LANDSCAPE MANAGEMENT IN IDAHO

Meeting the Challenge through Organizational and Technological Innovation

By Kevin C. Boling, Dennis Murphy, Michael Goodwin, and Michael D. Sullivan

Potlatch Corporation's resource managers in Idaho are meeting the challenges of constant and accelerating change through organizational innovation that combines team problem solving with experience and technology. The development of this approach paralleled rising public concerns regarding forestry and resource management, but its tools—improved inventories, geographic information system (GIS) technology, and the organizational structure to manage them—are rooted in a continuing need to upgrade both the quality and the efficiency of the company's resource operations.

As an outgrowth of this approach, the company manages its 670,000 acres with a sophisticated GIS database that offers improved timber and nontimber resource information. This "landscape" approach to resource decision making allows stand-level decisions to shape objectives for broader landscapes and permits evaluation of those decisions within ecosystems. Three pilot applications of this approach will be completed in 1995, and will be applied on the company's entire north Idaho property within five years.
The Role of GIS

Lyyssonen (1978) and Smith (1981) identified the need for accurate, scale-controlled maps; an attribute database derived from site-specific cruises; and a computer system to store, retrieve, and update the inventory. Additionally, the advanced management concepts embodied in Potlatch's landscape approach require site-specific timber and nontimber inventories and a highly sophisticated means of managing and analyzing the information to address today's timber and environmental issues. These methods expand the time horizon of the database and the geographic scale of the analysis. GIS technology provides the information infrastructure to support planning at a landscape level—building on the site-specific stand database to evaluate activities at watershed and landscape scales.

Potlatch's current inventory system evolved over several years, increasing its level of sophistication based on operational needs. A site-specific inventory program, with resolution adequate for operational planning, was actually initiated in 1981. However, manually compiling and updating map features resulted in errors and limited analysis of geographic relationships. Moreover, the 18-month lag between updates reduced the usefulness of the database and led to development of "unofficial" databases in paper files throughout the field organization. The database was helpful for long-range planning and inventory reporting, but short-term use remained too labor-intensive. The high-resolution, stand-level data, though expensive, was of limited value because time quickly eroded its utility.

The initial implementation of GIS technology reduced the update lag to less than 10 weeks. Updates are now synchronized with operational workloads and completed three times annually. This improved efficiency allows fuller realization of site-specific inventory benefits. Additional investments in GIS software and hardware, a digital planimetric map database from high-altitude photography, and staff training have extended this benefit and added to overall efficiency. Because the database is accessible in the field, these investments also improve the effectiveness of field managers.

Organizational Challenges

Potlatch's resource management functions were historically organized along lines typical of the industry. Forestry and logging were separate: Forestry was responsible for forest inventory, and logging was responsible for producing logs on time and within budget from forestry's harvest plans. Cooperation ebbed and flowed between the two, but a strong conservation ethic developed in the company's resource organization that served Potlatch's needs well for a long time and set the stage for later changes.

Changing public attitudes and a plethora of precedent-setting federal and state environmental laws and regulations in the 1960s and 1970s set new standards for private land management practices affecting what were perceived as public values—air, water, wildlife, and aesthetics. This complicated resource management at Potlatch, but it was only one argument for restructuring these functions. Just as important, if not more so,
was the need to incorporate into management decisions—rapidly and completely—new information on site productivity, landscapes, ecosystems, wildlife, and forest health. The relative value of the resource, and hence the value of efficient management, also became more important in the 1970s and '80s. Careful implementation of forestry and logging plans was crucial to protect site productivity, comply with laws, and deliver the right logs on time and within the budget.

A unified resource management structure began to develop. In 1982, one resource manager was named to head both logging and forestry, although separate operations continued in the field. In 1984, the field-level logging and forestry organizations were further consolidated under two woodland managers reporting to the resource manager. This structure continued until 1991.

Preparing for a New Century

More challenges came in the 1990s. One was competitive pressure to reduce the costs of administration, capital, and operation while continuing to satisfy internal and external customers with quality products. New management philosophies such as “employee participation” and “total quality” were adopted. Concurrently, the pace of change accelerated as concepts such as “biodiversity” and “ecosystem management” spurred new management approaches like “new forestry” and “new perspectives.”

