

CHAPTER THREE

Implementing Sustainability

One challenge of stewardship of the national forests and grasslands is to translate the broad-gauged policy of sustainability into specific planning and management practices that will provide long-term ecological, economic, and social benefits. This chapter defines the characteristics of these three aspects of sustainability. It also explores the ways in which the three are interrelated. Ultimately, it suggests ways in which we can measure sustainability, determine when the objectives of sustainability have been attained, and fully incorporate these concepts into decision making.

3A. Ecological Sustainability

The Elements of Ecological Sustainability

Ecological sustainability means maintaining the composition, structure, and processes of an ecological system. The National Forest Management Act (NFMA) goals of maintaining species diversity and ecological productivity should therefore be broadly viewed in terms of ecological sustainability. That is, species diversity and productivity can be preserved by maintaining the composition, structure, and processes characteristic of an area.

In its discussions, the Committee acknowledges the hierarchical nature of ecological systems. That is, it specifically recognizes landscapes, species, and genes as sequentially nested levels of the hierarchy. Each of these levels is a useful distinction when characterizing the composition of an ecological system.

Composition

Composition refers to the biodiversity of an ecological system, including genetic, spe-

cies, and landscape diversity. *Genetic diversity* is the variation in inheritable characteristics within and among individual organisms and populations. *Species diversity* is the number of different kinds of species present in a given area. *Landscape diversity* is the variety of plant communities (including their identity, distribution, juxtaposition, and seral stage) and habitats evaluated at the landscape scale.

In the past, management guidelines for biodiversity have focused primarily on individual species of plants, fungi, vertebrates, and invertebrates. The species-by-species approach to assessing biodiversity is impractical to implement, however, simply because there are so many species. A broader, ecological approach is more cost-effective both in terms of time and finances. Such an approach is strongly focused on habitat at a variety of spatial scales, from the project scale to the landscape scale. It requires identifying and measuring variables that will allow reliable inferences about ecological composition.

Habitat alone cannot be used to predict wildlife populations, however. The presence of suitable habitat does not ensure that any

particular species will be present or will reproduce. Therefore, populations of species must also be assessed and continually monitored. Tools for assessing both habitat conditions and population dynamics must be developed and frequently validated. Because of limited time and funds, however, it may only be possible to assess the status of a relatively few “focal” species. These species will provide information about the integrity of the larger ecosystem to which they belong. Focal species can include those that are threatened and endangered, occupy rare habitats, are of high management or public interest, are game species, or are indicator species. (The concepts of focus and indicator species are discussed more fully later in this section.)

Structure

By structure, we mean the biological and physical attributes of sites and landscapes. Structure can be of biogenic origin [e.g., large trees, fish carcasses, and broken branches or rotting logs (coarse woody debris) on forest floors] as well as geologic (e.g., mountains, canyons, unconstrained rivers, pools, and riffles). In general, landscape structure includes the size, shape, and spatial relationships of cover types. It also includes the sizes, shapes, and patterns of habitats interspersed across a landscape, as well as their connectivity, all of which influence the kinds of organisms that can exist in that landscape. For example, connected patches of similar vegetation can determine the ability of animals to move across the landscape. Such movements may vary from roaming within a home range to seasonal migration, dispersal of young, or changing geographic range after an environmental disturbance. Some habitats, such as bodies of water or riparian corridors, are both small and discontinuous but nevertheless have ecological impacts that greatly exceed their spatial extent.

Variations in the physical attributes of ecological systems, especially soil, water, and

air, can both constrain and provide opportunities for biological diversity. For example, natural watersheds have many habitats, such as alluvial soils, steep slopes, deep pools, shallow riffles, and waterfalls, that support a diverse biological system. In contrast, a river that has been dammed to create a reservoir or diverted from its natural channel may have few habitats and far less diversity. Landscape structural diversity may also require the retention of natural disturbances, such as fire, flood, and wind throw (trees blown down in storms). Therefore, planners must consider (1) the larger physical landscape, its historical legacy, its current condition, and its biological potential, both inside and outside the national forests, and (2) the ability of species to respond adaptively to environmental change. The necessary data to evaluate ecological sustainability should be collected in regional and watershed assessments and considered in large-landscape and small-landscape planning processes.

Processes

Ecological processes include photosynthesis, energy flow, nutrient cycling, water movement, disturbance, and succession. These processes are fundamental to the functioning of ecological systems. Disturbances such as wildfire, floods, or windthrow, for example, are natural and integral processes in many systems. Organisms that make up the biotic component of such systems have evolved in response to environmental changes triggered by disturbances. Disturbances often move ecosystems towards earlier successional stages, stimulating renewal processes (e.g., stand-replacement forest fires followed by primary-plant succession) and short-term increases in productivity. Large-scale disturbance may move an ecosystem to a new system state from which it may, or may not, return to its predisturbance condition (e.g., conversion of prairie grasslands to agricultural fields and channel incision).

Often, one goal of management is to mimic those natural disturbance processes that either allow the system to return to its original state or move it to a more desirable state. The similarities and differences between human-induced and natural disturbance processes are poorly known and constitute an active area of scientific research. Despite this uncertainty, managing lands to mimic the disturbance processes that sustain ecosystems through time, without surpassing the adaptational limits of the plants and animals, is an important goal.

By sustaining the main components of an ecological system, composition, structure, and processes, the system gains resilience, the ability to renew or maintain and propagate itself after disturbance. The continuing productivity of an ecological system, including its ability to produce desirable “outputs,” such as clean water, wood, fertile soil, riparian habitat, or viable wildlife populations, depends upon potential renewal.

The concepts of composition, structure, and process can be viewed as a triangle, with a particular corner receiving greater emphasis, depending on the management at hand (see Sidebar 3-1). In focusing on one corner of the triangle, however, the other corners cannot be forgotten, and the focus may shift as the management situation changes. This perspective on ecological sustainability is entirely consistent with other approaches that categorized attributes of sustainability (such as the Santiago Criteria; see Table 3-1).

Sustainability must be evaluated along a continuum rather than viewed as a single target value. The range of composition, structure, and processes required to sustain an ecosystem must be interpreted in light of the natural and historical variation of the region. The knowledge that a threshold level may exist, below which a “threatened” component of the system is at risk, means that sustainability must receive stewardship emphasis at all times and locations.

Assessment activities must balance short-term gains and losses against opportunities

that provide for long-term benefits. These tradeoffs become a concern when a system is near a sustainability threshold or when impacts accumulate over time. Difficult decisions may be necessary when a system nears the point where its composition, structure, or processes are at risk of undergoing fundamental changes that may be repairable only over the long term. In these cases, attention must be paid to that part of the triangle that may have the greatest long-term effects on sustainability. An example occurs in the southwestern forests, where fire suppression has resulted in extensive areas with massive fuel loads. The risks are high that a large-scale fire may cause long-term loss of species and significant changes in ecosystem properties. Therefore, in the near-term, steps should be taken to move the system closer to one that can retain the full suite of ecological components that are more typical of this forest system. In some cases, to achieve sustainability goals may require management actions that upset the short-term stability of the system.

Factors to Consider in Implementing Sustainability

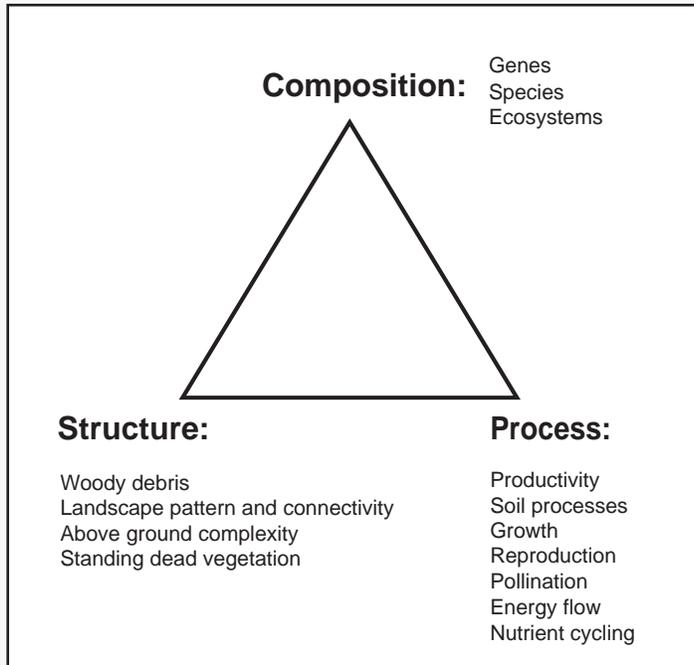
Implementation of national forest plans is not a precise process; there are many unknowns and potential pitfalls that are not under the control of resource managers. Therefore, planning must acknowledge scientific and social uncertainties, be cognizant of the inherent variability of natural processes, acknowledge adverse cumulative effects of management actions, and preserve options for future generations. This is the daunting, but essential responsibility that falls on the shoulders of the Forest Service.

Acknowledge the Dynamic Nature of Ecological Systems

The classical paradigm of ecology has been the stable-state ecological system, sometimes

3-1. Structure and Function in Ecosystem Restoration

All ecosystems have elements of composition and structure that arise through diverse ecological processes. Achieving a desired future condition of a landscape depends on sustaining key ecological processes whose functions then produce valuable compositional and structural elements. If the linkage between underlying processes and explicit compositional and structural elements has been broken in some ecological systems, restoration may be difficult and complex. One example is the introduction of large woody debris into forest streams to improve aquatic habitat where current levels of wood are well below historic norms. Such structure is an essential component of many streams; however, if large woody debris is added to a stream without considering the riparian processes of that specific site, the restoration effort may ultimately fail. A general focus on structure cannot substitute for improved riparian management practices that will allow



future natural inputs of coarse woody debris, seasonal inputs of particulate organic matter, amelioration of stream temperatures, stable riverbanks, and, ultimately, the restoration of key riparian processes. Thus, both structure and process must be addressed in such restoration projects.

Another example is the restoration of natural processes without sufficient attention to structure. In dry-forest types of the western United States, fire exclusion or suppression has historically occurred over large areas. To meet restoration goals, the use of fire has been proposed for forests where it historically was an impor-

tant process. However, the altered structure and composition of current forest conditions makes the reintroduction of fire and its expected outcomes problematic. In the current situation, a fire during the normal season may burn too intensely. An out-of-season fire may not be the appropriate intensity and may burn too long because of the accumulated fuel loads on the forest floor. Through some of these situations, even large trees may be killed. Thus, fire reintroduction without some prior forest treatment (e.g., thinning or understory removal) may have unintended effects on ecosystem composition unless structure and process interactions are addressed.

Table 3.1. Relationship between the criteria from the Santiago agreement and the three elements of sustainability: composition, function and structure

Criteria from Santiago Agreement	Composition	Function	Structure
1. Conservation of biological diversity	X		
2. Maintenance of productive capacity of ecosystems		X	
3. Maintenance of ecosystem health and vitality		X	X
4. Conservation and maintenance of soil and water resources		X	X
5. Maintenance of forest contribution to global carbon cycles		X	X

referred to as the “balance of Nature” or “Nature at equilibrium.” As our understanding of ecological systems has evolved, that view has been replaced by a nonequilibrium paradigm that recognizes the inherently dynamic nature of ecological systems. Ecological systems are regularly subject to episodic, natural disturbances that change their states (that is, they lead to changes in composition, structure, or process).

Contemporary with this shift in thinking was the recognition that ecological systems are hierarchical structures best evaluated at a variety of spatial scales. The traditional ecological hierarchy includes genes, populations, species, communities, ecosystems, and biomes.

The combination of these two ideas on nonequilibrium and hierarchical structure of ecological systems leads to a complex view of those systems from both local and landscape perspectives. A large landscape may be in compositional equilibrium even though individual patches in the landscape are in a variety of states that may change through time. An

example is the distribution of forest seral stages across a large landscape. The relative proportion of the different stages may stay approximately constant through time, even though the seral stage of specific areas is dynamic.

The new, nonequilibrium paradigm in ecology has the potential to be misused. If nature is often in a state of flux, then some people may wrongly conclude that whatever changes occur to ecological systems are acceptable. Yet, ecological systems are not infinitely resilient, and rates of change are bounded. Human impacts must be constrained because ecological systems have adaptational limits that, if surpassed, will lead to undesirable conditions. For example, timber harvest on steep slopes may lead to loss of soil and a permanent reduction in the productive potential of that part of the landscape. Such degraded ecological systems will be severely limited in their ability to provide those critical goods and services required by current and future human generations.

Sustaining ecological processes so they operate within their expected bounds of variation is the only way to sustain ecological diversity and productivity for future generations. Even though we now recognize the nonequilibrium nature of ecological systems, we also recognize that the concept of stability of large-scale landscapes is well founded. Ecological systems have historically changed sufficiently slowly that there was apparent continuity in landscape processes across multiple species lifecycles and human generations.

Acknowledge the Significance of Natural Processes

National forests and national grasslands contain a variety of natural resources that change over time and space. Over long periods, natural catastrophic events (e.g., widespread fire, landslides, floods, droughts, hurricanes, or volcanic eruptions) are certain and important impacts in most ecological systems. Chronic but important changes also may occur that alter the character of the vegetation and associated resources. These changes include succession (i.e., the sequential changes in vegetation composition and structure through time), long periods of high or low precipitation, temperature changes, loss of site productivity via soil compaction or erosion, outbreaks of insects or disease, establishment and spread of nonnative species, and loss of native-species diversity. Although many natural processes have a dynamic and often unpredictable aspect, an appreciation of the expected intensity, frequency, and duration of those disturbances must be factored into planning efforts.

In the past, the Forest Service often did not adequately acknowledge the dynamic nature of natural resources. Notions like “the regulated forest” and “maximum sustained yield” that guided the level of timber harvest generally assumed that natural disturbances (fire and insects, especially) would be suppressed and, therefore, could be ignored in

planning. When at least temporarily successful, these suppression policies often created new problems, such as fuel buildups. When fires and insect epidemics occurred anyway, the calculated timber harvest level generally proved to be overestimated. As mentioned above, future planning and management efforts must recognize and acknowledge disturbance processes.

Previous management practices have changed the composition and structure of forests and rangelands such that a simple return to more natural conditions is difficult or impossible in the near term. For example, widespread harvesting of large-diameter trees in many ponderosa pine forests, coupled with long-term fire suppression, has resulted in relatively dense stands of regenerating trees. These stands are more prone to catastrophic wildfire. How they should be managed is an ongoing debate. Similarly, in unconstrained river-valley systems throughout much of the American West, historical grazing and other practices have affected watershed conditions and riparian plant communities; stream widening and channel incision have been a common result. Even under the most enlightened future stewardship, the recovery of many streams and flood plain functions is not possible in the short term. In some instances, the direct effects of increasing human populations near and within protection boundaries of national forests and rangelands may limit future stewardship options.

The attempt to “acknowledge natural processes” is a desirable attribute of the planning process and its implementation. An example of such an attempt is the current effort to try to identify “historical ranges of natural variability,” which is discussed in more detail below. The knowledge being gained is providing Forest Service personnel with opportunities to use their professional understanding of site characteristics and processes to develop stewardship practices most appropriate for attaining ecological sustainability. However, the

scientific knowledge base is often limited with regard to specific ecosystem processes and their interactions. Much previous research has focused on specific management practices (e.g., timber harvest and road construction) or cause-and-effect at specific sites. Thus, our ability to generalize and extrapolate the results of individual studies to a wide range of ecosystem conditions remains limited.

Acknowledge Uncertainty and Inherent Variability of Ecological Systems

Uncertainty arises from numerous sources and occurs during many stages of the planning process. Most important to our discussion here is the scientific uncertainty that arises from incomplete understanding of how ecological systems work or insufficient information to determine the relationships between processes. Often, there is incomplete information of the relevant ecological processes, the connections among ecosystem components, and incomplete knowledge of the impacts of management.

In addition to being subject to uncertainty, ecological systems are often highly variable, and processes may operate differently above and below some thresholds. Analysis of management alternatives must consider the lack of complete understanding of relationships within ecological systems, confidence limits on projections into the future, and the inherent variability of ecological systems.

Uncertainty and variability are primary ingredients of nearly all stewardship decisions. However, previous planning efforts generally did not acknowledge natural variability, or the risks associated with decisions made under uncertainty. For example, estimates of future annual timber harvest in a forest plan are usually presented as a specific value. If nothing unanticipated happens over the implementation period of the plan, that value may indeed represent the most probable outcome of a specific plan. However, without including

some measure of uncertainty and variability, that number may falsely imply that the projected outcome is fairly certain and has a narrow range. Given the inescapable variability of ecological processes, planners have the responsibility to explicitly incorporate stochastic processes into their analyses. It is critical that the Forest Service learn to make decisions and manage in a highly variable and uncertain environment and to fully inform the public of the risks associated with its decisions.

Acknowledge Cumulative Effects

To aid implementation of the National Environmental Policy Act (NEPA), regulations issued by the Council on Environmental Quality (CEQ) in 1978 defined cumulative effects as

the impact on the environment resulting from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such actions.

Implicit in this definition of cumulative effects is the concept that a specific cause-and-effect response to a management action can be identified. Also, the CEQ definition implies a simple additivity of effects, a phenomenon that seldom occurs because of multiple and nonlinear environmental responses to change in ecological systems.

The CEQ definition of cumulative effects is even less clear regarding how to incorporate the role of future natural disturbance. Natural disturbances are a fundamental feature of both managed and unmanaged ecological systems within a national forest or rangeland. However, many types of potential cumulative effects from management practices may not actually become apparent until disturbance occurs. For example, a decision not to thin a dry-site forest that has high fuel loads may result in catastrophic watershed conditions only if a wildfire occurs; a poorly designed road may not be

problem until after a large storm, when numerous road-related landslides occur; overgrazing in riparian areas may not manifest itself in a loss of woody species unless the area suffers an extended drought.

Because of the wide variation in site-specific practices and local environmental conditions (e.g., vegetation type, topography, geology, and soils) across a given national forest or rangeland, the direct and indirect effects of management practices may not always be well understood or easily predicted. Even when general patterns of cumulative effects become evident at watershed and bioregional scales (e.g., basin-wide and regional patterns of channel incision, reduced abundance or extent of specific plant or animal species, or altered water quality), the effects on smaller sites may be difficult to estimate.

There are few standard analytical methods available that effectively address cumulative effects. The field of integrated assessment is striving to provide the analytic framework in which to consider feedbacks and cumulative effects; however, the field is just being formalized, and the approach is generally applied at broader scales than a national forest. Assessments of early cumulative effects on the national forests have often focused on issues related to water resources and fisheries. Although watershed-analysis procedures have been developed during the past decade to better represent the spatial distribution and temporal occurrence of watershed effects, the diversity of watershed conditions and management activities occurring in a given area may preclude widespread use of standard analytical methods.

Neither the NFMA (1976), nor its subsequent regulations, makes direct mention of cumulative effects or cumulative-effects analysis. However, the regulations recognized the need to coordinate planning with local, state, and other federal agencies as well as with private landowners whose lands are intermingled with National Forest System lands. The regulations also required monitoring and

evaluation of the effects of management on national forest lands that may be affected by planning decisions, including the effects of activities occurring on nearby lands. Preventing potentially adverse cumulative effects to watershed conditions, water quality, aquatic habitats, or other resources from land-use practices has been largely dependent upon NEPA and CEQ regulations and the evolution of associated case law. Unfortunately, NEPA documents often focus primarily on the direct effects of proposed action, without fully assessing the cumulative effects.

When new NFMA regulations are written, specific language is needed directing that cumulative-effects analyses be incorporated into planning efforts to the degree possible. These analyses should focus on relevant issues at both bioregional and watershed scales. As difficult as it is, we must focus attention on cumulative effects in planning.

