REPORT OF THE ECOSYSTEM-BASED ASSISTANCE GUYDELINES
ACTION TEAM

# ECOSYSTEM-BASED ASSISTANCE (EBA)
# PRINCIPLES AND GUIDELINES

United States
Department of Agriculture

Natural Resources
Conservation Service

March 17,1995

Contents



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## I. EXECUTIVE SUMMARY

### PRINCIPLES FOR
### ECOSYSTEM-BASED ASSISTANCE (EBA)

I. ECOSYSTEMS ARE HIERARCHICAL. ENTRY PLANNING AREA IS ENCOMPASSED IN LARGER ECOSYSTEMS AND ENCOMPASSES SMALLER ECOSYSTEMS.

II. ECOSYSTENIS ARE COMPLEX. THE LIVING AND NON-LIVING COMPONEN'TS OF ECOSYSTEMS ARE INTERCONNECTED AND INTERDEPENDENT.

III. ECOSYSTEMIS ARE DYNAAIIC. TEMPORAL CHANGES OCCUR IN ECOSYSTEM STRUCTURE AIND FUNCTION.

IV. ECOSYSTEMS PERFORM CRITICAL LIFE-SUPPORT FUNCTIONS.

V. HUMANS ARE AN INTEGRAL PART OF ECOSYSTEMS.

VI. KNOWLEDGE OF ECOSYSTEMS IS INCOMPLETE.

*The Natural Resources Conservation Service (NRCS) provides Ecosystem-Based Assistance in the planning process to achieve its vision of a productive nation in harmony with a quality environment.*

*EBA integrates ecological, economic, and social factors through NRCS' planning and assistance processes to maintain and enhance the quality of the environment to best meet the land-user's and society's current and future needs.*

*NRCS provides EBA to individuals and groups to assist them in making decisions to improve or restore damaged ecosystems, to improve or maintain ecosystem health, and to achieve a sustainable level of use of the Nation's natural resources.*

*NRCS will incorporate the above EBA principles into all program activities.*

## II. INTRODUCTION

### a. Preface

In recent years Federal agencies have worked separately and together to develop the concepts of Ecosystem Management (EM) or in the case of the Natural Resources Conservation Service (NRCS), Ecosystem-based Assistance (EBA). Whatever the terminology, the resolve of the agencies seems firm and positive that agencies need to change the way they look at planning and the need to use innovative solutions to approach problems differently than bas been done the past.

This awareness among not only the agencies, but also among the public, is hastened by the realization that dealing with parts and pieces of the environment has antagonistic and detrimental effects, and while there may be some short-term ben6-fits, there ma be long-term adverse impacts as well. It is necessary to take a different look at the way human institutions operate in relation to Nature. It is time to reassess how human activities affect Nature. When economic and social goals come into conflict with Nature's activities, natural systems often are the losers. Natural systems do not have the flexibility to change the way that human systems do, therefore more consideration and evaluation must be given to bow natural systems, will be influenced by specific actions. To accomplish this, NRCS chose to integrate Ecosystem Management precepts with its assistance given to landowners and land users; this is EBA.

This report is a product of a team of experts that was assembled to develop the "principles and guidelines" needed to make NRCS implementation of EBA as efficient as possible. The report gives direction that various groups within NRCS can use to help implement EBA 'in their own programs and activities. The report should not be considered the definitive final word concerning EBA. Each group within NRCS should use the materials presented here as guidelines to support and enhance their own efforts to better understand and implement Ecosystem-Based Assistance.

### b. Historical View

What we witness today as "holistic planning" had its start at least a hundred and fifty years ago when Henry David Thoreau set down his thoughts about his life and its interactions with Nature at the small Walden Pond in Massachusetts. Later in that century, John Wesley Powell explored the western reaches of these United States. These writings about the interactions of the land, water, climate and other factors described an ecological web of actions, one dependent upon the other. Aldo Leopold continued the building of an ecological context in the 1930s with his descriptions of the interactions of wildlife, farming and nature.

For many Americans the Apollo flights to the outer reaches of space and the moon allowed millions of people for the first time to see the whole Earth as it appeared from

outer space. Seemingly, a small sphere of mottled blue and white with continental islands floating in giant pools of water. Now for many individuals, the Earth did not have countless Frontiers just over the horizon.