Potlatch's quality focus included forest management. A critical internal review of forest management activities identified silvicultural investments that would both reduce costs and increase volume. It also concluded that maintaining our right to use these silvicultural options would require incorporation of other resource values into a long-term management strategy that demonstrates a greater sensitivity to a wider range of forest resources. Two important goals were identified: (1) a desired level of sustainable harvest from Idaho fee lands that addresses both wood quality and quantity objectives, and (2) demonstration of leadership in environmentally responsible management of timber as well as other important nontimber resources (water, wildlife, and aesthetics).

Implementing these recommendations called for a departure from the traditional hierarchical structure. The new organization, based on teamwork and trust, was designed from the bottom up by the team members themselves.

A New Approach

A “design team” was selected by peers representing different professional function areas, subject to approval by a steering committee of supervisors. Each member of the team was personally invited to participate. The invitation also contained a full explanation of the process along with a clear statement of the resource manager’s five goals:

1. Fully implement the goals and objectives identified by the internal review.
2. Combine logging and forestry responsibilities at the ground level.
3. Reduce the cost variance between company and contract logging operations to provide the lowest cost but highest quality logs for the Idaho manufacturing operations.
4. Incorporate a wildlife biologist position in the new organization.
5. Emerge from the reorganization with a team of resource professionals positioned as leaders in natural resource management—committed to doing the right things, doing them well, and building for the future.

During the reorganization, all de-
partment personnel offered priorities. Five were selected: reduce and/or eliminate overhead; improve communication, empower employees; organize to allow people to perform well; and create teams of professionals responsible and accountable for resource management functions. A new organization proposed by the design team, with minor alterations by the Potlatch Steering Committee, was approved by upper management and implemented in just four months.

The reorganization merged forestry and logging functions at the stand level. Logging personnel assume forestry responsibilities, and foresters are accountable for logging results. Administrative levels were reduced from five to three. Although the white paper recommended adding eight new positions, five positions were actually eliminated, and continuing competitive pressures have required implementing the white paper objectives without additional personnel. A wildlife biologist and a communications specialist were added, although the latter has since been moved to another department.

The core field structure consists of three area teams, each led by a manager. Each of the three areas has three district teams staffed by three to four resource professionals and one logging engineer. All nine district teams are supported by teams of specialists in resource information, specialties (hydrology, wildlife biology, greenhouse, tree improvement, biometrics), accounting, and acquisition and allocation (which manages log flow as well as land purchases, sales, and exchanges).

In place four years, the new organization has developed and begun pilot implementation of the landscape approach for managing forests. In fact, the ground-level responsibility and accountability inherent in the new structure have made this approach feasible and have generally improved the quality of our resource management.

**Landscape Management: An Overview**

Fundamental to the application of a landscape approach is the ability to project the effects of resource decisions over time (Fig. 1). Identifying key landscape structures and their exact locations permits GIS to project or "grow" those structures into the future and evaluate their geographic relationships. This same information can be extended and manipulated to project habitat elements for different wildlife species and hydrologic variables relating to water conditions. Armed with this information, resource professionals can evaluate alternative harvest and treatment schedules as they affect stated objectives for timber production, wildlife habitat, and stream health/water quality.

Potlatch’s operating area in Idaho was partitioned into some 50 landscape management units, each with one or more watersheds aggregated to a maximum size of 50,000 acres. Initially, three pilot projects tested concepts and identified operational challenges.

Planning. Although the landscape planning process continues to evolve, it currently involves several specific steps.

These include goal setting; analyzing current conditions; identifying objectives, constraints, and opportunities; designing activity schedules and projecting those schedules on the landscape; adopting a plan; implementing the plan; and finally, monitoring and adapting the plan.

**Goals.** A basic statement of goals for all landscapes within Potlatch’s operating area in Idaho underlies the entire process. These goals include:

- managing harvests at sustainable rates;
- modifying and adapting practices to improve financial and production goals while maintaining or enhancing other resources;
- prescribing silvicultural treatments and logging methods with a sensitivity to land characteristics;
- determining the structure and ecological function of important landscape patterns;
- establishing distinct riparian management areas, maintaining stream functions, and enhancing and restoring streams as needed; and
- managing diverse habitat components within stands and across landscapes to promote vertebrate species richness, meet the special needs of sensitive species, and manage habitat for featured game species.

These goals are supplemented with specific objectives for each management unit, based on the opportunities and constraints for that area.

The next step is to use field reconnaissance and GIS information to assess the current landscape, its condition, and its components. The GIS database is continually updated with current and improved site-specific information.