Preserve Options

Preservation of future stewardship options is rarely possible when current rates of resource exploitation are high. Preserving options assumes that an acceptable range of choices will be available to address the environmental problems confronting future human generations. However, many American forest and range ecosystems have been intensively used and managed with adverse effects on their productivity. The most significant changes in these systems in the West have occurred during the past 100 to 150 years. For example, in forested systems, much old growth has been harvested in response to demand for softwood timber and the desire to convert to faster-growing young growth, and extensive road systems have been built with technologies that we now consider obsolete. In rangeland areas, alterations to riparian systems and stream channels have been extensive, a consequence of historical watershed and riparian management practices. In all of these situations, future

stewardship options have been reduced or, in some cases, essentially eliminated. Current management practices can potentially change (reduce or sometimes increase) future options, but if these practices significantly and adversely affect other resources or values, then they are also likely to limit future options significantly. If current practices result in such impacts as species becoming threatened or endangered, water-quality standards being exceeded, or public values and trust being violated, then dramatic readjustments to those practices are clearly needed.

Preserving options is also a way of explicitly acknowledging our incomplete knowledge of complex ecological systems (that is, our ignorance of how they function and their interactions with natural and human-influenced disturbance regimes) and of our responsibilities to future generations of humans. This philosophy is, perhaps, best encapsulated by focusing first on what we leave before focusing on what we take from ecological systems.

How Ecological Concepts Affect Planning

Assessing and Monitoring Sustainability

Assessment and monitoring to characterize sustainability are indispensable parts of land and resource stewardship. To date, they have not been integrated into the planning and implementation process. Yet, including assessment and monitoring within the planning process is, perhaps, the single most important shift that can happen in forest stewardship. Assessments inform decisions regarding the current status of land and resource stewardship. The assessment and monitoring processes create the information necessary for future decisions, can save costs of future inventory analysis, and reduce the likelihood of management mistakes. Monitoring is the

means to continue to update the baseline information and to determine the degree of success in achieving ecological sustainability. Monitoring involves not only collecting relevant information in an appropriate manner but also maintaining and updating the databases that contain the original data and their syntheses. Including these activities in land stewardship means both that the most up-to-date information will be used to guide management decisions and that information relevant to those decisions will be collected.

Assessment and monitoring are meant to form an evolving process. The focus may change over time or space as concerns change. Whether the current emphasis is on composition, structure, process, or some combination of these features depends on pending decisions, characteristics of the system, and features most at risk. Furthermore, ongoing technological developments and advances in the scientific understanding of sustainability will lead to additions and refinements in the ways that sustainability can be measured. For example, concurrent developments in geographic information systems (GISs) and the field of landscape ecology have allowed a broad-scale perspective of land stewardship to be implemented. Thus, management should be viewed as a learning process that contributes to our current knowledge and affects the way sustainability is measured and provided for.

Assessments must recognize the hierarchical organization of ecological systems. A hierarchical approach to the assessment of ecological systems recognizes that smaller subsystems change more rapidly than do the larger systems to which they belong. At a landscape scale, processes operate so as to constrain faster and more local processes at smaller spatial scales (e.g., forest canopy structure affects local understory-species composition and rates of photosynthesis). Given this perspective, current scientific understanding suggests that sustaining ecological diversity and productivity over

multiple human generations requires stewardship policies set initially at a landscape scale. This idea is relatively new in management. Therefore, the initial goal of a sustainability policy should be the retention of those ecological structures and processes that support and retain ecological diversity and integrity at a landscape scale. After assessment and monitoring at the landscape scale are addressed, the value of the regional information for finer-scale analysis can be considered (Table 3-2).

Given the lack of well-established theories that specify which level of the complex hierarchy of ecosystems is most appropriate for sustainability, guidance to assess at a particular scale is imprecise. For the foreseeable future, managers will have considerable latitude in choosing the boundaries, and thus scale, of the systems they manage. This indeterminacy is appropriate as long as managers realize that the ultimate goal of management and stewardship is to retain those dynamic processes that provide for biological diversity at the landscape scale. One major difficulty in landscape management is that any one manager usually has authority over only a portion of the landscape.

Although approaches to stewardship should begin by considering the large land-

scape scale, that scale may not work for resolving some management problems. Therefore, choice of boundaries and spatial scale will remain an essential part of assessing a system and proposing solutions to specific problems. Small landscape assessments, however, must be able to be aggregated upward and be consistent with large landscape analyses (as is discussed in Chap. 4).

A Hierarchical Approach to Planning

For pragmatic reasons, only a limited number of measures can be used to infer the sustainability of complex ecological systems. Therefore, it is useful to apply a hierarchical assessment to identify the most relevant spatial and temporal scale for a particular management problem. A hierarchical approach to assessment allows planning to simultaneously consider sustainability needs at various spatial scales. This approach acknowledges that some characteristics of sustainability are best viewed from a regional perspective while others are more appropriately considered at watershed or local, site-specific scales.

The planning process needs to identify the issues that are relevant at each scale (Table 3-3). Assessments then use these issues to drive

Table 3.2. Example sustainability attributes by scale.

Scale	Composition	Process	Structure
Region	Metapopulations Migrants Ubiquitous Species	Fragmentation Connectivity	Land cover
Watershed	Rare habitats Streamsides	Energy flow Nutrient cycling Soil processes Disturbances	Habitat distribution Vegetation distribution
Site	T&E species Game species Economic species	Pollination Reproduction Mortality Disturbances	Standing dead Woody debris

Table 3.3. Example of a hierarchical assessment for aquatic ecosystems.

Geographic Extent	Scale	Aquatic Example of Assessment
1,000,000 to 10,000,000 ha. (Broad)	Region: Basinwide	Land cover patterns
200,000 to 1,000,000 ha. (Mid)	Sub-basin	Status/trends of population in sub-basin Current and potential critical habitats Existing linkage between subpopulations Relationship between national and human distribution
50,000 to 200,000 ha. (Fine)	Watershed, Sub-watershed	Current and potential population distribution Current and potential critical habitat Linkage between critical stream reaches
Less than 50,000 ha. (X-fine)	Stream reach	Current and potential distribution by stream reach Critical habitat distribution/size by reach Linkage/isolation of critical habitat by reach Relation between national and human disturbance

their inquiry. It is useful to establish terminology for discussing the hierarchies involved in an assessment process. The nation is the broadest level (coarsest scale) of assessments for the Forest Service. Regional assessments, for areas such as the Southern Appalachians or the Sierra Nevada Range, may be based on bioregional characteristics or planning regions. At the middle level of this scale are such areas as watersheds, which follow hydrologic boundaries, or conservation areas, which focus on habitats that cut across hydrologic boundaries. Because watersheds can range from subbasins to smaller scales, watersheds are also represented at the fine scale of resolution; project-level management represents the finest scale.

Broad Regional Issues

Regional-scale information typically is derived from a combination of remotely sensed and ground-based data. Both satellite imagery and aerial photographs can provide complete spatial coverage of an area. The availability of

this information should be fully exploited for landscape-scale analyses. The ecological value of this information, if carefully interpreted, arises from the information it provides on vegetation composition, pattern, and context at the large landscape scale.

Processes that are particularly important at a regional scale include fragmentation and connectivity. Fragmentation is the process by which habitat is broken up into smaller, separate patches. Habitat fragmentation can and often does result from human land-use dynamics, including forestry, agriculture, and settlement, but also can be caused naturally by wildfire, wind, flooding, outbreaks of pathogens, increased abundance of herbivores (such as elk), and other disturbances. Land-management decisions can alter habitat fragmentation patterns of natural forests and rangelands by adding fences and roads or by producing changes in vegetative cover.

The pattern of habitat fragmentation and the resulting connectivity of the remaining habitat can constrain the spatial distribution

of species by making some areas inaccessible. Connectivity is a threshold dynamic, meaning that incremental reduction of habitat may have only gradual effects on the presence or abundance of a species until the threshold is reached. At that point, the adverse effects on species viability tend to be dramatic.

Changes in the abundance and distribution of land cover, along with changes in connectivity and fragmentation, are more likely to have substantial effects when habitat for a given species is near its threshold abundance. The threshold of connectivity varies among species and depends on the abundance and spatial arrangement of the habitat and the movement or dispersal capabilities of the

organism. For example, species may become isolated in small patches of habitat, and thus become vulnerable to local extinction, if they are separated by intervening habitat that is hostile to their movement.

Subregions: Watersheds and Conservation Areas

Subregions provide a middle scale (between regions and sites) for assessment and monitoring. Often, information relevant to a specific management issue is best represented at the subregion scale. Examples of subregions are watersheds and conservation areas.

3-2. Measuring Ecological Integrity in the Interior Columbia Basin

The Interior Columbia Basin Ecosystem Management Project (ICBEMP) utilized the concept of ecological integrity to describe the state of ecological systems in the Interior Columbia River Basin of the Pacific Northwest. According to the ICBEMP, ecological integrity refers to the presence and functioning of ecological components and processes. For its assessment, the ICBEMP evaluated the integrity of five systems: forestland, rangeland, hydrologic, aquatic, and terrestrial community types. For each of these systems, scientists developed a definition of high integrity. A terrestrial system that exhibits high integrity, as an example, is a mosaic of plant and animal communities consisting of well-connected, high-quality habitats that support a diverse assemblage of native and desired nonnative species, the full expression of potential life histories and taxonomic lineages, and the taxonomic and genetic diversity necessary for long-term persistence and adaptation in a variable environment. Generally, conditions before Euro-American settlement (pre-1800s) provide the standards for evaluating the presence and functioning of ecological components and processes (as described in the next sidebar).

The ICBEMP scientists developed measures of integrity for each component, some of which are listed below.

Rangeland Integrity

- Grazing influences on vegetation patterns and composition
- Expansion of exotic species
- Changes in fire severity and frequency
- Woodland expansion into herblands and shrublands

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- Expansion of exotic species
- Changes in fire severity and frequency
- Woodland expansion into herblands and shrublands

Forestland Integrity

- Consistency of tree-stocking levels with long-term disturbances typical for forest types considered
- Amount of nonnative species
- Amount of snags and down woody material
- Changes in fire severity and frequency from historical levels

Hydrologic Integrity

- Amount and type of past disturbance
- Disturbance sensitivity and recovery potential

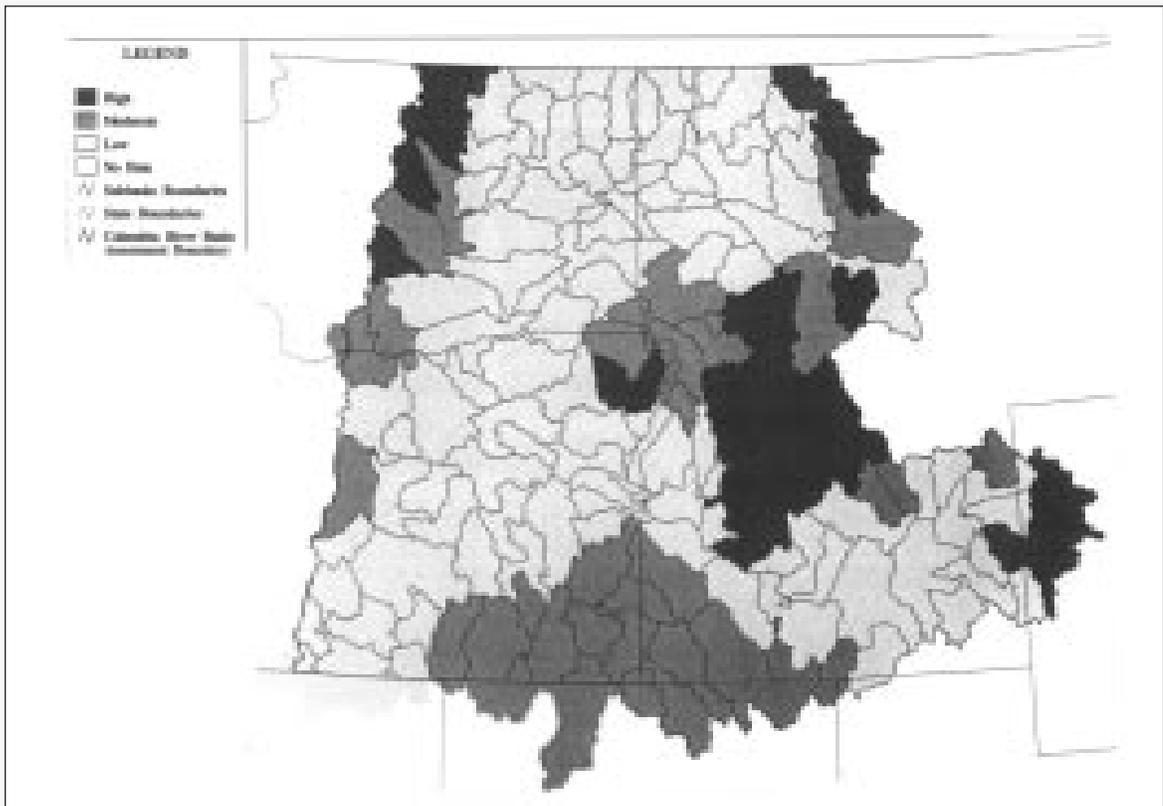
Aquatic Integrity

- Riparian vegetation
- In-stream habitat

Terrestrial Community Types

- Availability of habitat

The scientists then rated the different watersheds of the Interior Columbia Basin in terms of their integrity by each component; they also rated their aggregate integrity considering all components (see figure). All lands and ownerships within each watershed were considered in the evaluation. In addition, they outlined the major threats to ecological integrity in each part of the basin as well as opportunities to address those risks. The measures listed above were proposed in the ICBEMP scientific analysis as indicators for managing to maintain and restore ecological integrity and for increasing the compatibility of resource production and resource protection.



Composite Ecological Integrity Ratings.

3-3. Using the HRV to Assist Land and Resource Stewardship in the Interior Columbia Basin

The Interior Columbia Basin Ecosystem Management Project (ICBEMP) extensively used the historical range of variability (HRV) to characterize native ecosystems and serve as a benchmark for understanding the effects of human-induced changes in the Pacific Northwest systems. They simulated the HRV by developing pre-Euro-American settlement succession/disturbance models for each vegetation type in the Interior Columbia Basin and estimating change over a 100-to-400-year period from a historical vegetation map.

In this analysis, the ICBEMP scientists make a number of points: (1) They used a time period characterized by relatively consistent climatic, edaphic, topographic, and biogeographic conditions that would enable them to describe contemporary ecosystems. They concluded that the present macroclimate emerged approximately 2700 years ago and that the present plant communities endemic to temperate climates have been in equilibrium with the environment for the past 2000 years. While the Little Ice Age of a few hundred years ago shifted the equilibrium of species' ranges and disturbance regimes, it did not result in extinctions or substantial changes in ecological relationships. (2) They recognized Native American peoples' use of fire as a disturbance process that influenced the HRV, as these cultures have had an integral role on the landscape for at least the past 2000 years. (3) They did not consider human disturbances of post-Euro-American settlement as part of the HRV because those disturbances were of a type, size, and rate that were not typical of disturbances under which the endemic plant and animal species and ecosystems had developed. (4) While HRV provides a means of referencing the current conditions and differences among land-management scenarios, scientists noted that land managers may not wish to target them as management objectives for a number of reasons. These reasons include other human values for the landscapes; the high cost of restoring some heavily altered systems; and the fact that some natural disturbance events are of a size, intensity, and pattern unacceptable to society. (5) The ICBEMP scientists pointed out that action may be needed to return the landscape to conditions within the HRV. As an example, fuel buildups through the development of understory thickets have resulted in conditions that, in some cases, seem outside the historical range of variability. Prescribed fire and/or timber harvest could be employed to address these problems.

The ICBEMP scientists believe that HRV is valuable in a number of ways for assessing and monitoring the effects of land management relative to departure from historical conditions. These departures can be used as a reference against which to evaluate change and help identify risks to ecological sustainability. Also, understanding the HRV for different resources can help managers design actions that produce goods and services in ways that contribute to ecological sustainability.

An estimation of broad-scale habitat departures from historical ranges of conditions can thus provide an early warning of broad-scale vegetation changes that may result in risks to species persistence. Such an estimation can therefore serve as a reliable coarse-filter assessment of the efficacy of current management practices. As an example, ICBEMP scientists compared the current broad-scale habitat availability within a region or landscape to HRV. It was assumed that a species' persistence within a geographic area was not at risk if the current area of that species' primary habitat fell within the medium 75% of the historical data.

In simplest terms, a watershed comprises a land area that drains to a common point. The use of watersheds as the planning unit focuses assessment on a physically connected portion of the landscape, unambiguously delineated by topographic features at the margins (i.e., ridges and watershed divides). Implicit in a watershed perspective is the crucial role of gravity in the general movement of water, nutrients, sediment, organic matter, and other resources in a downslope direction. The movement of various ecosystem outputs and products to lower elevations provides for process “connectivity” within the watershed, whereby downslope areas are “connected” or influenced by activities and processes occurring on upslope areas. For example, altered water quality in a headwater stream may contribute to downstream changes in water quality or aquatic habitats. In similar fashion, a landslide initiating along a ridge may carry far enough downslope that it significantly changes the character of a stream. It is this “connectivity” of various products and processes within watersheds that can provide an important ecological basis for undertaking watershed-based planning efforts.

Although ecosystem products within a watershed most commonly move from higher to lower elevations, there are mechanisms by which materials and processes are transferred in an upvalley direction. For example, the return of adult salmon from the ocean to their natal streams can represent a significant influx of nutrients. After the adults spawn and die, their carcasses provide nutrients for a wide variety of aquatic and riparian biota. Alteration of a stream channel at a specific location, either by natural or human causes, may cause upstream migration of channel gullying and widening. The ecological impact of channel incision and widening can cause more than an increase in local sediment production. In some situations, these channel adjustments may represent a major alteration to riparian and aquatic habitats; in others, they may result in

undercut toeslopes of hillsides with subsequent increases in hillslope erosion rates.

From a human perspective, watersheds represent a prominent component of our culture. We commonly name human communities after the streams and rivers or other landmarks that arise within their topographic divides. Thus, there is strong sense of place and identity associated with specific watersheds that people can, and do, relate to. In many instances, this “sense of place” may transcend other cartographic or political boundaries that society has developed (e.g., township, county, or state). Part of the human connection with specific watersheds is related to each watershed’s having unique features by consequence of its position in a larger landscape, by its size, by the character of its streams and rivers, by the spatial distribution of vegetation types, by the types and abundance of animal species, or by any combination of such factors. The underlying geology, topography, climatic patterns, plant communities and their distributions, drainage patterns, and other attributes differ for each watershed. This uniqueness not only contributes to the appeal for using watersheds as a basis for planning efforts, but also challenges managers of the national forests and grasslands to understand and consider these unique qualities in the development of plans and management decisions.

Although there are often distinct advantages of using watersheds to address various types of ecological and regulatory concerns (e.g., fisheries, riparian management, and clean water) on national forests and rangelands, there are also situations in which a different perspective of ecosystem conditions and issues may be more useful and appropriate. Watersheds where topographic relief is indistinct may not have well-delineated watershed divides. For example, in the north-central states, streams and lakes abound, but the topographic relief is not large, and thus watershed divides are not pronounced compared to what we see in

mountainous terrain of the west. Where watersheds have significant relief (e.g., prominent hills and mountains), the distribution of specific forest types and plant communities are typically arrayed along specific elevation bands; those vegetation types usually connect with those of adjacent watersheds. Because many animal species frequently range across watershed divides, relatively large-scale ecological assessments addressing wildlife, recreational use, and other issues may best be addressed by using planning areas that involve multiple watersheds or components of them (e.g., the southern Appalachian physiographic region). Similarly, the range of the northern spotted owl covers many watersheds in their entirety and portions of others. For wide-ranging terrestrial species (e.g., wolves, bears, raptors, and ungulates) the connectivity of habitat across the landscape may be a prime determinant of their viability. In sum, when considering planning areas, it is important to choose boundaries that enclose the geographic extent of the issues to be addressed.