Those images changed forever the public's concept of the human relationship to the Earth, and of the Earth's relation to the Universe. No longer did the Earth seem boundless; there were limits. Everyone could see them. Many people recognized the self-contained structure on which humans lived bad bounds. Unless mankind tended and planned the future of the Earth's natural resources, environmental degradation and catastrophe were possible and maybe inevitable.

A change in perspective called for a change in thinking. What was satisfactory a quarter century ago, now called for a new way of operating. For the NRCS that changed thinking was Ecosystem-Based Assistance. EBA looks to planning with humans as part of Nature, rather than being something separate from Nature. EBA thinks of human actions being in concert with the ecosystem, rather than thinking of the ecosystem as an enemy to be defeated. Rachel Carson said: "Man is part of nature and his war against nature is inevitably a war against himself'." EBA offers a way for the NRCS personnel to work in concert with Nature, with institutions- and with other-individuals to simultaneously achieve both human goals and be in harmony with Nature's laws. EBA offers the opportunity to integrate ecological, social and economic aspects into a single planning effort.

The ecosystem approach allows land owners, managers and users the opportunity to examine and assess how individual actions and activities will affect and influence their land water, air, plants and animals. When all parties start to see their actions in terms of others' impacts then ecosystems start to benefit from that thinking. When ecosystems are benefited , all the actions and activities within that ecosystem are benefited. This is not to say that accomplishing those goals is an easy task, but the effects from that cooperative planning will be long-lasting and will benefit both NRCS clients and Nature.

The principal role of the NRCS is to provide technical assistance to owners and operators of non-federal lands within the United States. This has been and will continue to be the major function of the NRCS. Since the mission and goals of NRCS relating to land use and natural resource management are accomplished through the decisions made by others, NRCS has adopted the concept of EBA. Ecosystem-Based Assistance describes how NRCS provides technical assistance to decision-makers and conservation partners as a standard method of doing business. EBA builds upon NRCS' planning process to effectively address broad-scale natural resource and ecosystem issues and concerns.

### c. The EBA Guidelines Action Team

NRCS appointed the Ecosystem-Based Assistance Guidelines Action Team to define what EBA represented in principle and how it could operate in a multidisciplinary agency like

NRCS. The Ecosystem-Based Assistance Guidelines Action Team met in Washington D.C. during the week of May 23, 1994. The Action Team's original charge was to:

> Develop a practical,-user friendly process that integrates economic, social, and environmental concerns and assists field staff in identifying problems and opportunities in an ecological framework.

The team revamped this original charge to more accurately represent needs expressed in the Ecosystem-Based Assistance Action Plan (Item 1 of the Technology Actions). The revised charge became:

> Develop guidelines that integrate Ecosystem-Based Assistance into the NRCS assistance process to maintain and enhance the quality of the environment and to best meet society's current and future needs.

Ecosystem-based Assistance is defined in the EBA Action Plan as:

> ...the appropriate integration of ecological, economic, and social factors through the-NRCS planning and assistance process to maintain and enhance the quality of the environment to best meet society's current and future needs.

EBA is the process to guide the sustainable management of natural resources and of the ecosystem where those natural resources are located. Although "ecosystem" is a scientific term, it does not have a precise definition. The EBA Action Plan defined an ecosystem as "a biological community and its interaction with the environment." Fundamentally, EBA is based on the analysis of a large-scale area, such as a critical habitat area or watershed, but assistance will be delivered on a site-specific basis to individuals who are part of that large-scale area or influenced by the-effects occurring in that large-scale area. However, small ecosystems must be examined with as much or even more intensity as the large ecosystems.

Assistance, as NRCS has known it in the past, guides individual decisions made by land users and stakeholders in the context of the larger ecosystem in which those land users are operating. This is not a completely different system for many NRCS personnel or for the land users they serve, but in providing ecosystem-based technical assistance NRCS personnel must be more acutely aware than in the past of the relationships between land-user and community actions and natural responses of the area involved.

d. The EBA Action Plan.

The Team's charge was derived from the first Technology Action Item in the EBA Action Plan: The goal was to develop principles and guidelines for EBA that:

⇒ Are based on good science and sound technologies.

⇒ Are practical to attain and are packaged in easy-to-use formats.
⇒ Reflect interactions among biological, social, economic, and physical processes.
⇒ Allow for the imprecision of biological/ecological data.
⇒ Assure adequate soils survey and soil interpretations.
⇒ Recognize short- and long-term changes.
⇒ Recognize risk and uncertainty.
⇒ Recognize international accomplishments in technology.
⇒ Provide a framework to apply science-based ecosystem health indicators.

