DETERMINING LAND CAPABILITIES AND LIMITATIONS

FOREST STEWARDSHIP MANAGEMENT NOTE #4

INTRODUCTION

Landowners should be encouraged to define the ideal combination of benefits they would like to obtain from their land. However, they must also recognize certain inherent limitations imposed by the nature of their property. By considering possible limiting conditions, landowners may also discover capabilities they have overlooked.

This Note summarizes the major factors that determine the capabilities and limitations of land from a stewardship planning viewpoint. It also provides an introduction to key sources of information about these factors so that landowners can develop a better understand their land and their management plans.

LAND FACTORS THAT ARE FIXED

1. CLIMATE AND WEATHER - Temperature extremes, rainfall amounts, and other climatic factors limit the types of plants and animals that can survive in an area. Furthermore, the success of some practices, such as planting trees (FSMN #12) or herbaceous vegetation (FSMN #7), depends on proper timing within the annual climatic cycle, as well as luck in terms of the weather that year. The timing of other practices may need to be adjusted in response to actual weather conditions. For example, logging should be suspended when soil conditions would lead to deep rutting (FSMN #18). The SIP Standards and Specifications Manual (#3) gives acceptable dates for planting trees and herbaceous cover in various parts of the state. Tables giving the hardiness zones of many plant species are also available (#2).

2. LANDSCAPE CONTEXT - The location of a property on the landscape can greatly influence its capability to produce certain benefits (FSMN #39). For example, a property adjacent to a lake is likely to provide habitat for more types of wildlife than an otherwise similar parcel that is not near a body of water.

   Thus, it is important in the planning process to consider the character of the landscape in which a property is located, with special attention to immediately adjacent areas. Forest Stewardship Plans should include comments on landscape factors where they are relevant to the landowners' objectives (FSMN #39). Topographic maps and aerial photographs are useful tools for assessing landscape level factors, but field experience in the area is the most important.

3. TOPOGRAPHY - The shape of the land's surface, its topography or terrain, may limit land management activities primarily in terms of vehicular access and the risk of soil erosion. For example, if slopes are too steep, it may be impossible for logging vehicles to work safely on them or the cost of controlling soil erosion may make logging uneconomical. What constitutes a slope that is too steep depends, in part, on the properties of the soil (see below). Topographic limitations are best assessed by walking the land, but much can be determined from topographic maps and from stereo pairs of aerial photographs. Thus, it is always a good idea to include topographic maps in land management plans.

4. SOILS - The single most useful source of information about land characteristics is the county Soil Survey (#7). Soil Surveys consist of maps that show the soil type of any given area, descriptions of the properties of the various soil types, and interpretive tables that indicate the capabilities and limitations of each soil type for various uses.

   The soil maps are easy to use because they are aerial photographs with soil types drawn over them like a jig-saw puzzle. The soil descriptions are somewhat technical, but they point out key properties and their effects on common management activities. The interpretive tables are organized by type of use, including woodland management, wildlife habitat, building site development, recreational development, water management, and other applications. With these tables, one can quickly identify management concerns and possible problems for a wide array of projects on any piece of land.

For example, one might find that the proposed site for an excavated pond has a severe limitation due to shallow depth to bedrock. Or, you might find that the soil in an area proposed for a red pine plantation is more suitable for white spruce. Soil Survey information should always be included in Forest Stewardship Plans. Introductions to soil interpretation are available for those without a background in soil science (#4-6).

5. INDICATOR PLANTS - Another very useful way to assess the suitability of an area for tree production is by observing "indicator plants". Many herbaceous species are especially particular about the soil conditions they will grow in, and by knowing these conditions, one can judge the quality of the land for various tree species. As a simple example, wetland plants indicate poor growing conditions for upland hardwood trees. The indicator-species approach can be much more subtle and sophisticated (#1).

LAND FACTORS THAT CAN BE MODIFIED

1. VEGETATION COMPOSITION - The vegetation composition of an area, meaning the species of trees and other plants present, largely determines the types of wildlife that occur there and the visual quality of the area. If the composition of the existing vegetation does not enhance the landowners' objectives, it is possible, within the limits imposed by soil type (see above), to change the plant species, and consequently, many other properties of the area.

   The species of plants that grow in each area often change over time naturally, a process that is termed plant succession (FSMN #41). Both the rate of change and the identity of the incoming species are somewhat unpredictable, but certain successional trends are reliable enough to form the basis of some management practices. For example, aspen stands growing on rich, well-drained sites can be converted to longer-lived hardwoods fairly reliably by letting nature take its course. On the other hand, hardwood stands with some aspen in them can be converted to largely aspen by clearcutting such stands at relatively frequent intervals. Plantations, of course, can drastically change vegetation composition is short order (FSMN #8).

   The Forest Stewardship Program encourages a long-range approach to land management. This includes the conversion of areas from one vegetation type to another in order to better meet landowners' objectives, if such changes are technically feasible and environmentally sound.

2. VEGETATION STRUCTURE - Vegetation structure refers to the spatial arrangement of plants in an area, especially the degree of vertical layering from the ground to the canopy and the amount of horizontal patchiness in tree size, etc. (FSMN #41). Like vegetation composition, the vegetation structure of an area has a major influence on its wildlife, visual appeal, and other properties. Fortunately, modifying vegetation structure is relatively quick and inexpensive compared to changing species composition. Consequently, recommended management practices tend to concentrate on structural vegetation changes whenever these will serve the purpose.

3. WILDLIFE - Attempts to increase or decrease wildlife populations through direct actions on animals are usually very expensive and generally meet with very limited success (FSMN #40). Whereas the nature of the vegetation in an area is largely determined by soil properties, and historical events, the wildlife populations in that area are largely governed by the current vegetation, and historical events. Thus, efforts to manage wildlife populations should generally give first consideration to habitat conditions, primarily vegetation composition and structure.

REFERENCES

FSMN #'s refer to other Forest Stewardship Management Notes in this series.

#1 Coffman, M.S., et al. 1984. Field guide. Habitat classification system. For Upper Peninsula of Michigan and Northeastern Wisconsin. Cooperative Research on Forest Soils (CROFS), School of Forestry and Wood Products, Michigan Technological University.

#2 Henderson, C.L. 1987. Landscaping for wildlife. Minn. Dept. Natural Resources.
#3 Michigan Department of Natural Resources, Forest Management Division. 1992. Stewardship Incentive Program (SIP) practice standards & specifications manual.
#4 Mokma, E.D., et al. 1982. A guide for land judging in Michigan. MSU Extension Bulletin E-326.
#5 Olson, G.W. 1984. Field guide to soils and the environment. Applications of soil surveys. Chapman and Hall.
#6 Olson, G.W. 1981. Soils and the environment. A guide to soil surveys and their applications. Chapman and Hall.
#7 Soil Conservation Service (SCS). Various dates. Soil survey of "Your" County, Michigan. The SCS has published modern soil surveys of many, but not all, of Michigan's counties. Contact your local SCS (U.S. Department of Agriculture) office to find out the status of your area.

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