Site-Specific Information

The requisite information on composition, structure, and processes needed at fine spatial scales largely depends on the specifics of the management issue. Compositional information typically focuses on the status of species (plants, animals, or fungi) that are rare, endangered, or used for economic or recreational purposes (e.g., timber or game species). Structural features include topography and land form, but most often relate to the age and seral stage of the vegetation. Process information at the fine scale usually relates to the contributions these species provide to critical ecosystem functions. Examples include pollination, soil processes, nutrient cycling, and energy flow across trophic levels. Processes also include disturbances, such as fire, windthrow, and flooding, that affect the structure and

composition of biogenic and geologic elements at a local scale.

Ecological Integrity: An Integrative Measure of Ecological Condition

Because of the unprecedented rate of change in ecological systems in the United States and the accompanying loss of biological diversity, environmental scientists have sought a way to measure or characterize the state of these systems. Such a metric would allow managers to assess the efficacy of their management practices in moving ecological systems toward, or maintaining them within the bounds of, sustainability. The concept of ecological integrity has been put forth by a wide variety of scientists as a way to encapsulate appropriate metrics, and measurable definitions have been proposed.

According to the dictionary, integrity is “the state of being unimpaired, sound” or “the quality or condition of being whole or complete.” A variety of definitions of ecological integrity exist, most differing in the scale of the assessment. A fine-scale approach stresses the structural and compositional aspects of ecological systems, focusing on individual species and their dynamics within specific ecosystems. A coarser-scale approach focuses on macroscale processes (i.e., primary productivity, nutrient cycling, and hydrologic systems) and pays less attention to the local composition and structure of the systems from which these processes emerge. It is important to recognize that the concept of ecological integrity is relatively new and the scientific foundations underlying it are not fully developed.

Previously in this chapter, we stated that NFMA’s goals of maintaining species diversity and ecological productivity should be viewed in terms of ecosystem composition, structure, and processes over time and space. Therefore, we propose that an ecosystem has ecological integrity when it can maintain characteristic compositions, structures, and processes

against a background of anthropogenic changes in environmental conditions. Ecosystems with high ecological integrity continue to express the evolutionary and biogeographic processes that gave rise to the current biota; they have a species composition, diversity, and functional organization expected from natural habitats of the region; and they are resilient to environmental change and disturbance occurring within their natural range of variability.

Some important considerations in implementing the concept of “ecological integrity” include the following:

1. Given the complexity of this concept, it will be difficult to assess with a single indicator, but rather will require a set of indicators measured at different spatial, temporal, and hierarchical levels of ecological systems. As an example, the Interior Columbia Basin Ecosystem Management Project (ICBEMP) used a wide variety of measures to describe the ecological integrity of the interior Columbia River Basin. Scientists were able to aggregate these measures to evaluate ecological integrity overall and by major ecosystem component (see figure in Sidebar 3-2).

2. Because ecosystems are inherently variable, managers need some guidance about the amount of environmental variation that is acceptable and is within the biota’s ability to respond adaptively to it. Estimates of an acceptable range of variability in compositions, structures, and processes provide reference distributions or conditions against which competing management scenarios are compared and ecological integrity is assessed. These reference conditions may be, in fact, the “coarse filters” within which the current physical landscape and biota evolved. To the degree that future management scenarios can achieve these conditions, the more likely it is that the “coarse filter” will achieve the objectives for ecological

sustainability and the less likely that “fine-filter” strategies will be needed for individual species.

Reference conditions are rarely characterized as uniform “snapshots” of the past. Considerable variability caused by climate change and disturbance by fire, flood, insects, disease, and other natural factors typically affects these reference conditions. Reference conditions vary within an ecosystem over time, and the proportions of old-growth forests or early seral conditions are never in a true equilibrium state. These conditions also vary between ecosystems. For example, in Washington state, old-growth forests may be common in both wet, coastal, Douglas fir forests and dry, interior, ponderosa pine forests. Pine forests that burned frequently from natural fires were composed of wide-spaced large trees with a grassy understory. When fire was removed from these systems, they developed a multistoried canopy structure much like old growth in coastal Douglas fir, but this condition is neither natural nor sustainable. The old-growth structures of these forests are inherently different.

In general, it is easier to reconstruct disturbance regimes (e.g., fire frequency and intensity) than the effect of those regimes on the landscape, so reference conditions are rarely precise. Nevertheless, they play a key role in evaluating the “coarse filter” proposed by future management plans.

Historical Range of Variability

The historical range of variability (HRV), roughly equivalent to the natural range of variability concept, refers to the expected variation in physical and biological conditions caused by natural climatic fluctuations and disturbance regimes (e.g., flooding, fire, and windthrow). It is derived from an ecological history of a landscape and is estimated from the rate and extent of change in selected physical and biological variables. Because HRV is derived from a historical analysis, its value

is dependent on the time interval evaluated. Often, disturbance events have low predictability, but are usually bounded in space (extent) and time (recurrence interval); that is, small-scale disturbances occur more frequently, and large-scale disturbances more infrequently. As a consequence of this relationship, the longer the time interval considered, the greater the estimated HRV. Therefore, the HRV concept is only meaningful when a time interval has been specified and justified.

Selecting a time frame for estimating HRV is difficult and often limited by the availability of information on past landscape patterns. One approach is to select a time period characterized by climate, species composition, and disturbance regime similar to those of today. The rationale is that this benchmark HRV will encompass the climatic fluctuations and disturbance regimes that influenced the biota over their evolutionary history and to which they are adapted. Other time intervals and rationales are, of course, possible. The deciding criterion is that the HRV chosen will result in future conditions that sustain ecological integrity.

The concept of an HRV of an ecological system is appropriately understood as a set of frequency distributions of physical and biological conditions, distributions with both dynamic shapes and dynamic ranges. It would be inappropriate to consider HRV solely in terms of the upper or lower value of the range of any given distribution. Equally important as a management goal is the shape, as well as the range, of these distributions.

The concept of HRV as a characterization of reference conditions for management of the national forests and grasslands is based on the common-sense notion that the environmental conditions most likely to conserve native species are those under which they evolved. Given vast numbers of species and the uncertainty about their habitat needs, we seek management strategies aimed at creating the conditions for conserving the suite of species without examining them one at a time. In

addition, ecological states that exceed the HRV can provide an early warning system for landscape conditions that may reduce ecological sustainability. Recent assessments, such as the ICBEMP, have used HRV in their evaluations of ecological integrity and in the design of management strategies. (See Sidebar 3-2.)

The HRV concept has become controversial in a very short period of time. Some people worry that it means taking landscapes back to their “preColumbian condition” (i.e., to their condition before Columbus discovered America). We would like to offer some observations about the concept and its use:

HRV does not imply a particular condition, rather it implies a distribution of conditions for each resource of interest. For example, if the amount of old-growth forest in Oregon’s Coast Range varied from 25 to 60% during the past few thousand years, the HRV approach would argue for management strategies that attempted to keep the current distribution of old-growth conditions within that range in the future.

Using the HRV concept does not prohibit humans from the landscape. First, actions are often needed to shift altered systems back within the HRV, as described in Sidebar 3-3. Second, the HRV provides a target distribution of environmental conditions within which human action can operate without significant risk to the integrity of species and ecosystems. Conditions that exceed the HRV provide a set of warning signals when landscapes are beyond the bounds of evolutionary experience.

HRV is best applied to coarse attributes of the landscape: the condition of streams; the distribution among seral stages of different forest types; the amount and distribution of large dead trees; and the size, frequency, and intensity of disturbances.

Some dimensions of HRV are difficult to reestablish within some landscapes. As an example, the forests of the Western Cascades in Oregon and Washington will not be managed for the large, infrequent, high-intensity burns that created them. It is just not socially

acceptable. Such burns may occur, but not through purposeful public policy.

By many measures, much of our current standard of living is based on converting landscapes to conditions outside the HRV. The cities and farmlands of much of America are

examples. Much nonfederal land around national forests and grasslands is also outside of HRV. Given that we wish to retain our native species, though, maintaining at least a significant portion of the landscape within HRV would seem prudent. With the continued

3-4. Cross-Scale Issue: Population-Viability Analysis in the Northwest Forest Plan

The species-viability assessment conducted by the Forest Management Assessment Team (FEMAT; 1993) used expert panels to assess the likelihood of four possible outcomes for habitat conditions on federal lands. The panel process was designed to elicit expert opinion and professional judgment relative to these outcomes:

Outcome A

Habitat is of sufficient quality, distribution, and abundance to allow the species population to stabilize and to be well distributed across federal lands.

Outcome B

Habitat is of sufficient quality, distribution, and abundance to allow the species population to stabilize, but with significant gaps in the historic species distribution on federal land. These gaps cause some limitations in interactions among local populations.

Outcome C

Habitat only allows continued species existence in refugia with strong limitations on interactions among local populations.

Outcome D

Habitat conditions result in species extirpation from federal land.

Options were compared by assessing whether a species (or group) attained an 80% or greater likelihood of achieving outcome A. This likelihood and outcome combination were selected, based on the collective judgement of the scientists involved, to represent a relatively secure level of habitat and an appropriate criterion for comparing options. The charge to FEMAT (from the Forest Conference Executive Committee, which was composed of the relevant cabinet offices) was to present alternatives that provided a medium-to-very-high probability of ensuring species viability.

The authors pointed out that options other than attaining an 80% likelihood of Outcome A to achieve viability may be acceptable for some species. For other species, irreversible gaps in their historical distributions may have already occurred, and Outcome B may be their most likely future, under even the most protective options. If a species is already restricted to refugia by its own natural history or past management actions, some combination of outcomes A, B, and C may result.

development of nonfederal land, the responsibility increasingly rests on the national forests and grasslands to provide landscape conditions similar to those under which native species evolved.

Cross-Scale Issue: Species Viability

The emphasis on composition, structure, and processes within ecological systems directs the focus to broad spatial scales and large landscapes. A systems approach gives equal emphasis to the components of the system (i.e., the individual species).

The desire to ensure species viability is an expression of both the intrinsic and instrumental value of biological diversity. Diversity is sustained only when individual species persist; the goals of ensuring species viability and providing for diversity are inseparable.

A viable species is defined as consisting of self-sustaining populations that are well distributed throughout the species' range. Self-sustaining populations are those that are sufficiently abundant and have sufficient genetic diversity to display the array of life-history strategies and forms that will provide for their persistence and adaptability in the planning area over time.

Because of the inescapable uncertainty of environmental events, the likelihood of a species persisting indefinitely across time is always uncertain. Because it is impossible to ensure the viability of a given species, it is necessary to be clear about the goals of a viability requirement and the process of viability analysis. Some important principles related to viability are:

- 1) The short-term viability of a species is influenced by many factors, including its size, sex ratio, age structure, reproductive and survival rates, and geographic distribution. In addition to total population size, the spatial distribution of local populations, and of individuals within

populations, can have profound effects on the likelihood of persistence.

- 2) Any statement about the likelihood that a species will be viable under a management strategy should explicitly incorporate probability and time; that is, the likelihood that a species will be viable under a management strategy is measured along a continuum, in terms of some projected likelihood of persistence over a specified time period.

- 3) The purpose of a viability assessment is to gain insights into how resource management can influence the probability of persistence.

- 4) A first step in providing for species viability is to assess the likelihood that a species will be viable over specified periods. Such an assessment should be based on a current understanding of how populations change in space and time as a consequence of internal and external factors. Since viability can never be ensured with 100% certainty, whether a population is deemed viable is a decision based on an acceptable risk of extinction. Ultimately, this is a value-based, not a science-based, decision.

- 5) Given that habitat loss and fragmentation are often major factors that put species at risk, the Forest Service planning process should stress the quantity, quality, and distribution of habitat necessary for species viability.

An example of species viability assessment is provided by the work done for the Northwest Forest Plan.

Focal Species

Because monitoring the status and assessing the viability of all species is impossible, studies must focus on a smaller subset of species. The Committee proposes the generic

term “focal species” to allow a variety of approaches to selecting those species to monitor and to assess for viability. The key characteristic of a focal species is that its status and time trend provide insights to the integrity of the larger ecological system. The term “focal” includes several existing categories of species used to assess ecological integrity:

1) Indicator species: species selected because their status is believed to (1) be indicative of the status of a larger functional group of species, (2) be reflective of the status of a key habitat type; or (3) act as an early warning of an anticipated stressor to ecological integrity. The presence of fish in a river is an indicator of water quality.

2) Keystone species: species whose effects on one or more critical ecological processes or on biological diversity are much greater than would be predicted from their abundance or biomass (e.g., the red-cockaded woodpecker creates cavities in living trees that provide shelter for 23 other species).

3) Ecological engineers: species who, by altering the habitat to their own needs, modify the availability of energy (food, water, or sunlight) and affect the fates and opportunities of other species (e.g., the beaver).

4) Umbrella species: species who, because of their large area requirements or use of multiple habitats encompass the habitat requirements of many other species (e.g., deer).

5) Link species: species that play critical roles in the transfer of matter and energy across trophic levels or provide a critical link for energy transfer in complex food webs. For example, prairie dogs in grassland ecosystems efficiently convert primary plant productivity into animal biomass. Prairie dog biomass, in turn, supports a diverse predator community.

6) Species of concern: species that may not satisfy the requirement of providing information to the larger ecosystem but because of public interest will also be monitored and assessed for viability. Such species include some threatened and endangered species, game species, sensitive species, and those that are vulnerable because they are rare.

Available knowledge of species' ecologies and their functional roles in ecological systems is so limited that it is not always possible, *a priori*, to unambiguously identify focal species. Therefore, the selection of focal species, based on existing information and the criteria for inclusion, should be treated as a hypothesis rather than a fact. Given this uncertainty, the assumption that a specific species serves a focal role must be validated by monitoring and research.

An emphasis on focal species, including their functional importance or their role in the conservation of other species, combines aspects of single-species and ecosystem management. It also leads to considering species directly, in recognition that focusing only on composition, structure, and processes may miss some components of biological diversity.

Spanning Ownership Boundaries in Assessments

Monitoring on national forests and rangelands must relate closely to assessment efforts of other agencies. At broad scales, land is composed of multiple-agency ownerships, and in many places, private ownerships are intermixed with federal lands. It is therefore imperative that assessment opportunities are coordinated with private, state, and other federal landholders. An example of issues that may arise as a result of multiple ownerships is the management of wide-ranging species, such as grizzly bear in the Greater Yellowstone Ecosystem or the red-cockaded woodpecker in the southeastern states. Where management issues cross ownership boundaries, there is a

clear need for common assessment information at regional and subregional scales. Uniform data collection and documentation standards are necessary for the agencies to collect, map, and share data across boundaries.

An example of such cooperation was accomplished by the Southern Appalachian Assessment, which involved specialists from both federal and state natural resource agencies to describe the ecological, economic, and social characteristics of the multistate region. In that case, an interagency cooperative was formed, which directed the scope and depth of analysis. By avoiding the duplication of work that might have been necessary had each agency acted independently, the scope and depth of analysis were significantly broadened. The breadth of the Southern Appalachian Assessment allows for opportunities to further expand the analysis, depending on the general availability of the data. (See Sidebar 3-5.)

Planning for Ecological Sustainability

What are the implications of planning for sustainability on national forests and grasslands? First, ecological sustainability should be interpreted broadly. Planners must look at the land in a large-landscape context, including lands and communities beyond the boundaries of the national forests and rangelands.

Second, the characteristics of the land, the ways in which people interact with it, and what they expect from it must be assessed. For example, watersheds provide a link to social and cultural issues, and most people develop a sense of place that relates to a watershed and its defining geographic features. The planner first asks whether the human uses of the land appear compatible with a goal of sustainability. To reliably answer this question requires an emphasis on assessment and monitoring.

Third, national forests and rangelands are open systems, affected by land use outside their boundaries. Therefore, assessment and monitoring must be consistent with the pro-

grams of other agencies. Attaining this consistency requires a high degree of interagency collaboration, consistency in documentation and measurement standards across public and private lands, and a spirit of collaboration to solve shared environmental problems.

Fourth, for the foreseeable future, decisions on appropriate management of natural resources will be made in the context of considerable uncertainty about the outcome of those actions. Where risks are high and uncertainty about outcomes is great, active adaptive management (discussed in Chap. 4) will be needed. Implementation of adaptive management approaches will speed up the process of learning how ecological systems function and will decrease the likelihood of large-scale management errors.

Fifth, perhaps the single best metric of sustainable use of land is the persistence of species over time. The public needs to understand that the productivity of an ecosystem can be sustained over the long term only if species persist.

Finally, the Forest Service must recognize the need to regain the trust of the American public and to reestablish its credibility as a competent steward of the nation's natural resources. To regain this position of leadership will require extensive public input to the planning process and an independent review of Forest Service decisions by outside reviewers. The Committee therefore recommends that the Forest Service establish a standing advisory board to ensure that it is making use of the best available technology and scientific knowledge. (See Chap. 5A for more discussion of this proposed board.)

3B. Economic and Social Sustainability

The Forest Service, as trustee and steward of our great national treasure, the national forests and grasslands, has a legal obligation to preserve opportunities and choices for future generations while providing for the economies, communities, and people of today. Although the Forest Service cannot and should not be expected to single-handedly sustain existing economies, cultures, and communities, the National Forest System lands nonetheless contribute many values, services, outputs, and uses that allow economies and communities to persist, prosper, and evolve according to their own wills. This charge, contributing to the well-being of people today and tomorrow, is at the heart of the Forest Service's role in economic and social sustainability.

Over the ages, the use and treatment of land and resources has shaped the opportunities for generations that followed. Around the world, places once rich and productive, teaming with plants and animals, now lie barren because of the actions of people. The capacity of human society to destroy the ecological integrity of the land places a high responsibility for stewardship on how society uses and protects its land and resources. In the case of the public forests and rangelands, this stewardship responsibility means that, in promoting the economic and social sustainability of communities and economies, the Forest Service must first ensure the ecological integrity essential to long-term sustainability.

The Forest Service's role in promoting economic and social sustainability has four dimensions, and each is inextricably linked to ecological sustainability. First, the forests and rangelands *provide many and diverse contributions*, through which economies and communities define and sustain themselves. Whether these contributions are the timber for local mills, clean water for downstream farms, spiritual resources valued by Native American

tribes, or the scenery and solitude sought for recreation, they are important elements that, in turn, contribute more broadly to the achievement of sustainability in our society.

Second, an effectively structured planning process can *build society's understanding* of the interconnectedness of communities and economies with sustainably managed forests and grasslands. In so doing, it encourages people to act in a manner that does not undermine ecological sustainability and their own long-term sustainability. In other words, by promoting an understanding of the linkages between human and ecological systems, establishing realistic expectations about the nature and scope of contributions from the public lands over time, and providing opportunities for active stewardship, the planning process for the national forests and grasslands can contribute to society's ability to progress in a sustainable manner.

Third, planning processes with continuous, open public deliberation can *enhance society's ability* to make sustainable choices. The planning process can provide mechanisms and fora that provide focus for societal and community decision making that is realistic, informed, and sustainable. Planning is the logical process through which linkages among the many different organizations, businesses, and community groups that care about an area can communicate, address shared problems, articulate a common vision for the future, and craft strategies for pursuing that future that are compatible, if not complementary, and that are consistent with the goal of sustainability.

Fourth, assessment and planning *identifies and assists communities in need*. When natural or policy influences disrupt the economic or social fabric of a community, planning can highlight where assistance is needed for economic transitions. The federal government can identify key opportunities for such communities

3-5. The Southern Appalachian Assessment

The Southern Appalachian Assessment (SAA) summarized the status of atmospheric, social/cultural/economic, terrestrial, and aquatic conditions in the Southern Appalachians of the United States. This assessment was a collaborative effort among federal agencies, state agencies, universities, special-interest groups, and private citizens. All played a role in the development of the assessment, and all have benefitted from the results. A first task of the assessment process was to determine what questions were appropriate for the seven-state region of the Southern Appalachians. The process also identified information and research needs for the future. Five published reports are now available as is a web site, and much of the data is available on CD-ROM. Although there was no specific statutory requirement for the assessment, its production has been very beneficial to forest planning as well as to planning at other administrative levels. The assessment process also recognized the limitations of what could be done within the year-and-a-half timeframe in which the process was completed. Three constraints were very useful in organizing the task: (1) existing data were used, (2) a tight time constraint existed, and (3) a financial constraint existed in that no new funding was provided by the assessment process.