## III. EBA PRINCIPLES - AN EXPANDED VIEW

The following expanded view of EBA principles is guidance for the person providing Ecosystem-Based Assistance. The guidance provides generic information about the allow better understanding of the principles' content and objectives. Each principle is accompanied by sample implications to give better understanding of the principle's content and objective. A detailed discussion of the principles is provided in the appendix.

### I. ECOSYSTENIS ARE HIERARCHICAL. EVERY PLANNING AREA IS ENCOMPASSED IN LARGER ECOSYSTEMS AND ENCOMPASSES SMALLER ECOSYSTEMS.

When providing ecosystem-based technical assistance:

⇒ Consider relationships among levels of ecosystems to predict the effects of proposed actions or activities.

⇒ Recognize that both the larger ecosystem and the smaller ecosystems may represent different objectives of the people living in those areas. These differing objectives likely will influence and guide decisions that are made about the planning unit.

⇒ Consider transcending administrative, jurisdictional, and geographic boundaries and their potential impacts on the planning process.

### II. ECOSYSTEMS ARE COMPLEX. THE LIVING AND NON-LIVING COMPONENTS OF ECOSYSTEMS ARE INTERCONNECTED AND INTERDEPENDENT.

When providing ecosystem-based technical assistance:

⇒ Consider the beneficial and adverse effects on ecosystem interactions when doing planning.

III. ECOSYSTEMS ARE DYNAMIC. TEMPORAL CHANGES OCCUR IN ECOSYSTEM STRUCTURE AND FUNCTION.

When providing ecosystem-based technical assistance:

⇒ Consider both short- and long-term effects on the structure and function of ecosystems.

IV. ECOSYSTEMS PERFORM CRITICAL LIFE-SUPPORT FUNCTIONS.

When providing ecosystem-based technical assistance:

⇒ Consider how proposed actions will affect the ecosystem's biological, chemical, and physical processes, which sustain all life-support functions.

V. HUMANS ARE AN INTEGRAL PART OF ECOSYSTEMS.

When providing ecosystem-based technical assistance:

⇒ Recognize that human influence on ecosystems can be significant.

⇒ Consider the goals and objectives of both the individual and society.

⇒ Recognize that human welfare depends on healthy, productive and sustainable ecosystems.

VI. KNOWLEDGE OF ECOSYSTEMS IS INCOMPLETE.

When providing ecosystem-based technical assistance, recognize that it:

⇒ Is based on the best currently available knowledge, science and technology.

⇒ Requires the proactive expansion of the knowledge on ecosystems.

⇒ Is flexible and rapidly incorporates knowledge gained from its application (adaptive management).

⇒ Requires cooperative and integrated data collection, planning, and evaluation.

⇒ Requires shared resources and expertise.

## IV. Planning Framework For Ecosystem Based Assistance

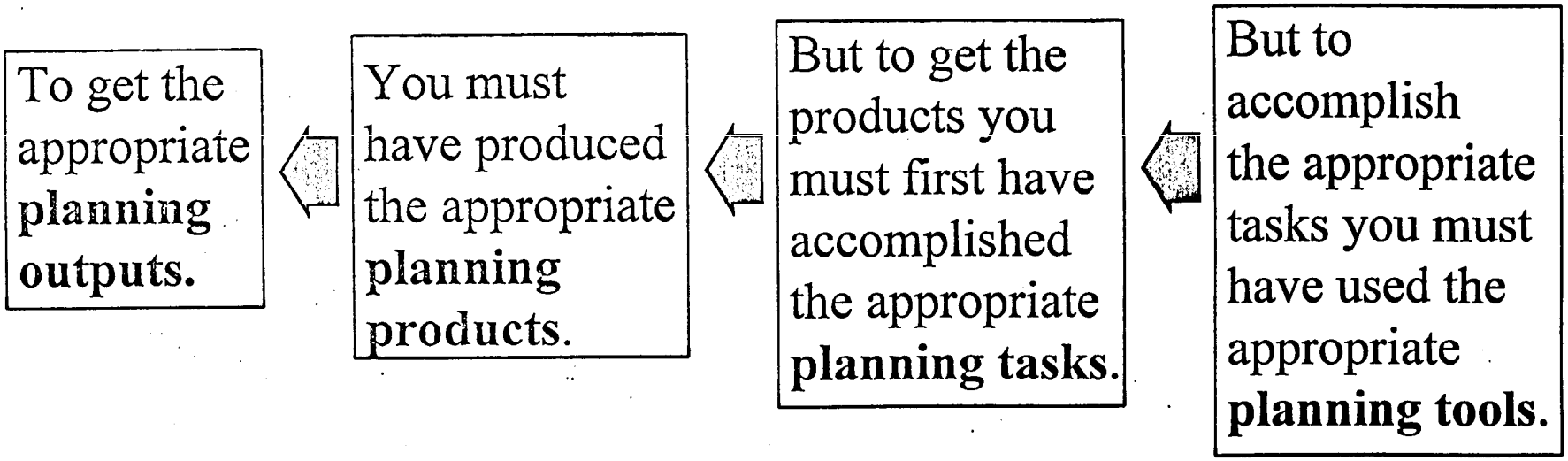
NRCS will provide Ecosystem Based Assistance through its planning process, which will be modified to reflect a change in emphasis from resources to ecosystems. The three diagrams in this section are intended to be a framework to guide planners in applying EBA through the planning process. The concepts illustrated in the diagrams apply to all levels of planning from an individual field to a watershed or larger ecosystem. However, it is very important to understand that they are a guide, not a "cookbook". Planners must exercise sound professional judgment during all phases of planning. Planning assistance must be site specific and tailored to meet the stakeholders' ecosystem management goals. The level of detail and effort will also vary depending on the planning objective and the ecosystem needs.