Timber assessments include stand delineations, stand tables, site productivity, and stand structural characteristics. Riparian areas are delineated as operable stands and managed under uneven-aged conditions, with resultant reductions in harvest.

![Figure 2. Watershed analysis uses a hydrologic risk assessment for each stream. Relationships between a channel stability index (in-stream conditions) and an index of water yield increases (canopy density/stand structure analysis) are charted to determine the relative likelihood of channel destabilization.](image-url)
Riparian areas that were forested meadows and are candidates for revegetation are identified. These projects produce the dual benefits of restoring ecological function and increasing timber production. This assessment also uses field reviews to characterize the physical terrain according to its potential for regeneration success.

An assessment of road conditions develops an index of sediment delivery for the entire road network and identifies potential hot-spots of sediment production. In addition, the road network's potential impact on wildlife is evaluated in terms of access management and open road densities. The same procedure can also be applied to the location, design, and maintenance of planned roads.

A field examination of sediment condition, channel and bank stability, stream canopy closure (temperature), and sediment sources in the watershed determines stream conditions and water quality. Best management practices of the Idaho Forest Practices Act are supplemented with watershed-specific prescriptions to adjust the timing and nature of management activities to control slope and stream effects.

An estimate of potential stream channel destabilization due to increased water yield is made from an index of channel stability, produced by in-stream assessments, and an index of water yield increases, based on a canopy density analysis of stand structures in the watershed. The two indices are related to produce a hydrologic risk rating chart (fig 2, p. 19). The rating chart is one of several methods employed in the Idaho Department of Lands Cumulative Watershed Effects Procedure (1995), which Potlatch uses in analyzing current conditions.

Wildlife habitat components—type, amount, distribution, structural composition—are also evaluated, and the presence of sensitive plant or animal species—including threatened or endangered species—is noted, along with the particular needs of featured game species. Evaluating the habitat requirements of “guilds” (species groups that use similar components or respond similarly to management activities) addresses the needs of multiple species.

A final delineation includes social and cultural factors that may require special objectives or constraints. These may include domestic water supplies, recreational sites, or areas of special aesthetic concern.

All these assessments of current conditions provide the background to develop objectives for the landscape management unit. Several goals are common to all units, although opportunities and constraints vary.

Putting It into Practice

Once the assessment is complete and specific goals, constraints, and opportunities have been selected, one or more activity schedules can be designed to identify silvicultural treatments, road construction and improvement schedules, harvesting timing and methods, and so forth.

Planning harvests and silvicultural treatment involves modifying and extending historical processes, and still relies heavily on individual stand prescriptions. These guidelines are extended by incorporating physical land classifications with stand structure conditions. Plans start with treatments that produce the most volume per acre and are modified to accommodate economic or operating conditions and nontimber values. In all cases, the objective is economically competitive and sustainable timber production, with a commitment to nontimber considerations.

Traditional treatments, such as clearcuts, may be modified to address specific nontimber needs. For example, snags, patches, and clumps may be left behind to enhance structural diversity for wildlife. Similarly, road maintenance and closure schedules may be altered to meet erosion or wildlife concerns.

The planning process also identifies opportunities to enhance fish and wildlife habitat by modifying silvicultural treatments, harvests, and road design and construction.

Planning for the Future

Because our knowledge of the land and its resources is incomplete, landscape evaluation is subjective. The plans must make an honest attempt to produce an activity schedule that meets well-thought-out objectives. But to take action within the limitations of incomplete knowledge, an adaptive management approach uses periodic reevaluations to monitor results. Resource conditions are remeasured on intervals of one to five years, and the entire planning process is repeated at five-year intervals.

New information is immediately incorporated into the process. Assessments of current conditions are changed to reflect monitoring results and resource responses. New concepts from current research as well as new opportunities and constraints will be included as they become apparent. Consequently, the planning process is adaptive between landscapes and over time.

While Potlatch’s implementation of landscape planning is still in the early stages, resource managers are confident that it will ultimately provide a sustainable, economically viable means of producing timber while addressing public values and perceptions. Technology, particularly that related to GIS, plays a key role in the ultimate success of this approach by supporting the knowledge and skill of resource professionals Potlatch believes that this new organizational structure efficiently combines people and technology in a resource management program that is both fiscally and ecologically responsible.

Literature Cited


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