The SAA now serves as both a useful reference and as a benchmark for future analysis. In addition, several indirect outcomes have developed from the SAA:

- The use of GIS technology and training have spread throughout the region.
- The key resource inventories have been improved, and information has been provided for planning and management.
- The process built cohesion among different levels of the Forest Service organization.
- An esprit de corps was created among the science-based personnel within the Forest Service.
- The familiarity among the different agencies was increased, and this increased the legitimacy and prominence of the Southern Appalachian Man in the Biosphere (SAMAB) organization, which was the umbrella group for the multiagency project.
- Leadership attributes were developed and recognized as part of the process.
- The process proved the value of public participation in that the public helped define the questions to be studied in the assessment, provided information, helped with the outside scientific review of the drafts, and gave political support at key junctures.
- An adaptive-management style was adopted as part of the process.
- The assessment focused on describing existing conditions; it did not attempt to make administrative decisions and generally avoided overt policy recommendations related to the revision of specific forest plans.

One of the principal objectives of the SAA was to develop more-consistent information for forest-plan revisions. The results of this assessment have already been used directly to formulate the major issues that are being addressed in plan revisions for national forests in Virginia, Tennessee, South Carolina, Georgia, and Alabama. SAA results also will be used in each forest-plan-revision EIS to address cumulative effects across the broader landscape, including both public and private lands, in the SAA region. The open-meeting process and interagency technical-peer-

and make the essential linkages between communities and federal or state programs that can ease or overcome such disruptions.

In short, effective management of National Forest System lands provides important material, aesthetic, and spiritual contributions to society and promotes the ability of people in society to make sound and sustainable choices by building understanding, maintaining public dialogue, enhancing capabilities to act in a sustainable manner, and identifying and assisting with the community transitions brought on by disruptive natural or policy influences.

National Forests: Places Where People Work, Live, Worship, and Play

The long-term economic contributions of the forest reserves were recognized from the very beginning. Residents of irrigation districts in the West, wanting to be assured of reliable flows for their fields, pressed Congress for protective legislation, which was achieved in the Creative Act of 1891. Today, farmers continue to rely upon the clean, reliable flows from national forest watersheds, which comprise most of the high country in the West and a significant portion in the East. Second to watershed protection was commercial timber production, which was recognized as an official use of the National Forests in the Organic Act of 1897. Timber harvesting in the National Forests remained low until World War II, soared during the postwar boom, and has receded since the late 1980s. The timber volume is unlikely to return to 1980s levels, but a steady supply of wood products from the national forests will continue to provide significant economic benefits.

The national forests and grasslands benefit the economy in many other ways. Grazing of domestic livestock takes place on more than half of all National Forest System lands. Extractive activities, such as hard-rock mining and oil and

gas production, are found on nearly every national forest. Recreation on the lands and waters of the national forests, ranging from world-class ski areas to blue-ribbon trout streams to hiking trails used mostly by local residents, is a multibillion-dollar industry.

National forests and grasslands provide numerous benefits and services to adjacent towns and cities. For millions of Americans, their connection to the forest is tangible. The watersheds that bring green life to irrigation fields also serve the critical function of providing drinking water to towns and cities. Grocery stores, motels, restaurants, guides and outfitters, and other businesses in hundreds of communities depend in whole or in part on tourism revenues from nearby public lands. These economic enterprises help knit communities together. Indian tribes have treaty-based hunting, fishing, and gathering rights within many national forests, and watersheds on the national forests provide essential habitat for salmon to fulfill tribal fishing rights downstream. Traditional Indian people also revere sacred sites within national forests and grasslands. For centuries, Hispanic communities in the Southwest, with origins dating back to Spanish land grants hundreds of years ago, have relied on public lands for firewood-gathering, grazing, subsistence hunting, and water supply for their family farms.

The national forests and grasslands give essential definition to day-to-day life in many local communities. People hunt, fish, boat, and hike in them. Perhaps even more fundamental, the people's lands are the backdrop to many towns and communities, the ridge lines in the distance that each year go from green to white and back to green again. The forests and grasslands are places to daydream about and to seek refuge in. Sense of place is a deep, intimate emotion. These lands create it and sustain it through the force of their grandeur and the comfort of their constancy.

Nearby communities have a special role in providing stewardship for these resources.

People who work on the land often have a rich knowledge of it and of its history, knowledge that is accumulated through experience and passed down through generations. This knowledge is an important contribution to understanding social and ecological processes over time. Also, these communities are often the first line of defense when wildfire strikes on the national forests, and they provide much of the workforce and equipment for fighting unwanted fires.

The economies of many towns and cities are materially dependent on both resources and environmental services from the watersheds, forests, and rangelands. For example, when siltation levels increase in streams, fishing and coastal communities are affected by reduced fish populations and increased harbor-dredging costs. When timber harvest levels decline in response to changes in economic organization or public policy, small communities with little economic diversity can experience sudden high unemployment. Even in nearby urban areas, high-tech industries dependent on clean water can be affected by increases in siltation or declines in water supply. The national forests and grasslands must serve all of the nation's people; nevertheless, local residents deserve particular attention when the contributions of the forests to economic and social sustainability are being considered. So, too, should the stewardship responsibilities of adjoining human communities be addressed in planning for ecological sustainability of the national forests and grasslands.

Variability and Uncertainty: The Realities of Economic and Social Sustainability in a Dynamic Landscape

The notion of economic and social sustainability does not imply the persistence of the status quo. The health and vitality of economic and social systems lies in their

diversity and in their ability to adapt and evolve as conditions and needs change. The same diversity that characterizes an ecological system characterizes a human system. The idea that an ecological system seeks a stable equilibrium was once popular in ecology, as was the expectation that communities and societies could be stabilized through economic and social policies based on equilibrium models. Today, ideas of stability and equilibrium have been replaced with a new appreciation for the dynamic and emergent qualities of biological and social systems. Ecological sustainability, from this perspective, assures that conditions are maintained that allow and promote natural processes of change and adaptation at any time or place, while the overall essence of the ecological system remains. The same understanding applies to human systems and economic and social sustainability; human systems change through time, and sustainability is based on the capacity of human systems to adapt and evolve. Sustainable social systems learn to self-organize to further their own well-being within the context of opportunities. To support and enhance social and economic sustainability, public planning processes can illuminate the range of contributions available from a sustainably managed forest or grassland, and they can facilitate society's ability to make informed and wise decisions.

Assessing the Contributions of National Forests and Grasslands to Society

The land- and resource-planning process for National Forest System lands provides an important opportunity to better understand and define the many connections between forests and rangelands and their associated economies and communities. Because forests contribute in numerous tangible and intangible ways to the spiritual, cultural, social, and

economic well-being and identity of many communities and individuals, the planning process must actively consider and engage the different cultures, communities, and economies that give these contributions value. It is not always possible to quantify or rank diverse uses and values to determine such elusive concepts as highest and best use, just as it is impossible to identify, count, and value all plants and animals in an ecological system. It is, nonetheless, essential that important uses and values be recognized, assessed, and accommodated as practicable and appropriate. The process must also consider values that have been given specific legal or historical protections (such as Indian treaty rights and wilderness) and ensure that these values are provided for and protected and that other management activities do not detract from them.

Assessments of the contributions of national forests and grasslands to communities and economies must be a dynamic process, tracking changes in social values and resource definitions along with changes in knowledge and understanding. A dynamic planning process recognizes that the value of uses, products, and services from resources changes with time. For example, areas that are highly valued for timber harvest or minerals extraction may assume higher value to society, both locally and nationally, as sources of clean, reliable water or recreation. Furthermore, as new knowledge becomes available, the full worth of some contributions will be better recognized and more fully assessed.

Assessing the Social Consequences of Changes in Federal Land-Use Policy to Rural Economies and Communities

Rural communities often bear the brunt of changes in agricultural and natural-resource

polices. This impact has been especially apparent in recent years in small communities centered around wood products, ranching, mining, or agriculture. In many cases, these small communities are isolated from transportation corridors and lack alternative employment opportunities.

In the case of wood production, logging and milling communities often grew up with the encouragement of the Forest Service, as the agency attempted to assist economic development in the West. Especially during the exodus from homesteads in the 1920s and the Great Depression of the 1930s, potential mill owners were often assured that a supply of raw materials, such as timber, would be available forever from the federal forests in the area. As a result, current residents, employees, and owners were taken by surprise when concerns for environmental protection led to sudden, significant reductions in timber harvest on the national forests. While these communities were accustomed to temporary, market-driven boom-and-bust cycles, the notion of timber-harvest reductions as an instrument of federal policy was new and troubling to many people in these communities.

Across the interior west, livestock grazing on the public domain occurred long before permanent settlement. In many places, grazing predates the establishment of the national forests, and some ranchers with federal grazing permits are the descendants of the pioneer families who settled the area. As with the timber industry, ranchers have learned to survive market ups and downs, but limiting the area available for grazing to protect species and ecosystems is somewhat new. Today, with both market prices for livestock low and grazing allotments limited, many ranchers are selling their land to private developers for subdivisions and recreation development, creating a whole new set of environmental and land-use problems.

Social Assessments

Understanding the local, national, and international forces affecting communities, economies, and natural-resource policies is the first step in making decisions about resource-management policies and management activities. A social assessment can help policymakers and managers understand the regional and community-level consequences of changes in land-use policy and can help identify particular places and people that will most feel these consequences. In so doing, it will provide a base of knowledge from which to assess whether or not changes in policy or management are necessary and, if so, what those changes might be.

A good social assessment uses quantitative, qualitative, and participatory methods for gathering data and analyzing it. First, a social assessment analyzes and interprets available quantitative demographic, economic, and social information, such as the census data and employment-sector data at the county level. This information must be used carefully, however, because counties often have both towns and large, sparsely populated rural areas; in such cases, average effects across a county may not tell the whole story.

Second, a social assessment undertakes a qualitative analysis of the economic and political history of the region, the culture of groups and communities and how they have changed with time, the organization and leadership of local communities, the political and religious organization of the area, and other dimensions of social life. However, to adequately understand any particular community or place, it is critical that a participatory social- and economic-assessment process be organized and conducted by each individual community in these rural areas. Some assessments refine the quantitative demographic, employment, and social data for the specific place by using a qualitative approach to estimate actual levels and trends. A participa-

tory assessment also engages communities in a learning process about their identity, their history, the forces for change affecting them, and the opportunities for collective action. Thus, the social assessment is both a strategy for developing site-specific information useful for policy makers and a collective learning process that enhances community capacity by encouraging common understanding of shared problems and opportunities for community leadership and action.

Assessment Methods

A social assessment attempts to inform policymakers of the social, political, economic, and cultural context prior to the development of options or alternative courses of action. It is used to inform decision making about approaches that might minimize or avoid unnecessary disruptive influences and maximize the value of contributions from National Forest System lands to local communities and economies. In general, social assessments provide a regional context for understanding community level conditions, but most of the methodologies use the community as the primary unit of study. This distinction is important because regional trends typically are not characteristic of conditions in rural, small communities largely because economic growth generally occurs in the larger, metropolitan areas or in recreation and second-home developments. Thus, the social assessment provides a foundation of baseline data from which to evaluate the likely consequences of different policy options. "Social impact analysis" is the term for the analysis of the specific consequences likely to follow from a specific policy option or management alternative.

A social assessment provides the information base from which policymakers can estimate the magnitude of the changes in land-use policy and the ability of rural communities to respond. The community is the basic unit of analysis, defined in a place-specific sense. In

some analyses, that place is the county, and in others, it is a particular town or census unit. It has long been recognized that there are many different kinds of communities, such as communities of interest, communities of place, and others. Still, geographic communities are important from an economic and policy standpoint, especially for relatively isolated areas whose fortunes are linked to their location.

Local and regional economies are strongly and directly affected by distant forces found in national and international capital markets, economic trade policies, and environmental policies. As a result, communities engaged in primary resource production (e.g., timber, grazing, mining, or recreation) are especially sensitive to national and global economic and political changes. This sensitivity can lead to a boom-and-bust economy: times are either very good or very bad. This vulnerability is two-dimensional. One dimension is that primary-production economies generally export their products without doing much secondary processing or manufacturing. The second is that these communities are often small and isolated and have undiversified economies.

To understand both dimensions of vulnerability, social assessments employ a variety of methods. First, economic and social analysis of quantitative data sources is an excellent basis for regional comparison and for the identification of communities with the factors associated with economic and social vulnerability, isolation and lack of diversity.

Second, while communities of place are generally the basic units of analysis, there are cross-cutting communities of interest, occupation, and value. This multiplicity of communities means that aggregate measures of community trends based on the geographic community are inadequate to assess the specific social and economic sectors most likely to be negatively affected by changes in policy. For example, some occupations are often more directly affected by changes in timber or grazing policy than others, even though the

effect might be community-wide. Policy options need to recognize these differential effects both at the community level (often adjacent communities are different enough to have very different consequences from the same policy changes) and at the individual level (some occupational groups will be more affected than others). Clearly, the negative effects on both communities and individuals call for public-policy consideration as people seek to adapt to broader social changes.

Third, the land-ownership and management patterns of an area are a critical factor in understanding the limits as well as the opportunities for social and economic activity. Understanding the federal importance in the area requires understanding the broader land ownership and supply picture of the region: the percentages of land in federal, state, and private ownership; the percentages of resource supply (timber, forage, recreation, and minerals) from federal, state, and private lands; the percentage of budget from federal revenue sharing; and the percentage of the economy supported by transfer payments (social security, pensions, welfare, etc.). These and other variables provide the context within which the magnitude of change in federal policy can be estimated.

Fourth, the consequences to communities that result from federal policy and management changes are often measured in terms of likely effects on capital availability, employment opportunities, wage levels, local tax base, federal revenue sharing, and the ability to support public infrastructure and social services, factors important to maintaining a vital community. These economic effects are complex; each decision has positive effects on some people and negative effects on others. A full economic analysis examines the net consequences of decisions. Several factors make estimating the net effects of decisions difficult. Some examples are:

- economic trends that would have occurred independently of the management decision need to be identified (for

instance, investment in capital may lower employment in sawmills independent of changes in wood availability);

- normal variation in product prices caused by international market fluctuations have to be separated out from local events (for instance, an economic downturn in Asia has recently reduced wood prices); and
- interest rates affect the number of housing starts, which in turn affects demand for wood products.

In a particular area, the effect of amenity values on the location decisions of “high-tech” industries may have to be contrasted to the effects of reductions in commodity outputs on employment in directly forest-related industries.

Fifth, and the crux of a social assessment, is estimating the adaptive capacity of communities. Several concepts and approaches to developing integrated measures have been developed to estimate community adaptability. The essential feature of all of these concepts is the ability of the community to mobilize its members to collectively respond to the need to change and to develop the leadership, organization, and resources needed to carry out common goals.

Concepts

The social-assessment work done in both the FEMAT and ICBEMP bioregional assessments points to the urgent necessity of refining concepts and measures as well as greatly improving the existing data available for analysis. Two concepts are of particular importance:

- 1) Community capacity: the ability of residents and community institutions, organization, and leadership (formal and informal) to meet local needs and expectations. It includes physical and financial infrastructure (roads and capital availability); human capital (occupational skills and educational levels); and civic responsiveness (leadership). Community capacity focuses on the internal dynamics of

specific communities and their particular history, location, and identity. This concept was used in FEMAT (Forest Ecosystem Management Assessment Team) along with the concept of community stability, an equilibrium-based concept of community adaptability, to identify how specific communities might respond to anticipated drops in federal timber harvest, increases in watershed protection, and increases in scenic quality. All these changes were associated with the management options under analysis and were linked to specific social and economic factors.

- 2) Economic and social resiliency: the adaptability of human systems at the more macroscale. Since adaptiveness is defined as directly correlated to diversity, resiliency is measured by population density and cultural diversity, lifestyle diversity, and economic diversity. High resiliency ratings imply that these systems are highly adaptable. In areas where high in-migration has been occurring and new economic sectors have been developing, this measure captures a dynamic of change in even small communities that the capacity measure would miss. Since low ratings suggest that communities will have difficulty in adjusting to rapid change, the less diversified communities are identified for further analysis.

Integrated Measures

Integrating ways to assess community risk and vulnerability stand in contrast to past planning processes. In the past, it was assumed that analyses of commodity supplies (e.g., timber, water, and forage) provided sufficient information to project regional and local economic conditions and effects.

- 1) Communities at risk. A risk analysis estimates the likelihood that a particular community has sufficient internal capacity

to respond to the magnitude of an anticipated policy change. The FEMAT attempted to use a risk-analysis approach but did not develop a conceptual description of risk. Rather, a ranking of communities based on the level of “risk” (a matrix of community capacity and likelihood of successful adaptation from an expert-panel rating exercise) identified those communities most likely to be strongly and negatively affected by reductions in federal timber supply, those with generally neutral responses, and those that would benefit from increased watershed protection and scenic quality. A risk approach is a good integrated measure of adaptive capacity of specific communities and the projected magnitude of change. However, before such analyses are widely used, it is critical that a conceptual definition of risk be developed. (See Sidebar 3-6.)

2) Community vulnerability. Vulnerability analysis works from the concept of resiliency and estimates the likelihood that there is sufficient resiliency in the system of communities and associated economies to adapt to expected changes in federal land-use management and policy. To estimate the potential effects of policy changes, a resiliency measure looks at the dynamics within the area and estimates the adaptive potential of communities based on their diversity. This approach was applied in the Interior Columbia Basin Ecosystem Management Project. (See Sidebar 3-7.)

Pursuant to the requirements of NEPA, environmental-impact statements previously included only a brief section on community demographics and employment but little other social information. Social values for recreation, water, scenic, and spiritual qualities were not assessed. Occasionally, a brief introduction to the history and culture of the region was included.

It is also important to note that the economic values of ecological services have never been assessed in the traditional NEPA document. Systems with ecological integrity provide critical ecological services. Examples include the cycling and purification of water, sustaining the productive capacity of the soil through decomposition and mineral cycling, and control of local and regional climate mediated by vegetation structure and composition. Technological replacements for these essential functions are either impossible or expensive.

Recent bioregional science assessments have included some of the features discussed above. In the case of FEMAT, a social-science team used census and employment data, public-participation records, and research results found in the literature. However, the lack of social assessments as part of the planning process meant that there was not a base of information to work from. As a result, the FEMAT team had to use an expert-panel approach to develop comprehensive, regional and comparative information about rural communities throughout the region. (See Sidebar 3-6.) In addition, it also used expert panels to evaluate the effects of the management options on a wide range of resource values. In the Columbia Basin assessment, social scientists conducted baseline studies to understand the potential economic and social resiliency of different communities in the region and many other economic and social relationships. (See Sidebar 3-7.) In the Southern Appalachian assessment, local communities developed series of questions about themselves and the region and participated in gathering the data to answer them.

Given that one purpose of the national forests and grasslands is to contribute to social and economic stability, it is essential to describe the social and economic context in which plans are developed. Bioregional assessments, such as FEMAT, ICBEMP, and the Southern Appalachian Assessment, have contributed significantly to the development of

methods and concepts to achieve this goal. Future assessments of, and planning for, the national forests and grasslands should use and build upon these approaches.