The nine steps of the planning process have been grouped into three phases. Phase I includes the first four steps: identify problem, determine objectives, inventory resources, and evaluate resource data. Phase II includes the next three steps: formulate alternatives, evaluate alternatives, and make decisions. Phase III includes the last two steps: implement the plan and evaluate the plan. This grouping emphasizes that the planning steps are not linear. Often, several steps may be done concurrently, or a completed step may have to be revisited based on information discovered in later steps.

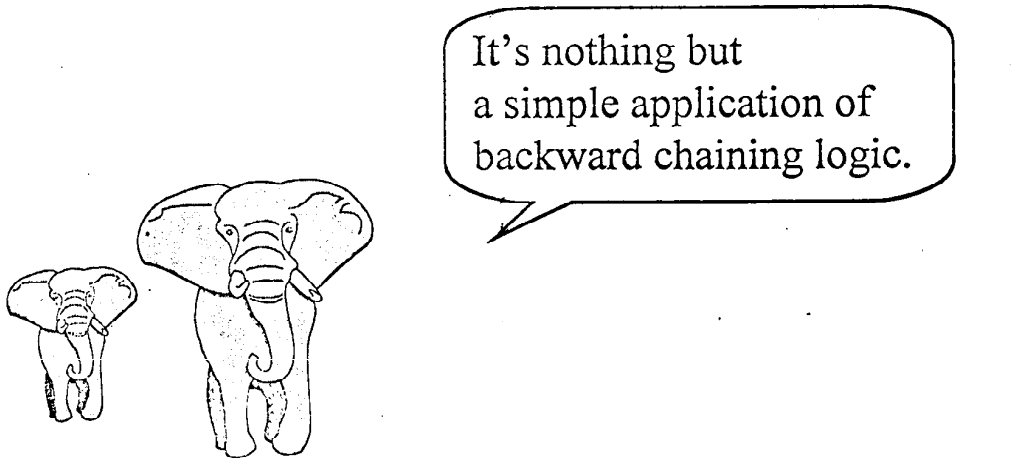
The diagrams are laid out in what is called backward chaining logic and are meant to be read from left to right. The idea is that each phase of the planning process begins with a goals or expected outputs. These outputs are given in the first box. To reach these goals, planners need to have produced the planning products listed in the second box. However, to have produced these planning products, planners need to have completed many individual planning tasks. Examples of some of these planning tasks are given in the third box. To accomplish these planning tasks, planners will have used many planning tools. Examples of planning tools are given in the last box.

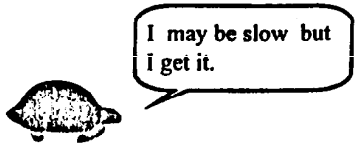
The entries in the first two boxes, Planning Outputs and Products Needed, are generic and apply more or less to all ecosystem-based assistance. The last tow boxes, Examples of Planning Tasks and Examples of Planning Tools, are intended to provide examples. Specific activities will need to be tailored to the ecosystem, and the scope and complexity of the assistance.

