
- reflects the integrated nature of nature itself

3 A strong watershed framework
- uses sound science

- facilitates communication and partnerships
- fosters cost-effective decision making
- stimulates action and tracks results

4 There are many ways to approach watershed management, and flexibility is always necessary.

Final thoughts: Recalling the watershed problem situation the group discussed at the beginning of the course, how would trainees approach a solution differently now after learning what they did in this course? Open floor discussion, 10 min.

Adjourn

** end of Unit VI and course **