Developing an adequate methodology for conducting social assessments at different scales is not conceptually difficult. Rather, ideas for how to conduct adequate social assessments abound and have been tested in other policy arenas over the past decades. What is needed is for the Forest Service to convene the best social scientists in the country and to explore different conceptual approaches. An ideal result would be a flexible methodology that is sensitive to scale, drawn from many analytical traditions (ethnography, qualitative analysis, demography, organization theory, quantitative analysis, and political science to name a few), capable of developing a foundation

of data amenable to many different kinds of analysis, and able to be maintained over the long term. Given the experience available and the importance of understanding social and economic sustainability, this is a high priority and can produce near-term results.

Considering the Economic and Social Impact of Land-Use Change in Setting Federal Policy

Federal policy can consider the potential social consequences of land-use change in three major ways: (1) in setting the overall land-use policy, (2) in tailoring the policy for specific geographic areas, and (3) in delivering resources

3-6. FEMAT: Community Capacity and Communities at Risk

The Forest Ecosystem Management Assessment Team (FEMAT) examined the effects of alternative forest-management plans on more than 300 small, rural communities in the northwest coastal states. Through an expert-panel approach that used local and state officials, county commissioners, and extension agents, FEMAT estimated the capacity of communities to adapt to large, sudden reductions in federal timber-harvest levels. By examining the magnitude of the change compared to historical variation and the capacity of specific communities to respond to such changes, FEMAT was able to provide policymakers with a framework for assessing the risk to rural communities associated with an array of options for ecosystem management. “Most-at-risk” communities were defined as having low or medium-low capacity and negative to moderately negative consequences. The percentage of communities so classified varied from 22 to 33%, depending on the forest-management alternative considered. Because such site-specific information can affect the future of human communities, this information was analyzed and presented in aggregate form (percentages) and with a regional distribution (i.e., a part of a county). The sensitivity of social data must always be considered in the analysis and presentation of results, a concern seldom understood by those who are not social scientists. Yet those data can be of immediate and direct concern and importance to community residents and public officials.

However, this analysis was used to design several policy strategies for mitigating the economic and social impacts of reductions in federal timber harvest. These policies included federal money allocated to job retraining, community economic development, and a new office of rural community development to identify and work with people and communities at risk.

to help the communities and individuals adapt. We will use the President's Plan for the federal forests of the Northwest to illustrate a recent application of these concepts.

The Committee has emphasized ecological sustainability as a fundamental goal in the management of the national forests and the roles of species viability and ecological integrity in this quest. It has also pointed out that the degree of risk to take for the achievement of species viability and ecological integrity is, in part, a social decision. Consideration of the economic and social consequences of different

levels of risk can influence the alternative chosen. In the President's Plan for Northwest Forests (see Sidebar 3-4), instructions included the requirement that species should have at least a medium chance of persisting, and the attainment of this goal was assessed by requiring an 80% likelihood of achieving viable populations over the planning period. Each of the ten options was rated by expert panels on various groups of wildlife species. Of all the alternatives, Option 1 was unanimously viewed as providing the greatest assurance of long-term viability because it allowed the least amount of distur-

3-7. ICBEMP: Economic and Social Resiliency and Vulnerability to Land-Use Change

The Interior Columbia Basin Ecosystem Management Project (ICBEMP) assessed economic resiliency in the northwest United States by measuring the diversity among employment sectors. The assumption is that people in high-resiliency counties have ready access to a range of employment opportunities if specific firms or business sectors experience downturns. A generally high level of economic diversity was found at the scale of large multicounty areas with relatively little variation from area to area. Estimating economic resiliency at the county level based on employment diversity provides a different picture: a lower average level of resiliency and more variation.

Social resiliency was measured at the community scale with four factors: 1) civic infrastructure (that is, leadership and preparedness for change), 2) economic diversity, 3) social/cultural diversity (population size and mix of skills), and 4) amenity infrastructure (attractiveness of the community and surrounding areas). Communities varied considerably in social resiliency.

A composite measure of socioeconomic resiliency was developed at the county level that combined three factors: 1) population density, 2) economic diversity, and 3) lifestyle diversity (see figure). While 68% of the area within the Columbia River Basin is rated as having low socioeconomic resiliency, 67% of the people of the Basin live in areas with high socioeconomic resiliency. Clearly, counties with low resiliency are of special concern because they often lack sufficient population to sustain existing services or develop necessary social services, such as medical clinics.

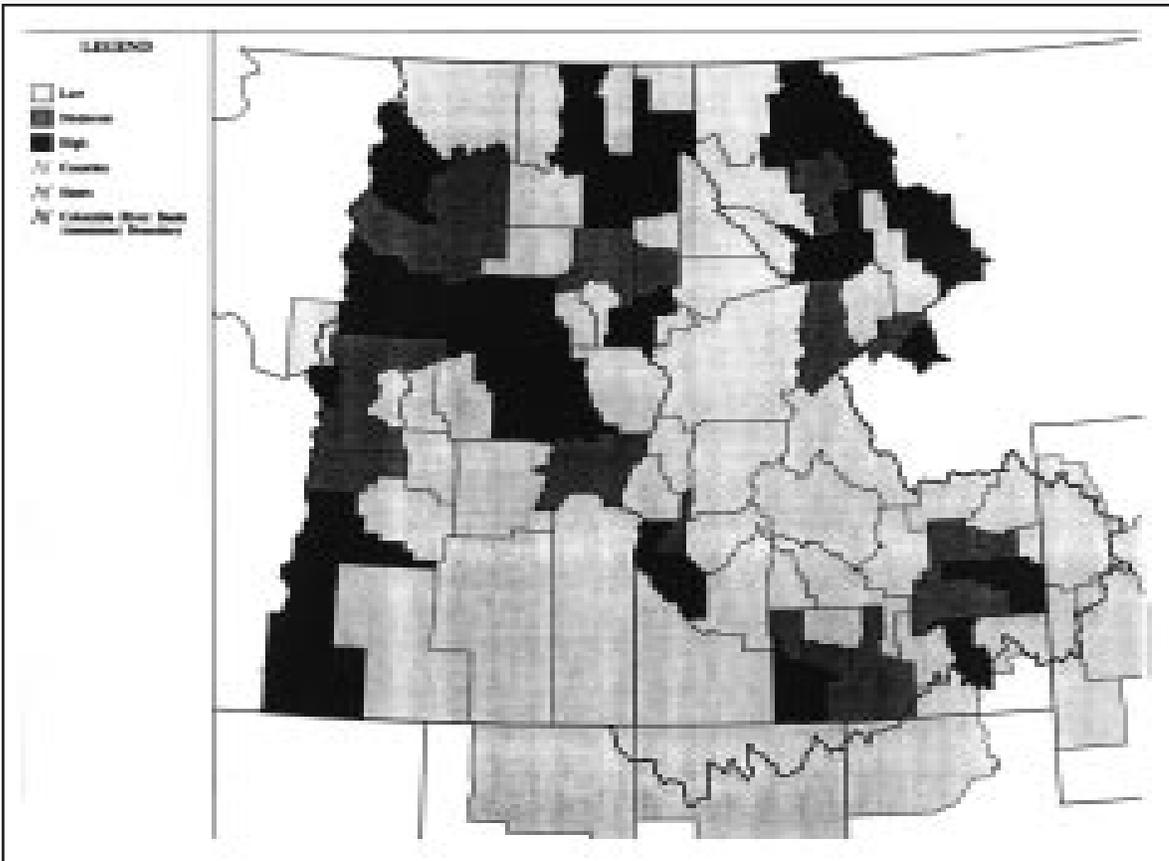
Recently, social scientists have refined the work of ICBEMP to allow more specific identification of particular communities that may be especially vulnerable to land-use change. They first identified three sources of economic and social impacts: lower timber harvests, lower livestock grazing, and reduced federal payrolls.

bance based on timber harvesting. However, this alternative was not chosen. The reason was largely because of the anticipated impacts on communities and economies. As a result, an option was chosen that provided somewhat greater risk to wildlife species but reduced the risk to communities dependent on federal timber for processing and milling.

In addition to consideration of social and economic consequences in the selection of policies, the adverse effects of a broad policy framework can be mitigated by creating a subpolicy tailored to reduce the impact on the

most vulnerable communities and individuals. The President's Plan for Northwest Forests attempted to achieve this result, in part, through the placement of adaptive management areas (AMAs), where approaches to technical, administrative, and social issues could be developed and tested. The AMAs were intended to represent major ecological communities in the planning area to allow experimental approaches to forest management. Option 9, the selected option, specifically ensured that the AMAs were located so that strong ecological protections surrounded them to allow managers to risk

They then identified communities that are especially dependent on one or more of these sources of employment and income. Finally, they identified those communities that are relatively isolated. Through such a screening, they believe they have identified those communities especially vulnerable to likely land-use changes that may emerge from ICBEMP.



Socioeconomic resiliency ratings by county.

failure without risking the integrity of the larger system. The location of particularly hard-hit communities was one of the location criteria that led to several of the AMAs being associated with adjacent timber-based communities. To make AMAs of immediate benefit to these adjacent communities, several specific requirements were added to the list of “experiments” expected in AMA areas: information-sharing strategies, such as ensuring the availability of resource databases; training local residents for technical support, especially in monitoring programs; and encouraging local processing of timber harvested from AMAs. The proposed AMA program called for expanded funding in these areas for research, demonstrations, monitoring, training, and capital investments.

Unfortunately, the AMAs have not fulfilled their potential, in part because of inadequate budgets but also because of a lack of agency commitment to ensuring their success. On a hopeful note, the Applegate AMA, which was established because it had a strong, community-based partnership dedicated to reducing conflict over natural-resource management, has become the center of activity on federal lands in Southeast Oregon, but it still lacks coordinated agency support and funding.

Finally, the federal government can use other programs to deliver resources to help the affected economies and communities cope with the change. The Clinton administration worked with Congress to allocate hundreds of millions of dollars to mitigate the negative economic and social impact of the President’s Plan for Northwest Forests. First, they guaranteed that the counties would receive, for a number of years, payments covering much of the revenue that had previously been received from in lieu payments associated with timber sales. Second, they made available funds that counties that were certified as “timber dependent” could obtain to support projects that would help them diversify their economies. Third, they provided earmarked funds for federal job retraining and education programs for displaced workers.

National Forest System Contributions to Social Sustainability: The Importance of Establishing Realistic Expectations

Stability and Fluctuation

As conceived in the Multiple-Use, Sustained-Yield Act of 1960, within the limits set by ecological sustainability, land- and resource-management planning was to seek the achievement and maintenance in perpetuity of high levels or regular periodic outputs of the various renewable resources of the national forests. (See Sidebar 3-8.) Two realities make this goal difficult to reach. First, the uncertain dynamics of ecological systems make it difficult to schedule a regular, predictable output of a single product (e.g., timber or forage) because productivity varies through time. Second, an even flow is difficult to sustain under variability, because it often comes by over-exploiting the system’s productivity in some years (harvesting more than is produced annually) or by impairing other elements of the system (e.g., grazing under conditions that cause erosion).

When they are managed to provide regular outputs, national forests and grasslands may appear to promise stable commodity flows, but it is difficult for them to deliver such flows for extended periods. Unfortunately, public expectations have been raised about the long-term capability of the land and likely future resource flows, based on limited estimates of maximum yields for a few resources. At the extreme, forests and rangelands managed this way become subject to catastrophic surprises when infrequent, but natural, events occur (e.g., catastrophic fires or drought). Human communities that grow dependent on commodity flows kept artificially high and constant can eventually suffer the same catastrophic surprises,

often losing all semblance of economic or social sustainability.

In fact, economic fluctuations and disruptions are minimized and economic vitality is enhanced when ecological systems are sustainably managed. Contrary to earlier assumptions, social sustainability and sustained outputs are not synonymous. By focusing attention on a short list of commodity outputs from a forest, many other uses and values (and thus the communities dependent

upon them) were overlooked and undervalued. The overall productive capacity of the ecological system rather than single measurable outputs should be sustained over the long term so that the land, water, and resources continue to contribute to the many and diverse values, services, outputs, and uses valued by people. In this sense, the flow of any product, whether a commodity like timber or an amenity like recreation, will not necessarily be constant or regular. Indeed, over the past

3-8. The Legal Mandate for Multiple Uses Consistent with Ecological Sustainability

The following are key phrases from the laws that govern the national forests, specifically, phrases that relate to the contributions that the national forests make to the economies that invigorate our communities and cultures.

Organic Act: This 1897 law gave three purposes for the Forest Reserves: (1) to preserve and protect the forest within the reservation, (2) to secure favorable conditions of water flows, and (3) to furnish a continuous supply of timber for the use and necessities of the people of the United States.

Sustained Yield Forest Management Act of 1944: While this act was largely intended to provide for the creation of cooperative units of public and private forest land, it also contains a clear statement of the economic and social contributions of forests. “Sec. 1. In order to promote the stability of forest industries, of employment, of communities, and of taxable forest wealth, through continuous supplies of timber; in order to provide for a continuous and ample supply of forest products; and in order to secure the benefits of forests in maintenance of water supply, regulation of stream flow, prevention of soil erosion, amelioration of climate, and preservation of wildlife.”

Multiple-Use, Sustained-Yield Act: This statute called for the “achievement and maintenance in perpetuity of a high-level or regular periodic output of the various renewable resources of the national forests without impairment of the productivity of the land.” It named the multiple uses as: outdoor recreation, range, timber, watershed, and wildlife and fish. It stated that “the establishment and maintenance of areas of wilderness are consistent with the purposes and provisions of the Act” and that “the purposes of this Act are declared to be supplemental to” the provisions named in the Organic Act.

National Forest Management Act: “The Forest Service ... has both a responsibility and an opportunity to be a leader in assuring that the Nation maintains a natural resource conservation posture that will meet the requirements of our people in perpetuity.”

centuries, we have learned that expecting an ecological system to deliver stable and high outputs of any single product has eventually had disastrous effects on human systems.

Clearly, prosperous communities and economies only remain healthy and vibrant if their foundation is ecologically sustainable. Thus, the Forest Service must be cautious and avoid making resources available in a manner that establishes unrealistic expectations for economies and communities that cannot be fulfilled over the long term within the context of ecological sustainability. Doing so will only lead to hardship when abrupt changes become necessary to restore the ecological system to a sustainable path.

Increasing the Predictability of Resource Use

The difficulty of obtaining stable resource flows from the national forests creates a dilemma in terms of achieving ecological, economic, and social sustainability. Achieving ecological sustainability may require active management to achieve desired conditions. Without predictable outputs, though, the needed capital may not be invested to create the capacity for the needed actions. Thinning to reduce the accumulation of fuels in the Intermountain West, as an example, may be an important part of a strategy to return forested ecosystems to conditions within the historical range of variability. Yet, without some predictability to the timber output, it will be difficult to justify investments to harvest and process the small material from the thinnings. And without some predictability, the potential of the national forests to contribute to ecological, economic, and social sustainability will be unfulfilled.

How can this predictability be increased? On the national forests and grasslands, it can generally be expected that actions contributing to long-term ecological sustainability have a higher probability of occurrence than actions

working against attainment of this goal.

Actions that produce outputs while contributing to ecological sustainability tend to have broad agency and public support. The Siuslaw National Forest, as an example, is finding it much easier to thin stands in reserves than to clear cut in areas dedicated to timber production. (See Sidebar 3-9.) While it is easier to say than do, finding strategies that simultaneously contribute to ecological, economic, and social sustainability is the key to increasing predictable resource flows from the national forests and grasslands.

Contributions to Communities with Specific Protections Under the Law

Resource management is inherently a process of allocating scarce resources among competing, yet legitimate, interests within society. Tradeoffs occur. Because some uses have particular values to society that may be overlooked in short-term decision making, Congress has bestowed specific protections to ensure that these values and obligations are not forgotten or undervalued. National forest planning must recognize and accommodate these protected values and uses.

Indian Tribal Rights

In the American federal system, American Indian tribes have a special position that has evolved over two centuries of policy development. As tribes ceded territory, they retained reservations and certain protected activities outside of the reservations. This section summarizes the key points that Forest Service planning must incorporate: treaty and other reserved rights, the trust responsibility, the government-to-government relationship, and other federal laws that affect tribal rights.

Treaty Rights

Many American Indian tribes, especially in the Pacific Northwest and Midwest, have rights to hunt, fish, trap, and gather on national

forest lands. Courts have upheld these off-reservation rights, particularly since the landmark decisions *United States v. Washington* and *United States v. Oregon*, which enforced provisions in treaties that allowed access to

3-9. Achieving Predictable Timber Harvests on the Siuslaw National Forest

The Northwest Forest Plan allocated more than 4/5 of the Siuslaw National Forest in western Oregon to reserves, either riparian reserves or late-successional reserves. The rest was allocated to “matrix” in which timber harvests were to be regularly scheduled. Reserves have ecological objectives, and timber harvest can proceed after analysis if it is needed to meet these objectives. Thinning in plantations appears to be the major timber-harvest activity likely to occur in these reserves, but no timber-harvest volume was assumed to come from the reserves in the Northwest Forest Plan to make sure that there was no pressure for timber harvest from these areas. The matrix has both ecological objectives and timber-production objectives. The Northwest Forest Plan estimated that approximately 25 million board feet a year would come from the matrix, largely from clearcutting in mature stands.

Ironically, it has been much easier for the Siuslaw National Forest to harvest timber in the reserves than in the matrix. Once a broad suite of people became convinced that thinning plantations would enable more rapid creation of late-successional conditions, barriers within and outside the agency to the actions largely melted away. On the other hand, the Siuslaw National Forest has been very slow to undertake harvest of mature forest in the matrix for a number of reasons. First, the scientific analysis underlying the Northwest Forest Plan clearly points out that cutting mature forest increases the risk to late-successional species. Option 9 was a compromise in terms of the amount of risk to take, but the risk exists nonetheless. Few professionals can be enthusiastic to implement actions with those results. Also, public protest is likely. Second, laying out timber sales that may negatively affect spotted-owl and murrelet habitat requires a number of years of examination and review. Forest personnel have chosen instead to focus their energies on the reserves, where they are not removing habitat suitable for threatened and endangered species.

Yes, the Siuslaw National Forest can be expected, under the Northwest Forest Plan, to offer at least 20 million board feet a year and, yes, these levels will likely continue for at least a decade because of the acreage of plantations that exist on the forest. But, by and large, those 20 million board feet will not be coming from clearcutting in the matrix, where the regularly scheduled timber harvest was supposed to occur. Rather, they will be coming mostly from thinning in the reserves (and the intermixed matrix land). One important point, though: the actions in the reserves will be based on the amount of treatments needed to move toward the desired future condition of late-successional forests. While timber harvest volumes from these efforts continue to be reported, they are the result of applying the needed actions, not the driver of them.

salmon fisheries in all usual and accustomed places. Courts uphold similar language in other treaties to protect fishing, hunting, and gathering rights on ceded aboriginal lands that include national forests.

During the past decade, the Forest Service has made impressive progress on Indian issues. The agency has created several liaison positions, held training sessions on the subject, developed a useful sourcebook, and established a working relationship with many tribes. The Forest Service should continue to expand these promising efforts, always being careful, when Indian rights are asserted, to evaluate such assertions objectively rather than resisting Indian rights on the implicit ground that they infringe on Forest Service prerogatives. An open recognition of Indian rights and a fully cooperative government-to-government relationship with tribes is one of many examples of how Forest Service stewardship should be outward looking and broadly cooperative with other governmental agencies that have authority and rights within the national forests.

Trust Responsibility

The entire federal government, not just the Department of the Interior, is responsible for carrying out the government's trust responsibilities, which include recognition of treaty-based and other legal rights of American Indians on lands outside and inside of reservation boundaries. Current operative regulations for carrying out the NFMA do not provide explicit recognition of treaty rights and the affirmative responsibility of the Forest Service to protect trust resources. In addition, the handbook, *Principal Laws Relating to Forest Service Activities* does not inform Forest Service officials that treaty obligations apply in some regions. Nor are there requirements to work cooperatively with tribes in the protection of trust and treaty resources. This situation should be changed in new regulations.