How to Read the Diagrams in This Section -- Begin with the left hand box and proceed to the right.






**The overall goal of planning is to help individuals and groups make decisions that will improve ecosystem health, restore and improve natural ecosystems, and achieve sustainable use of the nation's natural resources.**

# *NRCS Planning Process*
## *Phase I*

- *Identify problems*
- *Determine objectives*
- *Inventory resources*
- *Analyze resource data*

**PLANNING OUTPUTS**

- A problem statement for the planning area expressed in terms of ecosystem structure, processes, and human-valued functions.
- Stakeholder-defined objectives for ecosystem management.

**PLANNING PRODUCTS NEEDED TO ACHIEVE OUTPUTS**

- Map of the ecosystems in the planning area.
- Analysis of ecosystems in the planning area.
- Analysis of economic, social, and cultural conditions.
- Analysis of institutional concerns.
- Shared vision of desired future conditions for the planning area.
- List of ecosystem goals and management objectives with indicators and target values for meeting objectives.
- List of priority problems for further analysis.

**EXAMPLES OF PLANNING TASKS NEEDED TO ACHIEVE PLANNING PRODUCTS**

- **Organize technical team.**
- **Define planning area.**
- **Identify/organize stakeholders.**
- **Solicit stakeholder input.**
- **Identify social groups.**
- **Determine stakeholder attitudes and values.**
- **Identify appropriate ecosystems.**
- **Identify structure, processes and functions for each ecosystem.**
- **Characterize historical and current ecological conditions, trends, and health.**
- **Identify linkages between ecosystems and processes.**
- **Identify ecosystem stressors and determine their long and short-term impacts.**
- **Determine current social and economic conditions, trends and health.**
- **Identify minimum ecological conditions needed to maintain ecosystems.**
- **Identify ecosystem problems.**

**EXAMPLES OF PLANNING TOOLS**

- **National Planning Procedures Handbook.**
- **Soils information.**
- **National Wetlands Inventory Maps.**
- **Topographic maps.**
- **Ecoregions Map.**
- **Field Office Tech. Guide.**
- **Expert Knowledge.**
- **Computerized databases of the scientific literature.**
- **Information from other agencies.**