The Forest Service is obligated to recognize and to avoid adverse effects upon tribal rights to use national forest lands. For instance, the court in *Klamath Tribes v. United States Forest Service* (D. Or. 1996) found that the Forest Service has a "duty to manage habitat to support populations necessary to sustain Tribal use and non-Indian harvest, including consideration of habitat needs for any species hunted or trapped by tribal members." In carrying out this duty, tribal rights are to be protected "to the fullest extent possible." The court found that these standards had not been met, and issued an injunction in favor of the tribes regarding challenged timber sales in the Winema and Fremont national forests in Oregon.

The Forest Service must consider the effects of its actions on rights that may be exercised outside of national forest boundaries. Protection of salmon harvest is a prime example. Tribes with treaty and reserved rights to salmon have, in some cases, argued that management of such species should assure a harvestable surplus in addition to conserving the population. Arguments over this concept are continuing in the courts. A decision in the Indians' favor would affect forest management where spawning grounds and habitat used by salmon are impacted by forest-management activities.

Sovereignty and the Government-to-Government Relationship

Effective cooperative relationships between the Forest Service and tribal governments is essential. Carrying out the fiduciary responsibilities of the trust relationship and enforcing other federal laws that recognize tribal rights require that the Forest Service and other federal agencies work to develop cooperative relationships with tribal governments. Executive Orders require adequate consultation.

The principle of the government-to-government relationship requires personal con-

tact and establishment of ongoing cooperative relationships; sending a letter to the tribal council is not enough. In the Klamath case, for instance, the court found the government had a procedural duty to consult with tribes. Tribes are particularly interested in cooperative relationships in the planning and monitoring processes. Some issues to address are access, land exchanges, interaction between national forest lands and tribal lands regarding disease and insects, traditional knowledge, protection of sensitive information, and adequate monitoring for protection of trust resources.

The flow of information and management policies should be bidirectional in such cooperative relationships. Despite receiving less funding than federal agencies, many tribes have established excellent records in uneven-aged forest management and in recognition of the multitude of values that people have for forests. As tribes took over reservation forest management from the Bureau of Indian Affairs, harvests typically fell as concerns for the protection of nontimber resources in the forests were recognized. These reductions were not as controversial within Indian communities

3-10. Planning Coordination on the Urban Fringe

The San Bernardino National Forest is located just 50 miles from downtown Los Angeles in one of the fastest-growing suburban areas in the United States. The forest is bounded by 26 cities and numerous, smaller, unincorporated bedroom communities. Because of rapid growth in the region, the forest is increasingly threatened by residential and commercial developments near its borders. These developments are of particular concern to the forest because of the topography and ecology of the area; the forest and surrounding towns are located in the San Bernardino Mountains, in extremely steep, unstable, and fire-prone chaparral canyons. Poorly planned and executed development near the forest borders contributes to fires, erosion, flooding, and overuse of recreation facilities, all of which ultimately degrade the forest's fragile and rare chaparral ecosystem.

The threats to the forest from development are greater than from any other single factor, so mitigating the effects of development is of the highest priority. Gary Earney, the Cajon District's Lands and Recreation Officer, decided that the best way to encourage responsible development in the area, and thereby protect the ecological systems of the forest, was to get involved in the planning processes of the local governments. He works directly with municipal planners and private developers to minimize or mitigate the potential impacts of development on the forest, particularly to avoid the threat of fire damage. According to District Ranger Elliott Graham, helping these adjacent communities understand ecological systems and make their planning and development decisions in an informed manner "is the most critical thing we can do to protect the forest ecosystem." And such communication can be easily initiated simply by responding to requests for comments or participation by local communities and by paying closer attention to the planning processes of forest neighbors, activities that are often overlooked by the agency. As Earney commented, "In many cases agreements are made that actually improve the quality of natural resource management on the lands of all involved, make the on-the-ground jobs of our field personnel easier, and improve the quality of our forest visitors' experiences."

as has been observed in other situations; many tribes had criticized the Bureau of Indian Affairs' high harvest levels for some years. Interestingly, tribes often are able to handle salvage operations after fire and windthrow without long delays. Part of the reason is some shielding from the National Environmental Policy Act; but another major reason is that reservation forest-planning processes, supervised by tribal councils, lead to plans with broad support. Flexibility in implementation, with the approval of tribal councils, is easily attained in most cases. The Forest Service can learn from these successes.

Tribal stewardship of forests and rangelands can also learn from experiences and approaches on the national forests and grasslands. The Forest Service has pioneered interdisciplinary planning and development of strategies for the conservation of species and ecosystems in providing for multiple use. Also, the innovative strategies for increasing the compatibility of grazing and protection of riparian areas developed by the Forest Service and Bureau of Land Management provide many valuable lessons for tribal management of rangeland resources on reservations.

Other Federal Laws

Important tribal prerogatives have been recognized by such laws as the Antiquities Act, Archaeological Resources Protection Act, American Indian Religious Freedom Act (as amended), the Religious Freedom Restoration Act, the Native American Graves Protection and Repatriation Act, the National Historic Preservation Act, and Executive Order No. 13007 on Indian Sacred Sites. The current NFMA regulations refer to the core of many of these directives: the recognition of sacred sites and sites of archaeological and historic importance. Of the many concerns listed above, only this one receives explicit attention in the regulations, although only in the principles section. In planning and implementation, the

Forest Service must comply with these laws, and in doing so must seek meaningful consultation with tribal governments.

Tribal treaty rights and federal laws create distinctive rights that are different from, and sometimes stronger than, those of the general public. Regulations must recognize that the Forest Service needs to forge strong government-to-government relationships. In addition, development of the capacities of tribal governments through the Indian Self-Determination Act has enabled tribes to become true cooperators. Many tribes have a strong record in sustainable forest management, and many tribal concerns regarding the values that forests provide communities are the same concerns that the Forest Service is now learning to address. The Forest Service should actively seek the cooperation of such tribes in planning.

Hispanic Communities

The circumstances of rural Hispanic communities in the Southwest present another compelling example of how the Forest Service can make important contributions to local communities.

For many years before the War of 1848, most of the Southwest was controlled by Spain, succeeded by Mexico. In the United States–Mexico War, the United States annexed New Mexico, Arizona, California, Nevada, Utah, and parts of Colorado and Wyoming. The United States promised in the 1848 Treaty of Guadalupe Hidalgo that it would respect the land rights of Mexican citizens. Yet, through a well-documented pattern of fraud and deceit by many parties, Hispanic landowners and communities lost millions of acres.

Today, many of those former Spanish and Mexican grant lands are within national forests. Especially in the Rio Grande watershed in northern New Mexico and parts of southern Colorado, traditional Hispanic communities remain tied to those lands, both economically and emotionally. These communities, many of

them poverty-stricken, use the national forests for many purposes critical to their land-based lifestyle, including firewood gathering for residential heating and cooking, grazing, subsistence hunting, and, in a few instances, commercial timber harvesting. Those communities can be greatly aided or severely disadvantaged by land-management practices within the national forests. Most notably, acequias, the traditional Hispanic irrigation cooperatives, suffer when the national forest watersheds fail to provide steady flows of clean water.

Unlike Indian tribes, whose rights stemming from treaties and federal statutes remain in force, Hispanic communities generally do not possess explicit legal rights in the former grant lands of the national forests, however much the Treaty of Guadalupe Hidalgo might have intended otherwise. Nevertheless, these communities have powerful historical and contemporary equities that should be reflected in Forest Service policies. The first duty in the stewardship of the national forests and grasslands must be to protect the integrity of the ecological system. Once that is assured, however, the Forest Service should plan and manage land-grant national forest lands to contribute to the traditions and needs of local Hispanic communities. That has been the policy (announced but not always followed) of the Southwestern Region since 1972, as set forth in its Northern New Mexico Policy. The Forest Service should also give priority to watershed protection and to the personal uses of community members for firewood gathering, grazing, and hunting.

Economic and Social Sustainability: When Are the National Forests and Grasslands Fulfilling Their Responsibilities?

The notion of economic and social sustainability speaks to the very capacity of a

society to ensure the long-term well-being of people and the communities they inhabit. National forests and grasslands play important roles in building this capacity (1) when assessment and decision-making processes recognize, appropriately consider, and act upon the wide range of products, values, services, and uses contributed by the national forests and grasslands; (2) when they meaningfully involve the many communities that give voice to the value of these contributions; (3) when they foster an understanding of the linkages between social and ecological systems; (4) when they recognize the differential capacity of communities to respond to policy changes and work to reduce the negative economic and social impacts of these changes; and (5) when they foster responsibility for stewardship behavior that directly or indirectly enhances ecological, and, thereby, social sustainability. In other words, the Forest Service promotes the long-term economic and social well-being of the nation through both the tangible and the intangible contributions of the national forests and grasslands as well as by enhancing the ability of communities to make sustainable choices.

Human and ecological systems are highly variable, characterized by dynamic processes, and often uncertain in terms of their future natures and structures. Just as a few static measures of plant or animal abundance are not representative of the dynamic and process-oriented components of ecological sustainability, measuring economic and social sustainability is equally complex. Simple measures of employment or income levels or numbers of recreation visitor days, while important as descriptors of current conditions, reveal little about whether conditions are improving; whether conditions are sustainable; and whether communities have the capacity to pursue their desired futures. Consequently, it is more appropriate and realistic to ask, "Are the processes in place that will accommodate and encourage sustainability?" or "Do the communities and economies have the ability to

persist over time through innovation and adaptation to new conditions?” than the question, “Has social sustainability been achieved?”

Objectively assessing economic and social well-being, and in particular their relationship to the contributions of National Forest System lands, is not a simple task. For the Forest Service to do so in a manner that the American people find meaningful and acceptable is an added challenge. Regardless, it is essential that the planning process dynamically assess the connections between the National Forest System and associated economies and communities, the consequences of differing planning choices, and ways in which to minimize disruptive influences. Effective assessments are best informed when undertaken in a participatory manner, involving the people and communities that can reflect upon their own history, current status, and desired future.

To determine whether the planning process is fostering the assessments, connections, and actions needed to contribute to economic and social sustainability, a number of questions could be asked:

- Does the planning process illuminate and consider the broad range of values, uses, products, and services of a national forest or grassland and the communities that rely on these contributions for their identity, well-being, and livelihood?
- Is the process open and accessible? Do people know about it? Do people feel welcome to actively participate in it? Are people able to meaningfully participate? Is it transparent and easily followed and understood?
- Does the process recognize and accommodate the diverse needs, knowledge, and capabilities of all participants?
- Does the process fit the organization, communication, and decision-making styles that characterize the community?

- Does the process recognize the differential capacity of communities to respond to policy changes and work to reduce the negative economic and social impacts of land-use change?
- Does the process facilitate understanding and learning? Is it enhancing understanding about the capabilities of the national forests and grasslands? Is it enhancing understanding of the wide-ranging values associated with the contributions of the national forests and grasslands and the communities who hold those values? Are people’s concerns and interests effectively expressed? Is information readily accessible and in meaningful forms for the diverse individuals and groups who are, or might be, interested in it?
- Is the process serving as a catalyst for diverse and dispersed communities to organize, reflect, and constructively contribute to the planning process and to the stewardship activities that are identified through this process?
- Does the process recognize future Forest Service needs for stewardship activities provided by nonagency sources? Does it explore mechanisms for ensuring that these needs will be met? Are groups and individuals actively involved in providing stewardship services to the forests and rangelands that are appropriate and necessary within the context of ecological sustainability?

Recommendations

Assessments

Recognizing that economic and social sustainability relies partly on all participants’ understanding the economic and social condi-

tions in which decisions are made, the planning process should include an assessment of economic and social conditions and trends as a precursor to large-scale landscape planning. The nature of the assessment should be designed for each landscape to account for the specific nature of the local economic, social, and cultural community and the broader regional or national values and interests in the landscape. This assessment should highlight the role of specific contributions of the national forests and grasslands to the well-being of the social systems contained in the landscape and the capacity of communities across the landscape to accommodate land-use change.

Adequate social assessments require concepts, approaches, and methods developed specifically for bioregional and watershed-level assessments. At both levels, quantitative, qualitative, and participatory methods are required to adequately understand the past, present, and possible futures. Experiences from recent science assessments are a useful starting point for future assessments and plans.

Planning

The planning process should foster the meaningful involvement of diverse communities that can most effectively speak to the value of the many contributions of the national forests and grasslands and ensure that they are fairly considered in planning. At the same time, the planning process must foster a sense of community responsibility for achieving

social sustainability and enhance the capability of individuals and communities to act knowledgeably and wisely in pursuing a sustainable future.

Within the framework of ecological sustainability, planning should consider the potential economic and social consequences of land-use change in setting overall land-use policy, in tailoring the policy for specific geographic areas, and in delivering resources to help communities and individuals adapt. The planning process must also consider values that have been given specific legal or historical protections and ensure that these values are provided for and protected and that other management activities do not detract from them.

Planning should take care to avoid setting unrealistic expectations about future outputs from the national forests and grasslands. At the same time, the process should minimize dramatic fluctuations in contributions and, if possible, provide some measure of predictability about future contributions to society. As part of this effort, planning should encourage actions that simultaneously contribute to ecological, economic, and social sustainability.

Ecological, social, and economic sustainability are inextricably linked. Impairing the sustainability of any one aspect affects the entirety. Stewardship speaks to the responsibility of the human community to protect the ecological system that supports life. Balance speaks to the inevitable weighing of specific actions intended to promote ecological sustainability with the social and economic consequences of that action.

3C. Building the Stewardship Capacity for Sustainability

The stewardship capacity to achieve sustainability must be fostered both within the Forest Service and within the other agencies, governments, communities, groups, and individuals. The steps needed to achieve ecological sustainability and contribute to economic and social sustainability in the terms outlined in the previous two sections of this

chapter are formidable tasks, tasks that no agency can realistically accomplish alone. To succeed, the Forest Service must be willing to try new approaches, organize in new ways, experiment, learn, and adapt. They must also recognize the imperative to work with others outside the agency. And these non-Forest Service entities must have the capacity to help.

This section discusses the concept of stewardship capacity and the opportunities and challenges the Forest Service faces in building this capacity. The forest planning process should play a central role in recognizing, enhancing, and capitalizing upon stewardship capacity for sustainability.

As Webster defines it, capacity is “the ability to get work done; the power to grasp and analyze ideas and cope with problems.” Stewardship capacity therefore refers to the ability to bring about effective stewardship. It includes on-the-ground activities as well as the potential to conceive and analyze new ideas and to effectively solve problems. Stewardship capacity is not a single item but rather the amalgam of relationships, organizations, processes, skills, resources, understandings, knowledge and expertise, legal mandates, and institutional structures that accommodate, encourage, and implement stewardship activities. The essential foundation of stewardship capacity is contained in the many and diverse relationships that, through open, honest, and reliable communication and collaboration, link the different pieces of the stewardship puzzle. As conceived in this report, effective stewardship implies a fundamental change in relationships; relationships within the Forest Service, between the Forest Service and other agencies and governments, and between the Forest Service and the American people, whose lands they have the great honor and responsibility to steward.

The Eight Essential Building Blocks of Stewardship Capacity

Hindsight is often 20/20, benefiting both from an understanding of the actual consequences of specific actions and from new knowledge that is subsequently acquired. It is not surprising, therefore, that after twenty years of experience, we now have greater clarity about the necessary elements of an

effective forest-planning process. National forest and rangeland management has traditionally been approached with a fairly narrow view of the nature of the task at hand, the range of factors to be considered, and the scope of responsibility. Consequently, in the past, the capacity for land management was most often equated with the presence of specific capabilities; that is, the manpower, skills, resources, equipment, time, and authority to get the job done. And, although those capabilities are essential to the task of public-land stewardship, we now know that, by themselves, they are not enough. Several other critical components of stewardship capacity must also be present within the Forest Service and within society. Capability is but one of eight core building blocks of stewardship capacity. The others are trust, collaborative relationships, understanding, joint fact-finding, dealing with conflict, will, and a learning organization. Capacity is created and enhanced when linkages are made, connecting these building blocks of stewardship capacity. It is the function of the planning process to construct these linkages.

Trust

Trust in the Forest Service and among the many groups and individuals that care about the national forests and grasslands has diminished after years of a planning process that has been both divisive and disillusioning for all involved. This lack of trust has heightened conflict over national forest planning and has brought many planning efforts to an impasse. While it will be some time before trust in the actions of the Forest Service can be restored, trust in the process by which forest and rangeland management decisions are made is an essential component in building stewardship capacity. And for the planning process to be trusted, it must be perceived to be legitimate, credible, and fair to the diverse groups, individuals, and communities who care about

national forests and rangelands. To be legitimate, it must satisfy legal mandates, be sanctioned by administrative procedure, have the support and commitment of agency officials, and recognize other rights and authorities. To be credible, the base of knowledge informing decisions must be widely perceived as sound and complete. To be fair, the process must be inclusive and representative, with mutually agreeable criteria for decision making and equal access to information. If there is no trust, there is little capacity for working together. Hence, the first step in building stewardship capacity is to begin rebuilding trust.

Collaborative Relationships

Effective stewardship demands that people begin working together in ways that the previous approach to planning did not recognize or accommodate. Some of these people reside within the Forest Service, and must work together, linking researchers and policymakers, managers and scientists, and leaders and managers. Some of these people reside in other government agencies, and the Forest Service needs to establish constructive working relationships with them. Others reside in communities of interests and communities of place that care about the national forests and grasslands, and they, too, are essential to sustainable stewardship. They must be brought into the planning process in productive and meaningful ways.

The ability of the Forest Service and other individuals, organizations, agencies, and governments to work together toward common purposes is the foundation of collaborative stewardship capacity. To effectively pursue sustainability, stewardship of National Forest System lands must engage

- Those who have the information, knowledge, and expertise to contribute to developing courses of action (i.e., other agencies, governments, universities, tribes, national and regional nongovern-

mental organizations, and community organizations)

- Those who have sole control or authority over lands and activities adjacent to national forests and rangelands (i.e., other public and private landowners)
- Those who have the skills, energy, time, and resources to carry out stewardship activities (i.e., communities, individuals, organizations, and other agencies)
- Those who can help monitor and assess on-the-ground consequences of management actions to better inform future decisions (i.e., communities, individuals, organizations, and other agencies)
- Those who can independently validate the credibility of stewardship decisions and the reality of achievements (i.e., scientific experts and knowledgeable people)

In short, many and diverse collaborative relationships comprise a core building block of stewardship capacity. The planning process must provide opportunities and incentives for people to work together, establishing these collaborative relationships.

What Is Collaboration?

Collaboration, quite simply, is based on the old adage that “Two heads are better than one, and one by itself is simply not good enough.” Two heads can be better in many different ways. They bring more issues, perspectives, and ideas to discussions. They bring more resources, time, and energy to the resolution of issues and the implementation of plans. They foster better decisions, decisions that are better informed, better understood, better accepted, and more apt to be implemented.

With such a simple premise applied to so many varied contexts, it is not surprising that collaboration is not a uniformly structured process. Instead, collaborative processes work

precisely because they are tailored to fit the particular situation of concern. Consequently, there are many varied shapes, sizes, functions, and outcomes of collaborative processes in resource management. What is important is not the precise formula or the rigid structure, but rather that each is guided by some fundamental principles. Collaborative processes strive to be inclusive, open, representative, and flexible; guided by clear expectations and objectives; linked to a scientific basis and to existing law and procedures; and having clear decision rules and authorities. They build on current scientific understandings and knowledge and seek out relevant expertise as needed.

There is no magic to collaboration, but two key ingredients must be present: individuals who share a concern about a place, an issue, or a problem and a commitment to working together. In many of the promising approaches to resource management, the Committee found a common element: the individuals involved viewed what they were doing as an experiment and learned and adapted accordingly. They were “in it together.” Consequently, expectations and behaviors within the process were very different from those of traditional planning processes. Views of responsibilities differed; the Forest Service planner’s role was more flexible and adaptive; and those involved seemed more open, forgiving, and motivated by the process. Collaboration is about: working together on issues of mutual concern in a manner that best fits the needs of the people, place, and issues of concern.

Instituting Opportunities for Collaboration

As the United States has come to acknowledge the growing fragmentation of its forested ecosystems, the fragmentation of the institutional structures affecting those ecosystems has also become apparent. The institutional structures seldom accommodate effective collaboration. For example, a single watershed (e.g., the Applegate area in Oregon) can

have a checkerboard of private, state, and federal land ownerships, each of which has its own distinct objectives for land use and management. Without strong relationships among agencies and meaningful community engagement in identifying issues and solving problems, effective forest management is virtually impossible. The forest planning process should be a key avenue for organizing fragmented institutions and communities to foster the communication and coordination essential to sustainable forest management.

Multiple mechanisms of public dialogue need to be devised to enhance the capacity of the American people to effectively engage in the planning process. People are diverse in their conceptions of which forest and rangeland contributions hold the highest value and, therefore, what social choices should be made concerning the stewardship of National Forest System lands. They are diverse in their cultural practices and values. They are diverse in their willingness to engage in participatory public processes (some like meetings, others prefer face-to-face discussions, still others need to be in the woods to address the issues). And, they are diverse in their economic activities. Regardless, people with different backgrounds often share at least one common ground: they care about and/or want to live near or visit these lands. The national forests and grasslands have significant meaning to many people in many places. The process of forming a land- and resource-management plan is a critical avenue for people of differing cultures and interests to find commonality and community through their mutual concern for their lands. In so doing, they build the capacity of that community to effectively assist the Forest Service in pursuing sustainable ecosystem management instead of undermining collaborative efforts through protracted conflict. However, an enabling mechanism must first be present. No single “public participation” process will accomplish this end; rather, multiple opportunities are needed that capture

the diverse array of people and issues at play on our national forests and rangelands.

Engaging the American public in deliberating the future of the national forests and grasslands is more than just talking to people living near those lands. Gifford Pinchot, first Chief of the Forest Service, set forth the principle that local decisions should be made on local grounds. At that time, local people meant “people living nearby.” Today, people who live great distances from the forests and rangelands feel strong attachments to them and want to participate in making decisions about them. Just as transportation systems have changed the meaning of “local” in decision making, so have information technologies transformed the ability of people living far from the public lands to join in deliberating the future of those lands. New approaches and technologies should be considered in drawing more geographically dispersed, yet equally committed and concerned, individuals into the planning process.

Understanding

A lack of broad-based understanding pervades the current planning process. Groups, including the Forest Service, do not fully understand the issues of concern to each other; the constraints that circumscribe the agency’s considerations; and the realm of possible, realistic outcomes. The National Forest System planning process is currently structured only to solicit input and then criticism from nonagency groups and individuals; it provides no incentives for constructive development of ideas and solutions to problems. Hence, people involved in the process do not have to grapple with the very real legal, financial, ecological, social, and resource constraints that confront the Forest Service or with the very real concerns and interests of others. Moreover, there is little incentive for people involved in the process to develop proposals that recognize these realities; in fact,

the incentive is just the reverse. The current process has the Forest Service positioned like an arbiter in the middle of the fray, providing each group with the perverse incentive to argue for as much as possible in the hope of maximizing what it receives in the end. There is no incentive for reasoned or fully informed proposals, and there is no ownership in or commitment to the resulting decisions.

Many factors and issues of concern (to both Forest Service and non-Forest Service entities) bear on management decisions regarding the national forests and grasslands. For stewardship capacity to be enhanced, the broad array of issues, interests and concerns, legal and administrative constraints and possibilities, and budgetary realities must be understood across the spectrum of individuals, agencies, and groups who are a part of the process. It is only through working with an informed and realistic understanding of the complexity of the stewardship task at hand that people will be both encouraged and enabled to make reasoned and reasonable contributions to the process. While planning documents are not the path to providing this understanding, the planning process must facilitate it.

Fostering understanding also implies an expanded conception of the Forest Service’s role in education, one that encourages people to become aware of their connection to the forests and rangelands and their responsibility to assist with stewardship. Many natural-resource benefits are taken for granted in daily life. For example, the waters that flow from the national forests and grasslands have a significant economic value to large urban populations, to agriculture, and to other highly profitable industries. Many of these users are not even aware of their connection to the watershed that supplies a vital ingredient of their lives and livelihoods; hence, they do not actively assist the Forest Service in ensuring that these critical watersheds are sustainably managed. The planning process must be structured in a manner that builds broad-

based understanding and engages those who can provide a voice for the interests that must be recognized and understood if effective stewardship is to be realized.

Planning and assessment processes are critical opportunities for building and strengthening the understanding and relationships necessary to work toward sustainability. These processes can enrich and broaden agency understanding of the country's economic, social, and institutional environment at the same time that they help build community capacity. By engaging in meaningful public dialogue, citizens and interest groups can learn about one another and develop a deeper appreciation of different points of view. They can begin identifying shared issues of concern and envisioning mutually agreed-upon approaches to deal with these issues. A central function of the planning process is to facilitate community building by providing the opportunity and incentives for people to come together. Such opportunities can help strengthen a community's ability to chart and pursue a common future course, to be vibrant and healthy, and to be able to assist in the pursuit of sustainability for the public lands.

Joint Fact-Finding

The current planning process is plagued by "advocacy science." Different groups, individuals, agencies, and communities, working with different sets of information and assumptions about the resource base, challenge Forest Service decisions. Different "experts" reach different conclusions about what is and what should be. As different groups rally around their experts, they deepen the chasm between the agency and society and undermine our ability to achieve sustainability. Joint fact-finding (jointly conducted assessments and analyses) is essential to establishing a credible and common base of information from which all who care can draw. Conducted in an inclusive and collaborative manner and building

broad-based understanding and concurrence on the facts, joint fact-finding provides the opportunity for science to shed light on issues and possibilities rather than cloud them as currently is the case. Joint fact-finding, if conducted in an open and credible manner, also provides the first and critical step in building productive collaborative relationships between the many people who care about and can contribute to stewardship.

Information is a key element in building an accessible planning process and an honest relationship between the agency and communities. Where key information about the resources and management of national forests and grasslands is readily available in a range of locations and formats, open information policies can provide any interested individual the ability to understand, critique, and participate in planning processes. Involving diverse groups in acquiring and analyzing this information has several advantages. It forces the groups to come to grips with and articulate their true issues of concern as well as the assumptions on which they are basing their decisions. It forces them to listen to the concerns of others, to test each other's assumptions, and to have a legitimate forum within which to make adjustments to accommodate each other's needs. It allows them to understand and account for the legitimate concerns and needs of other groups. And it places everyone on an equal footing, understanding the full resources at stake, the ramifications of different decisions, and the constraints bounding the realm of possible outcomes. Moreover, it promotes each group's ability to contribute meaningfully to the process, make creative suggestions, articulate their different assumptions, and jointly develop a mutually satisfactory outcome, when possible. When planning and assessment processes are viewed as joint-inquiry processes between the agency and the public, then the attitudes of both are aimed toward mutual learning, issue identification, and problem solving, thereby enhancing the ability of the process to promote effective stewardship.

Dealing with Conflict

The demand for the many uses, values, and products of the national forests and rangelands has dramatically increased, while ecological integrity has declined. Restoring ecological integrity while continuing to contribute to economies and human communities is not an easy task. The challenge for the Forest Service within the planning process is to meaningfully and credibly illuminate the nature of and rationale for decisions, as well as the inevitable tradeoffs implied by these decisions. Rather than serving as the lightning rod, the planning process provides the catalyst that helps society both understand the range of options and make reasoned and reasonable choices that are ecologically sustainable and of significant value to society. An important role for a revised planning process is to build the linkages, forums, and understanding needed to make difficult decisions and resolve conflicts.

The planning process must recognize the inevitability of legitimate, yet competing, values in National Forest System management. It must encourage divergent interests to collectively deal with their differences while pursuing shared goals for the national forests and grasslands. Conceptually, it is quite easy to talk about balancing competing interests and pursuing mutually agreed upon paths. Consensus is a compelling concept. Practically, however, achieving consensus when so much is at stake and in the face of such divergent claims is a difficult task. None know this challenge better than the men and women of the Forest Service. Nonetheless, conflict can be a source of tremendous opportunity. A critical building block of stewardship capacity is the ability to recognize and capture those opportunities. Differences in values, perspectives, and experience can all provide opportunities for learning and critique. Getting an alternative perspective on things that have become “routine” over time is difficult without someone

with a different viewpoint. Conflict brings these perspectives and energy to the forefront.

Capabilities

Traditionally, capabilities would have been the primary, if not sole, focus in a discussion of stewardship capacity. Capabilities are the skills, resources, people, equipment, time, and authority to get work done. Many of the capabilities to undertake on-the-ground stewardship activities already exist in varying forms and places. These capabilities are found, for example, in the devoted, hard-working employees of the Forest Service as well as in the many and diverse groups and individuals who care so deeply about National Forest System lands. They reside in the agency and in academic and government research communities, in budgets, in legal mandates, in institutional structures and administrative procedures, and in individuals’ ability to access and use information or to operate equipment. The critical aspect of these capabilities is not their presence or potential but how they are linked to affect action; this is an important function of the planning process. An additional function is to recognize particular capabilities that are needed and to facilitate their development. Community organization and leadership, for example, are important capabilities for facilitating the involvement of communities in stewardship of the public lands.

Traditionally, the relationship between the national forests and grasslands and the broader society was treated as a one-way street. Public and private goods flowed from federal lands to numerous beneficiaries, and public servants made choices based on their own beliefs about what was best for the resources as well as society. Sustainability, however, requires a two-way relationship between the Forest Service and society. To build this two-way relationship requires engaged communities with sufficient leader-

3-11. Dealing with Conflict: The Beartree Challenge

The Rocky Mountain Ranger District of the Lewis and Clark National Forest in northern Montana abuts the southern border of Glacier National Park and stretches for 100 remote miles along the east side of the Continental Divide. With an area population of around 6,000, the density of human beings seems only slightly higher than that of the 80 to 100 endangered grizzly bears who also inhabit the region. The presence of grizzly bears is considered a significant problem in the surrounding ranching communities, for both economic and personal-safety reasons. A Forest Service employee explains: “We had a problem of deteriorating ecological habitat. Buffaloberry bushes and whitebark pine were disappearing due to fire suppression. This meant less food for grizzlies on National Forest lands, which meant they spent less time feeding there, which meant they spent more time eating on ranchers land. ... It’s easy to see how this ecological problem became a social problem.”

The situation was exacerbated by the fact that the Rocky Mountain region features ranches of 20,000 to 30,000 acres that provide an abundant supply of sheep, cattle, and pigs, which are vulnerable to hungry bears.

Not surprisingly, the conflict became quite heated. Ranchers, upset about not being able to kill a federally protected species that preyed on their livestock, focused their anger on federal land managers. Wildlife groups, on the other hand, opposed any disturbance of the bears. Seth Diamond, a Resource Assistant in the District, decided to try to deal with the conflict head on. As he explained: “The grizzly bear has the ability to stimulate great interest. Let’s transform it into something positive ... and use it to bring people together.”

Diamond’s solution was the Beartree Challenge, an innovative partnership among a broad array of cooperators, timber interests, environmentalists, ranchers, and educational institutions, on behalf of the grizzlies. The program has dual purposes. One goal is to improve the ecological habitat of the grizzlies by fostering the growth of the nuts and berries they eat, as a way to encourage them to stay on National Forest lands and not stray onto private ranchlands. The second is to improve the bear’s “social habitat,” minimizing and resolving the conflicts surrounding grizzly management by, as Diamond described it, “breaking down the barriers that polarize people over the grizzly bear issue.” The ecological goal was to be achieved by improving 1,000 acres of bear habitat over a five-year period through the use of controlled burns, plantings, and limited tree harvesting with the use of low-impact logging machinery. The many cooperators who donated their time and equipment were essential to the project’s success. Explains Diamond: “We worked hard to build strong relationships with cooperators. Without cooperators, we could not have done the project.”

The program worked to improve the social habitat of the grizzly bear by creating a partnership among the diverse set of interests involved in the controversy and by undertaking extensive public-education and media campaigns. Diamond solicited the endorsement of environmental organizations, such as The Nature Conservancy and Defenders of Wildlife, to help the project achieve “wide-based support.” The District also held on-the-ground tours of the

project's habitat improvement projects. The high-tech timber-harvesting equipment, which featured robotics and had never before been used in the United States, was especially popular, drawing visitors from all over the country. The project also featured "community links" with Boy Scout and Girl Scout troops, elementary and high schools, and universities, as well as ties with environmental-education programs, such as Project Learning Tree and Project Wild. Some 40 to 50 presentations were made in Montana and in Washington, D.C., to educate a wide array of people, from congressional members to school children. Forest Service staff also collaborated with state and federal agencies, San Francisco State University's Wildlands Studies, the University of Montana, and the Intermountain Research Station, using their scientific expertise in designing and implementing the project.

Diamond's approach was patient, open, and determinedly inclusive. As he noted: "We marketed the program aggressively ... not so much to say that this was the answer, but to show people what we were doing. We didn't wait for people to come to us. We sought out all segments of the public [including] people who are not traditionally positive about the Forest Service ... politicians [and] ranchers, ... not just people interested in wildlife." Once that hurdle was overcome, another one was waiting. Diamond recalled, "I got a fair amount of bad press in the proposal planning stage. Mainly from wilderness groups skeptical about any logging on the District. ... There was distrust of the Forest Service, distrust of the Forest Service/timber company alliance, distrust of our use of the media. People thought it was just a PR move." Diamond overcame this skepticism by "directly confronting it. Not like typical bureaucrats who say nothing. I let them know what we were doing." He also noted that it was "helpful to use other groups as go-betweens." The support of environmental groups, such as Defenders of Wildlife and The Nature Conservancy helped educate and allay the concerns of other environmental groups. There is, commented Diamond, "a much more collaborative atmosphere surrounding grizzly bear management. Much more positive. ... Ranchers used to have a 'shoot, shovel, and shut up approach' and now they have a 'wait and see' approach."

Diamond encouraged other Forest Service staff to deal directly with the conflicts they confront: "Look at where you have conflict. Identify the root of the conflict. Then think of some middle ground, some positive way to engage the different parties." And his formula for dealing with conflict: "Listen to people. Listen closest to the people most opposed to what you're doing. ... Think of new ways to frame the problem so that more interests get engaged and addressed. Change does not come about quickly or easily, but it nonetheless can be accomplished."

Diamond believes that one of the primary reasons for Beartree's success was simply that they were willing to try something new. As Diamond noted: "Three years ago, the District was at a crossroads. We could continue to manage grizzly habitat by reacting to conflicting demands, or we could grab the reins and develop a program that made the grizzly the focus of collaboration, not conflict. We chose the latter approach, and the Beartree Challenge is the realization of that vision. With the Beartree Challenge, we have seen the grizzly bear transformed from a symbol of controversy to a symbol of cooperation."

ship capability to coalesce resources for action. “Community” speaks to the quality of relationships among diverse and dispersed groups of people, not the geographic location of where they live. One goal of forest planning is to enhance the capability of diverse communities and facilitate their ability to constructively contribute to national forest management. Moreover, doing so will help create and enhance the leadership, institutions, and informal networks within communities that, in turn, help the Forest Service to interact more effectively with these communities.

Forming management partnerships is one way to harness the potential of dispersed capabilities. In many places, sustainability depends on contributions from communities and economies beyond a national forest or rangeland’s border. The Forest Service has always relied on individuals, organizations, industries, and communities to provide resources for society and to protect the forests from fire, insects, and disease. This list includes volunteers who help address the needs of a burgeoning number of recreational users [see Sidebar 3-12]; nongovernmental organiza-

3-12. The San Gorgonio Volunteers Association

The San Gorgonio Ranger District of the San Bernardino National Forest in southern California has found a very resourceful way to stretch its thin budget: harnessing the dedication and energy of the San Gorgonio Volunteer Association (SGVA). This 120-member organization donated more than 9,000 hours of volunteer time to the district in 1992, and made more than 17,000 visitor contacts during volunteer patrols of the San Gorgonio Wilderness Area. Its volunteers also provided all the staffing for the district’s Barton Flats Visitor Center and conducted more than 100 interpretive programs, which together reached another 13,000 forest visitors.

The Volunteer Association has filled a neglected niche within the San Gorgonio District. According to the district’s interpretive specialist, there was a “need for a Forest Service presence” in the forest because of its popularity as a recreation site. The San Gorgonio is one of the most visited wilderness areas in the nation and was being “loved to death,” with certain popular areas being trampled into “dustbowls.” In addition to wilderness patrols, naturalist and interpretive activities, and staffing the visitor center, SGVA also performs trail maintenance and it rebuilt the visitor center. The association provides programs to the 26 children’s camps within the forest boundaries; 30,000 children, primarily from inner-city areas in southern California, pass through these camps each summer. The SGVA also periodically helps pay for district projects, such as interpretive exhibits and repair of the water system and toilets at the visitor center, from money collected selling books and maps at the visitor center.

The San Gorgonio District has invested the essential time and energy into cultivating and training these volunteers. Three Forest Service employees, the interpretive specialist, the recreation manager, and the wilderness coordinator, attend the SGVA Board’s monthly meetings. They also train Association members for all activities that volunteers perform for the wilderness area. The efforts of the San Gorgonio volunteers highlight the fact that many national forests and rangelands have a constituency of groups and individuals who care about them and are motivated to act in their support. Simply realizing that this volunteer resource exists and asking people for help can reap tremendous rewards for National Forest System lands.

tions who have unique knowledge and expertise about particular resources or ecological attributes; and local industries that can provide the labor and services necessary for restoring or harvesting the commodity outputs of a forest (see Sidebar 3-13). Today, the American people are more interested than ever before in actively participating in providing stewardship support for the national forests and grasslands. Actively cultivating this public commitment and capac-

ity can significantly improve the Forest Service's stewardship capabilities.

The capability to undertake protective management, for instance fuel reduction in fire-prone ecosystems, requires adequate financial resources, a skilled workforce, and entrepreneurship. Current policy often assumes that finances, skilled labor, and entrepreneurship are provided by normal economic institutions. We argue here that maintenance of these

3-13. The Clifton-Choctaw Project

The Clifton-Choctaw Tribe is small, not federally recognized, and located on a 4.7-acre reservation in Gardner, Louisiana. A partnership between the Tribe and the Kisatchie National Forest of North-Central Louisiana has been a long-term success because it was structured to meet both the needs of the Forest Service and those of the Tribe. The partnership enables each to provide a critical service to the other that, in isolation, would not have happened.

The partnership came about when the local timber industry stopped processing "short wood" and the Clifton-Choctaw Tribe suffered adverse economic effects, including unemployment. According to District Ranger John Baswell, tribal members were disadvantaged by a "lack of education and training that they could transfer to another type of employment; ... they are a very marginal community with little political power." Consequently, they were having difficulty making a living. At the same time, Baswell noted that the Forest Service was "realizing that we needed to do something with the long-leaf pine source and here was a tribal group that had long-leaf pine as part of their cultural tradition and it was a natural for them."

Through a cost-share partnership arrangement with the Forest Service, the Tribe constructed a small tree nursery to grow long-leaf pine seedlings and started a pine-straw-baling operation. At the outset, the district silviculturist assisted the tribe with the seedlings, informing them of proper planting and care procedures. In the first year of operation, the tribe sold more than 900 bales of straw for mulch to local nurseries. In addition, they set up a small tree nursery adjacent to a gift shop where they had already been selling pine-straw baskets, quilts, beaded earrings, and other handmade items.