# *NRCS Planning Process*
# *Phase II*

- *Formulate alternatives*
- *Evaluate alternatives*
- ***Make decisions***

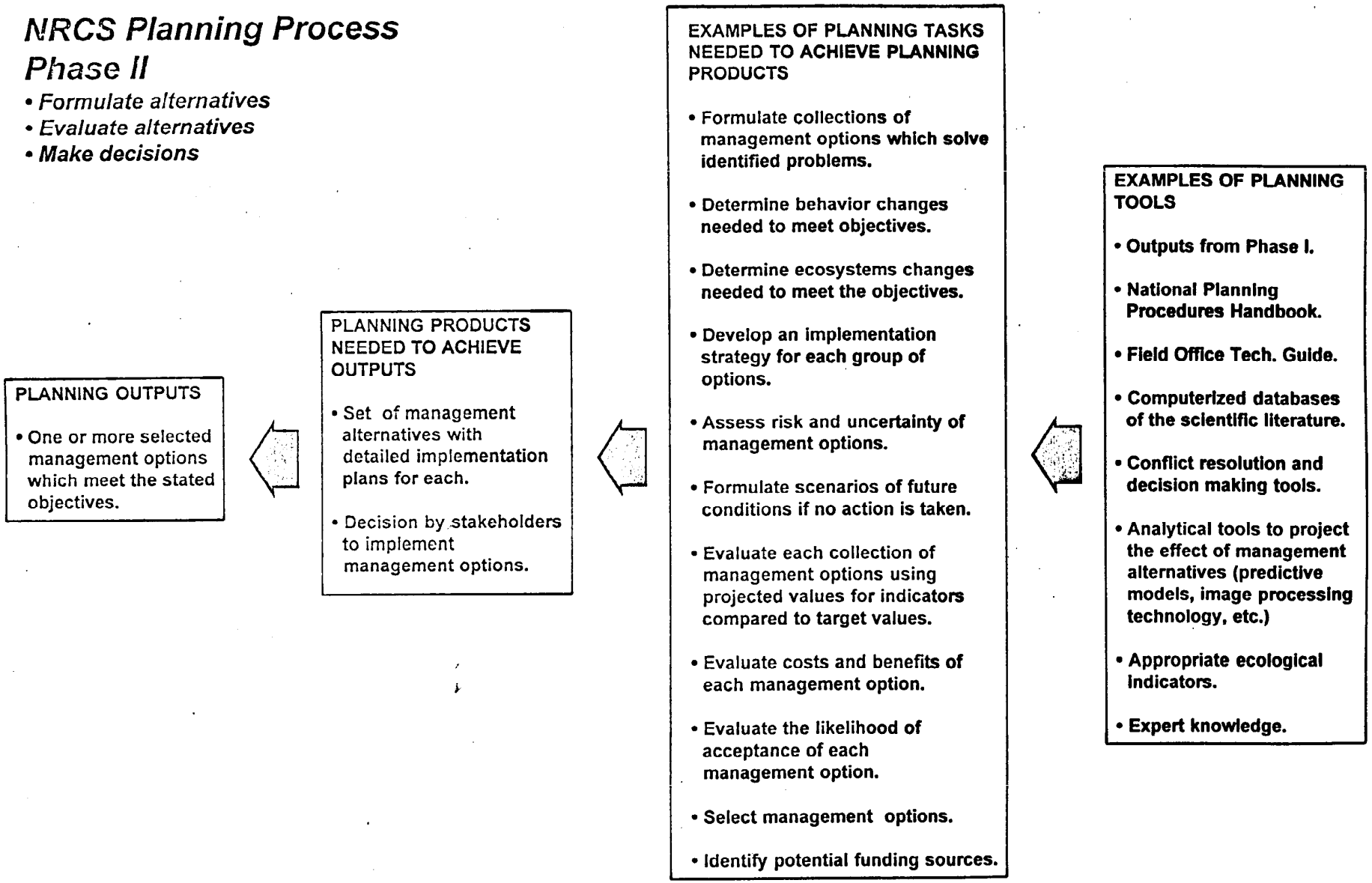



Diagram 2 of 3

# *NRCS Planning Process*
## *Phase III*

- *Implement plan*
- *Evaluate plan*

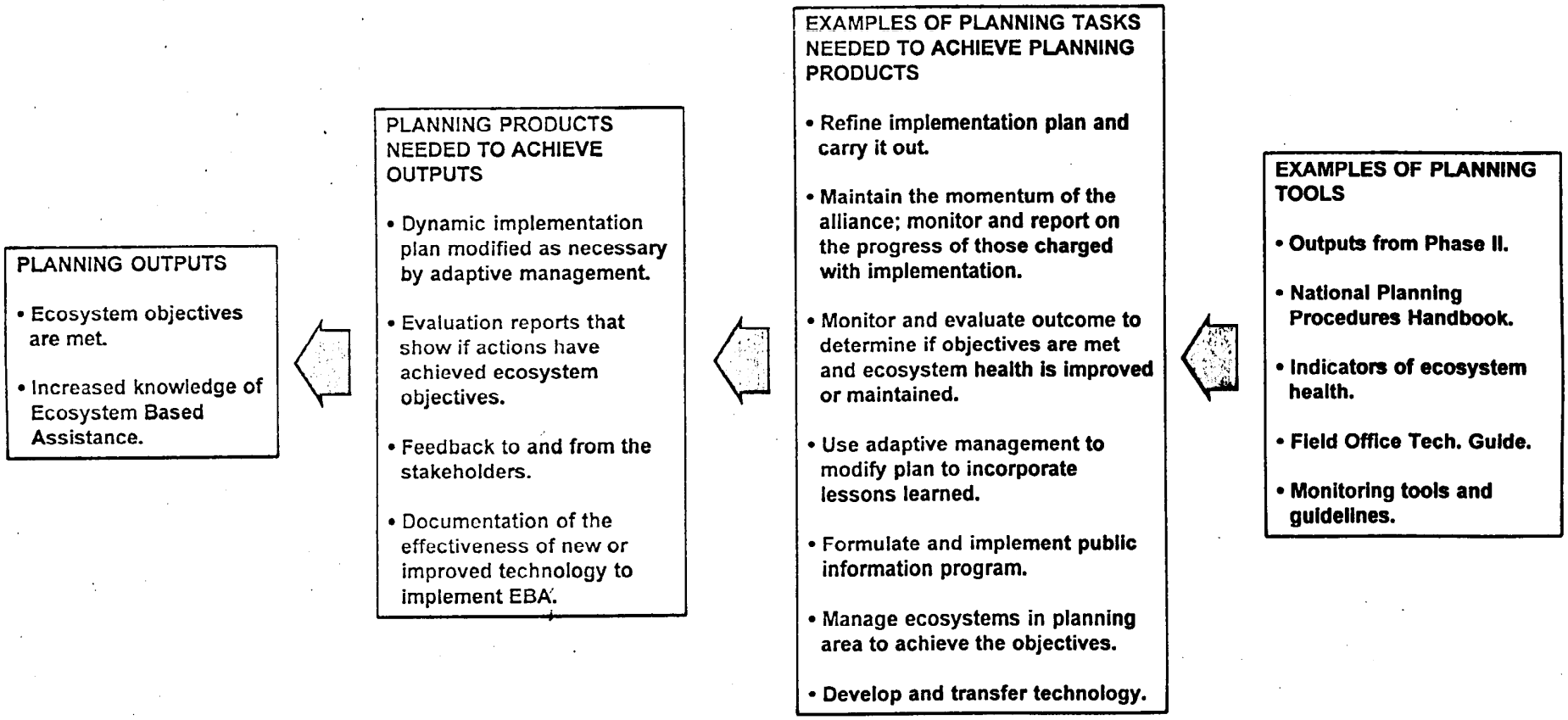





Diagram 3 of 3

## V. DETAILED EXPLANATIONS OF THE EBA PRINCIPLES

Below are detailed descriptions of the Ecosystem-Based Assistance (EBA) principles.

INTRODUCTION

Ecosystem Based Assistance is founded on the following principles and guidelines which are meant to serve as general guidance in implementing EBA:

### I. ECOSYSTEMS ARE HIERARCHICAL. EVERY PLANNING AREA IS ENCOMPASSED IN LARGER ECOSYSTEMS AND ENCOMPASSES SMALLER ECOSYSTEMS.

The concept of an "ecosystem" is a human construct, which is used to describe and model the-interactions between living organisms and their non-living environment in a specified geographic area. This means that ecosystem boundaries can be drawn where appropriate for planning or other purposes, as long as inputs and outputs to the system are considered. Ecosystem boundaries may not match administrative boundaries.

Planning areas, such as farm fields, whole farms, watersheds and ecoregions, can be considered as ecosystems. These ecosystems are embedded in larger ecosystems and in turn have smaller ecosystems embedded within them. Ecosystems are linked to each other by the functions they perform.

Effects, which occur at the lowest planning unit level, can be translated upward toward the larger ecosystems. In addition to the local site conditions, EBA must consider the interactions and interconnections between the smaller and the larger units of the ecosystem to accurately predict consequences and effects of proposed actions and activities.