The Tribe now has a contract to supply the Forest Service with 100,000 long-leaf pine seedlings. The Forest Service supplies the Tribe with seeds and buys the seedlings at the end of the growing season. Local Forest Service staff helped the Tribe obtain a second grant to increase production in order to supply private and state forests, as well as the National Forest, with long-leaf pine seedlings. Forest Service staff are currently helping the Tribe increase its water supply so that it can increase production of seedlings. The Clifton-Choctaw partnership represents a simple cooperative arrangement that gave the Forest Service a much-needed local supply of long-leaf pine seedlings and members of the Tribe an opportunity to improve their quality of life in measurable ways.

capabilities is important to ensure ecological sustainability in many places. For example:

- A viable timber industry will be needed for vegetation treatments to achieve ecological goals; otherwise the public expense of these treatments could be much higher.
- Local stewardship will often be necessary for watershed restoration.
- Entrepreneurs must be interested in organizing resources to undertake needed management activities.
- The regular implementation of projects helps ensure that a sufficient workforce will be available when needed.
- A strong and locally enforced legal and institutional infrastructure is necessary to protect ecological resources from degradation or over exploitation. Strong and stable communities, along with a sense of personal responsibility, help provide this infrastructure.

Today, the Forest Service needs to take an active role in considering what kinds of community and business capability are necessary for effective stewardship and developing both the awareness of this relationship and local entrepreneurship through the planning process. Achieving this goal may mean placing individuals in positions where they are responsible for maintaining these linkages and fulfilling these tasks. It also means using the planning process to forecast future needs and taking the steps necessary to ensure that key industries are present and intact to meet those needs as they arise.

Will

The old maxims, “Where there’s a will, there’s a way,” coupled with the converse wisdom “Where there’s no will, there’s no way,” speak volumes about a critical building block of stewardship capacity: the will to do what is necessary to be effective stewards. While a well

structured process is essential to effective stewardship, without a willingness to engage in that process and a commitment to see it through to fruition, success is not assured. And although the many physical capabilities supporting stewardship may be present, they will amount to little without the organizational and public will to use them in pursuit of the purposes and principles articulated in the planning regulations.

To some extent, the will of the Forest Service is currently stymied by a lack of public trust. Within the agency, it is stymied by a perceived lack of broad-based support for pursuing the core elements of a reformed planning process. Why should the public engage in a new planning process after devoting considerable time and energy to the last round of forest planning with little apparent effect? Why should Forest Service planners embark on a new process if support for it is not forthcoming from within the agency’s own hierarchy?

Forest Service leaders must provide a supportive agency environment through which internal capacity can be fostered and internal will enhanced. Agency leaders can create this fundamental will within the agency by providing encouragement, flexibility, support, resources, skills, training, and rewards; by evidencing the will themselves; and by providing opportunities to experience and contribute to a new planning process. The will must exist and be acted upon by the leaders to be followed by those on the ground. Only if the will is in evidence on the ground can it be recognized and embraced by the American people.

A Learning Organization

The internal capacity for stewardship within the Forest Service cannot be effectively established without an organizational context that promotes ongoing learning and appropriate change. An openness to learning is predicated in humility, in recognizing that there is yet much to learn about the ecological systems of the National Forest System lands and about

ways to work more effectively as an organization and a society. It means acknowledging that someone else, at times, might know more and should be consulted and listened to. It means acknowledging that there are different ways of knowing and different sources of knowledge that contribute to understanding the full context of stewardship.

Organizational learning is a process that relies on the ability of an organization to experiment, recognize the lessons of experience, and use an adaptive approach to developing and carrying out policies. In many ways, this type of behavior is anathema to the functioning of any large bureaucratic organization, and the Forest Service is no exception. Large bureaucratic organizations in both the public and private sectors are notoriously poor learners. They exhibit several characteristic problems: contrary information rarely makes it to the top, bearers of bad news are punished, and essential risk-taking and creative problem-solving are blocked by organizational norms and the professional paradigms that are challenged by them. Humility is not a strong suit. Regardless, if the Forest Service chooses to pursue the purposes and principles articulated in the planning regulations, then it must recognize, confront, and overcome these organizational hurdles.

Together, incentives and disincentives (carrots and sticks) can provide a boost to the Forest Service's ability to learn and pursue the purposes and principles underlying effective stewardship. Carrots can tease, encourage, and support the necessary efforts for sustainability; sticks can dissuade inappropriate behavior and identify inadequate or inappropriate practices. Organizations that recognize the imperative to learn, particularly in times of significant change, adopt a diverse set of strategies. Some provide internal incentives and rewards; others institute systems of checks and balances that externally validate the assumptions and actions of the agency. External reviews provoke two learning impulses: (1) to be up-to-date, informed, and honest in order to "pass muster" in the external

reviews and (2) to be open to hearing a different perspective, one that is less apt to be constrained by organizational norms and professional paradigms and hence more likely to raise issues and questions that may otherwise be left unseen. At the same time, external reviews add credibility to agency actions, something that is essential to effective stewardship.

Organizational learning and change require a supportive and open environment in which the organization, both its leadership and its members, want to learn and are willing to change. This desire to learn and willingness to change cannot be forced from the top down, nor acted upon at lower levels without approval and support from above. An organizational desire to learn comes from a common understanding of the need for change and a shared perspective on the direction that change should take. In other words, it needs a vision that all involved find compelling and motivating. And people will only rally around a vision and a process that they have ownership in, preferably through their own experience and assessment.

Learning organizations share several key characteristics:

- They recognize that they need to be learning and acting on that learning.
- They view their task as an experiment and recognize that the point of an experiment is to learn from its results and modify successive steps accordingly.
- They encourage team approaches that bridge skills, expertise, and interests.
- They lend helping hands and share ideas and responsibilities.
- They provide the flexibility that prompts creativity and innovation.
- They learn from what has not worked.
- They highlight endeavors that have worked.

- They provide skills, training, resources, and similar kinds of support.
- They employ constructive feedback loops.
- They have champions who provide the leadership and enthusiasm for the learning process.
- They support and encourage but seldom dictate.
- They institute mechanisms for external review.

Change is seldom a smooth and seamless process, even in the best of times and with the best of plans. Few would dispute that the Forest Service is in a time of great change. Although it is an understandably frustrating time for Forest Service employees at all levels of the organization, it is a time of tremendous opportunity as well.

Connecting the Building Blocks of Stewardship Capacity

The Committee of Scientists recognizes that pursuing a planning process constructed of these building blocks will not be easy. Many of these approaches contradict long-held professional paradigms and organizational norms that have focused on commodity outputs. Therefore, they may not be readily accepted and adopted. People who have not worked together constructively in the past and who distrust one another (e.g., scientists and managers; interest groups; Forest Service and other agencies; agencies and communities) will not suddenly begin collaborating. However, if the Forest Service adopts sustainability as its fundamental goal, then these new perspectives and behaviors must also be adopted. It is important to be realistic about the inherent challenges and to remain committed if progress is to be made. And, although the building

blocks apply to everyone, the Forest Service must recognize its particular responsibility to provide leadership, through commitment and opportunities, for stewardship to be realized.

The Forest Service is a large organization, with its own internal mix of knowledge, values, skills, experiences, creativity, and attitudes towards change. The adoption of new approaches to planning will not occur overnight. As one Regional Planner commented to the Committee, “We can’t turn on a dime.” Consequently, building this internal stewardship capacity to achieve sustainability will only be brought about by an organizational willingness to adopt this perspective, followed by structures that link the essential knowledge and energies to produce action.

Proposed Recommendations

- The Forest Service should recognize the necessity to develop and enhance both internal and external stewardship capacity to facilitate its efforts to achieve sustainability.
- Organizational structures should be developed that provide a ready forum and mechanism for the collaboration, information-sharing, and linkages between people and resources that are internal or external to the agency. This interaction can be assured by routine planning procedures that provide opportunities for ongoing and meaningful involvement, as well as by formal structures that better connect National Forest System stewards with agency and academic research communities, formal advisory councils, and external review panels.
- Internal stewardship capacity will be enhanced by improved communications between on-the-ground resource

managers and agency and academic research communities. These linkages are essential to promote the application of up-to-date knowledge and understanding by managers and to inform the research community of problems and needs that warrant examination.

- External review panels should be employed to verify the soundness of management accomplishments and provide incentives for managers to seek out knowledge that will better inform their actions.
- Partnerships should be encouraged that provide linkages to the skills, resources, knowledge, and capabilities of non-agency entities essential to accomplishing stewardship.
- The Forest Service should recognize that achieving sustainability will require ongoing learning and experimentation, both within the agency and within society. Flexibility and support should be provided to encourage effective approaches to enhancing stewardship capacity and to diffuse what is learned throughout the agency.
- The planning process should include a participation strategy that would allow interested parties living away from the area can participate in planning. Working analyses and discussion papers should continually be made available and contributions invited.
- Agency leaders should provide multiple opportunities for dialogue among and contributions by Forest Service employees. Ways must be found to foster the understanding, experience, and ownership of the eventual process and, thereby, the will to pursue it.

Proposed Actions Regarding Formal Advisory Boards

The process for communication with the public and other agencies, organizations, and interested parties needs to be institutionalized so that it is continuously and easily accessible to people living both nearby and far away from the planning area.

Section 14 of RPA/NFMA includes clear requirements for public participation, including authorization for the convening of advisory boards as part of the overall processes for public participation:

(a) In exercising his authorities under this Act and other laws applicable to the Forest Service, the Secretary, by regulation, shall establish procedures, including public hearings where appropriate, to give the Federal, State and local governments and the public adequate notice and an opportunity to comment upon the formulation of standards, criteria, and guidelines applicable to Forest Service programs.

(b) In providing for public participation in the planning for and management of the National Forest System, the Secretary, pursuant to the Federal Advisory Committee Act (86 Stat. 770) and other applicable law, shall establish and consult such advisory boards as he deems necessary to secure full information and advice on the execution of his responsibilities. The membership of such boards shall be representative of a cross section of groups interested in the planning for and management of the National Forest System and the various types of use and enjoyment of the lands thereof. (16 U.S.C. 1612)

The statute makes clear that the Forest Service should develop relationships with other federal agencies, state and local governments, and the public that are directly related to effective participation in developing the policy

3-14. Building Stewardship Capacity for Sustainability: The Applegate Example

The half-million-acre Applegate Watershed in southwestern Oregon and northern California includes Forest Service, Bureau of Land Management (BLM), state, county, and private lands. Frustrated by the polarization created by resource-management issues in their valley, neighbors (residents, community groups, BLM and Forest Service officials, local industry representatives, and local environmental organizations) decided to begin working together to make the Applegate Watershed a model for ecologically sound and economically and socially responsible resource management.

The group's vision statement captures their philosophy and objectives:

The Applegate Partnership is a community-based project involving industry, conservation groups, natural resource agencies, and residents cooperating to encourage and facilitate the use of natural resource principles that promote ecosystem health and diversity.

Through community involvement and education, the Partnership supports management of all land within the watershed in a manner that sustains natural resources, which, in turn, contributes to economic and community stability within the Applegate Valley. Their purpose is to make future land management “ecologically credible, aesthetically acceptable, and economically viable.” The Partnership uses a three-pronged approach: First, in their words, they “provide leadership in facilitating the use of natural resource principles that promote ecosystem health and diversity.” Second, they “work with public land managers, private landowners, and community members to promote projects which demonstrate ecologically sound management practices within the watershed.” And, third, they “seek support for these projects through community involvement and education.”

More than 100 individuals in the community are involved in some way in the Partnership. They have met weekly for more than five years, persevering despite the skepticism of outsiders, the reluctance of some federal partners, and the complexity of their task. The imperative to continue comes from the recognition that the alternative is a return to divisiveness and gridlock, which will undermine any hope of a sustainable future for the community.

Since its inception, the Partnership has conducted or supported many projects, some implemented through cooperation with private landowners and some administered and carried out by the Forest Service and BLM. With private foundation and university support, the Partnership helped sponsor a community assessment to better understand the communities within the watershed. In turn, the Forest Service and BLM worked with the Partnership to conduct several ecological assessments of the Applegate watershed. The Partnership and Forest Service and university researchers have also developed a GIS system that integrates BLM, Forest Service, and county tax-lot information. According to Su Rolle, BLM liaison to the group, the GIS system provides, “probably the greatest amount of integrated information for a half million-acre area in the whole western U.S.” This system has been an invaluable tool for conducting ecological and watershed assessments. And, perhaps just as significantly, it has affected people's perceptions

and willingness to work together. As Rolle explains, “Having the whole watershed pop up [on a screen] with all the lands seen as a whole, has increased people’s sensitivity and understanding that we really have to work together. We are all in this together.”

Recognizing its essential role in education about issues, problems, and opportunities in the watershed, as well as in promoting ongoing and inclusive involvement across the community, the Partnership publishes a newsletter that is mailed to all 8,000 valley households. In addition, the Partnership formed the Applegate Watershed Council. The Council has received more than \$400,000 in grants to conduct projects in the community, including a number of active aquatic and riparian restoration programs. Finally, the Partnership has been actively involved in projects on Forest Service and BLM lands. According to Rolle, agency projects “have improved significantly with the huge increase in dialogue with community people.”

Part of the Partnership’s success is due to federal agencies’ responsiveness to this community. Forest Service and BLM participants are convinced that the partnership approach will produce more creative solutions to natural-resource problems, more consistency, and better follow-through on projects, which will lead to improved environmental quality in the watershed. Successful projects, including a nonappealed timber sale, a Forest Service broad-based management program funded through state and local cost-sharing, and many watershed restoration efforts on private land, have added to the sense of hope in the community and in the promise of sustainability across the watershed.

The Applegate Partnership highlights the opportunities and challenges facing a community pursuing the goals of ecological, economic, and social sustainability. Pursuing sustainability requires a different community organization than that currently prevalent across the American landscape. It requires a shift in thinking about relationships to the land, to each other, and to the future. The change required is fundamental in nature; public-land agencies must serve as catalysts, facilitators, educators, partners, and assistants in this process. The Applegate community began by collaboratively crafting a vision of a desired future that recognized the imperative to reside sustainably within the ecological landscape. Public agencies recognized their key role in assisting this effort, acknowledging the diverse contributions that the public lands made to this community and, at the same time, the essential contributions that the community made to the public lands. In other words, by helping the community, the agencies were also helping themselves. The Applegate Partnership effectively links the many people, organizations, and resources that comprise or can help this community (e.g., in agencies, governments, universities, and private foundations). Partners work together to identify and understand the divergent needs and concerns that define the community. Through their ongoing dialogue, they have been able to contend with differences, make difficult choices, and remain focused and committed to the place they all share, the Applegate Watershed. Not all individuals in all agencies have acknowledged their critical role in assisting this effort, and their reluctance is the source of greatest frustration to the group and may, over time, cause the effort to unravel. Nevertheless, the Partnership provides an excellent example of one community’s efforts to pursue social and economic sustainability within the context of ecological sustainability. It illustrates the type of community organization and public-agency involvement that is critical to defining, then pursuing a future vision rooted in the notion of sustainability.

framework for its programs. The specifically named elements, standards, criteria, and guidelines, are key decision points in that they are the basis for making choices. For the public, including other governments, to effectively and wisely participate in these key decisions, the public-participation process needs to be explicitly organized as a learning process, not merely a “review and comment” process.

To develop good policy standards, criteria and guidelines, everyone involved needs to have a broad understanding of the ecological, social, and economic context and the kinds of strategies needed to achieve sustainability. This kind of public-participation process rests upon the development and deliberation of substantive resource and social/economic information. It requires the long-term engagement of the entire community of interested and affected parties and needs to result in collaborative stewardship capacity. At the same time, the process must always be open to new people, new ideas, and new problems.

Gifford Pinchot was an early proponent of advisory boards and formed many of them to contribute to the national and local management of the federal forests and grasslands. The use of advisory boards became a common administrative mechanism for ongoing participation, especially when technical information was know best to those using the land and resources. Early advisory boards were often formed for specific resources, especially timber and range, but concerns with public representation in the 1970s led to the passage of the Federal Advisory Committee Act (FACA) in 1972. FACA requires all formal groups formed by government agencies for providing advice on public policy and decisions to be representative, to have a clear charter, to be appointed for a specific period for a specific purpose, and so on. In the late 1970s, efforts to “downsize” the federal government led to the disbanding of many advisory boards working with national forests. Today, a major concern is determining when public participation involves giving

advice on public-policy choices, the point at which a FACA charter is necessary. This point raises concerns about the appropriate mechanisms for public participation in land- and resource-management planning.

Because the Forest Service cannot carry out the mission of sustainability alone, the Committee believes the Service should develop both formal and informal collaborative structures that engage the broader community of interests and responsible governments to work together. Mechanisms for ensuring ongoing, long-term, broadly inclusive public relationships that build the capacity for creating effective collaborative stewardship are necessary for effective planning. It is the obligation of every line officer to build and maintain strong relationships with members of the public, interested organizations, other governments, and appropriate federal agencies. In some areas, especially when communities are spread over a large areas, multiple, informal, localized networks can be a useful approach to maintaining these relationships. In other cases, especially when large landscape plans cross multiple social communities and other political boundaries, formal advisory boards may be the appropriate mechanism for ensuring full and representative participation.

Formal advisory boards, chartered under the Federal Advisory Committee Act and appointed by the Secretary of Agriculture, can provide an immediate, legitimate, representative, and predictable structure within which public dialogue can occur so that Forest Service relationships with a broad and dispersed community of interests can be efficiently maintained. The RPA/NFMA recognizes this potential and authorizes the formation of such advisory committees. These groups should contain representatives of the diversity of interested institutions and individuals, as currently required in the law. Thus, when they are the appropriate mechanism, the Forest Service should not hesitate to formally charter advisory boards at the individual national forest level or

3-15. Assisting Communities in Transition: Adams County, Idaho

Adams County, Idaho, is a small county with just 3000 residents. Its communities are quite isolated from the state's economic centers and are located roughly a three-hour drive from Boise. In 1990, Forest Service District Ranger David Spann helped organize the Adams County Development Corporation, an organization designed to identify needs within the county and to gather information on various funding sources that could potentially be tapped to address these needs.

Spann served as president of the Adams County Development Corporation for two years and was instrumental in linking the local communities with state and federal offices in Boise. He facilitated many community meetings, arranging his work schedule over a two-year period to work four ten-hour days for the Forest Service and then devote the fifth day working as a volunteer on rural development.

The Forest Service provided flip charts and pens for these meetings and use of the District's office computer by community members writing the group's strategic plan. The Forest Service also donated staff expertise to help the community with required environmental assessments. According to Spann, this type of assistance "may not sound like a lot, but it's meaningful for a small group that has no funding." These efforts produced several successful projects, including the renovation of a city water system, acquisition of fire-department equipment, and remodeling of a local museum, all in the town of Council, and the development of a senior-citizen center and a recycling enterprise in the town of New Meadows.

In 1994, the Development Corporation faced a major challenge when the Council sawmill, one of the area's major employers, closed. This closure had the potential to devastate the community, but the Corporation was there to help out. With the assistance of a new District Ranger, Pete Johnston, well over 200 community residents met to revisit and update the Corporation's four-year-old strategic plan in light of this new challenge. Their new strategic plan for economic development was approved by the governor, who then requested assistance from the Idaho congressional delegation to facilitate the delivery of federal grants to the town of Council. The community has since developed a stronger economic-development plan, improved their outreach for businesses, and attracted three new businesses to the town.

As District Ranger Spann commented, "in the case of a small community like Adams County, the professionalism that the Forest Service brought to the table in supporting people and helping them with their plans" was essential to helping this county deal with a significant disruption to their economy. "It took using our contacts statewide and with other federal agencies in the area for grants and other support." Spann's observation that "I was not doing a lot, but what I was doing was integral" is both an understatement as well as an indication of the tremendous value contained in the small, but critical, assistance that the Forest Service can provide to help enhance the economic and social sustainability of such communities.

at the large landscape level, whichever provides the greatest opportunity to gain representative, structured, and focused public interactions

through which the key issues can be most effectively and meaningfully addressed.