EBA goals and objectives at the, planning unit level should complement goals and objectives at higher level ecosystems. The effects of management changes in the planning unit should be complementary to the goals and objectives of the larger ecosystems.

Each planning level addresses ecosystem management concerns or goals in different degrees of detail, ranging from the farm's field to an "ecoregion-region" level.

An example of a planning unit hierarchy could be:

Farm or ranch field
Conservation Treatment Unit (CTU - groups of fields)
Operating unit (a farm or ranch
Area ecosystem (watershed, airshed, or critical habitat)
Regional ecosystem (groups of watersheds, airsheds, or habitats)

## II. ECOSYSTEMS ARE C0MPLEX. THE LIVING AND NON-LIVING COMPONENTS OF ECOSYSTEMS ARE INTERCONNECTED AND INTERDEPENDENT.

Organisms are linked to each other and to their environment through complex cycles of nutrients, oxygen, energy, water, and other necessities of life. Maintaining the interconnections between the living and non living components of an ecosystem is vital to maintaining its structural and functional integrity.

The whole biosphere can be considered one ecosystem since all of the living and non-living components of the Earth's surface are ultimately linked together at the global scale. Because of the interdependency of ecosystem components and the interlinking of ecosystems at various scales, a single change of sufficient intensity can affect an entire ecosystem and the effects can be transferred to other ecosystems.

## III. ECOSYSTEMS ARE DYNAMIC, TEMPORAL CHANGES OCCUR IN ECOSYSTEM STRUCTURE AND FUNCTION.

Ecosystems are not static. The structure (e.g., species composition) and function (e.g., nutrient cycling) of ecosystems change naturally over time in response to climatic, geologic, biologic and other changes associated with the aging of the Earth. In turn, these changes effect other changes in the ecosystem.

Ecosystems have a inherent capacity to respond to changes without being drastically altered themselves. This capacity varies from ecosystem to ecosystem; some ecosystems being more resilient to changes than others. When the capacity of a given ecosystem exceeds its capability to absorb changes, a new and different ecosystem may replace it.

When one component of the ecosystem, either living or non-living, is changed, the future conditions of the ecosystem likely will also be changed. The magnitude of any change in an ecosystem will determine how much the future of the ecosystem will be affected.

EBA must consider both long-term and short-term effects of planned actions. EBA requires periodic re-evaluations of ecological, social and economic conditions and trends to adapt management decisions to the changing ecosystem. EBA must account for these dynamic changes and be ready to respond to the changes by having and implementing an adaptive planning process.

## IV. ECOSYSTEMS PERFORM CRITICAL LIFE-SUPPORT FUNCTIONS.

Human life is dependent on ecosystems. Natural resources, such as food and fiber, as well as other components necessary for life are produced by ecosystems. In addition, ecosystems are the reservoir of many present and future medicinal and derivative products, as well as spiritual, aesthetic and restorative environments for the human spirit. Human interests are well served when the ecosystem's long-term sustainability is assured.

The EBA concept recognizes different types of ecosystems, including natural ecosystems and managed ecosystems (e.g., agro-ecosystems). Each of these systems and managed ecosystems (e.g., "agro-ecosystem"). Each of these systems are sustained by basically similar functions related to productivity, energy flow, and nutrient cycling All of these functions are essential for supporting life.

## V. HUMANS ARE AN INTEGRAL PART OF ECOSYSTEMS

Human values and activities influence the structure and functions of ecosystems. Human actions are a key component because of direct and indirect impacts, both adverse and beneficial, resulting from those human activities. These activities can have profound impacts on ecosystems throughout the world.

The role of humans is strongly considered in the formulation and delivery of Ecosystem-Based Assistance. The challenge in EBA is to balance the short-term demands for goods and services with the long-term sustainability of the ecosystem. An EBA plan is ecologically sustainable, economically sound, and acceptable within stakeholder's social and cultural values. When problems arise in an ecosystem, they are usually expressed as human values. In achieving a desired ecosystem condition, human values determine scope and extent of problems and the associated corrective actions to be taken.

Ecosystems must be sustained for the long-term well-being of humans and other forms of life. Human land use and management decisions determine the quality, health, and sustainability of ecosystems. Knowledgeable, well-informed decisionmakers are essential for a sustainable agriculture and natural resource use.

The combined impacts of individual human actions and activities affect the sustainability of ecosystems and natural resource use. EBA requires the consideration of the accumulative effects of human influences within and beyond any given planning area.

EBA is based on a shared vision that is developed with all stakeholders. Keeping in mind the vision to be achieved, management objectives are developed using historical data and current ecosystem information. The goals, values and concerns of both the individual, as well as those of society, determine the nature of resource management plans developed and implemented resulting from EBA.

The viability of EBA is dependent on the voluntary participation of landowners and users, and on their objectives regarding natural resource stewardship. These objectives should reflect the shared vision of the stakeholders. Land use and management alternatives should include economic considerations of the land user which should be in balance with the shared vision of the stakeholders.

## VI. KNOWLEDGE OF ECOSYSTEMS IS INCOMPLETE.

The relationships between living organisms and their environment are part of an ecosystem's complexity and are not fully understood. While our knowledge of the natural world grows daily, some important relationships regarding the effects of management activities on resources and ecosystem functions is unknown. Although our knowledge is incomplete, we still provide assistance based upon the best available knowledge derived from cooperative efforts, data collection, analysis and dissemination among various agencies and groups.

To understand ecosystem complexity, scientific data and technical tools are used to help evaluate impacts upon ecosystem components and processes. In many instances individual effects to the ecosystem cannot be directly determined, therefore ecosystem health indicators are used to describe effects. Predicting both on-site and off-site effects upon ecosystem components is essential and is an inherent part of EBA.

Since many decisions are made with inherent risk and uncertainty, the concept of adaptive management is included in EBA. Adaptive management is the process of using monitoring, evaluation, and experimentation to provide information to adjust future management decisions.

Ecosystem-Based Assistance can be implemented successfully using current knowledge and technology, while recognizing that the art and science of natural resource management will continue to evolve and will never be complete or finished.