

The background of the slide features a dense pattern of vibrant green leaves, likely from a deciduous tree, with prominent veins. The bottom portion of the image transitions into a blue-green water surface with gentle ripples, suggesting a natural, forested environment. A semi-transparent white rounded rectangle is centered on the page, containing the text.

Silviculture

ESRM 323

What is Silviculture?

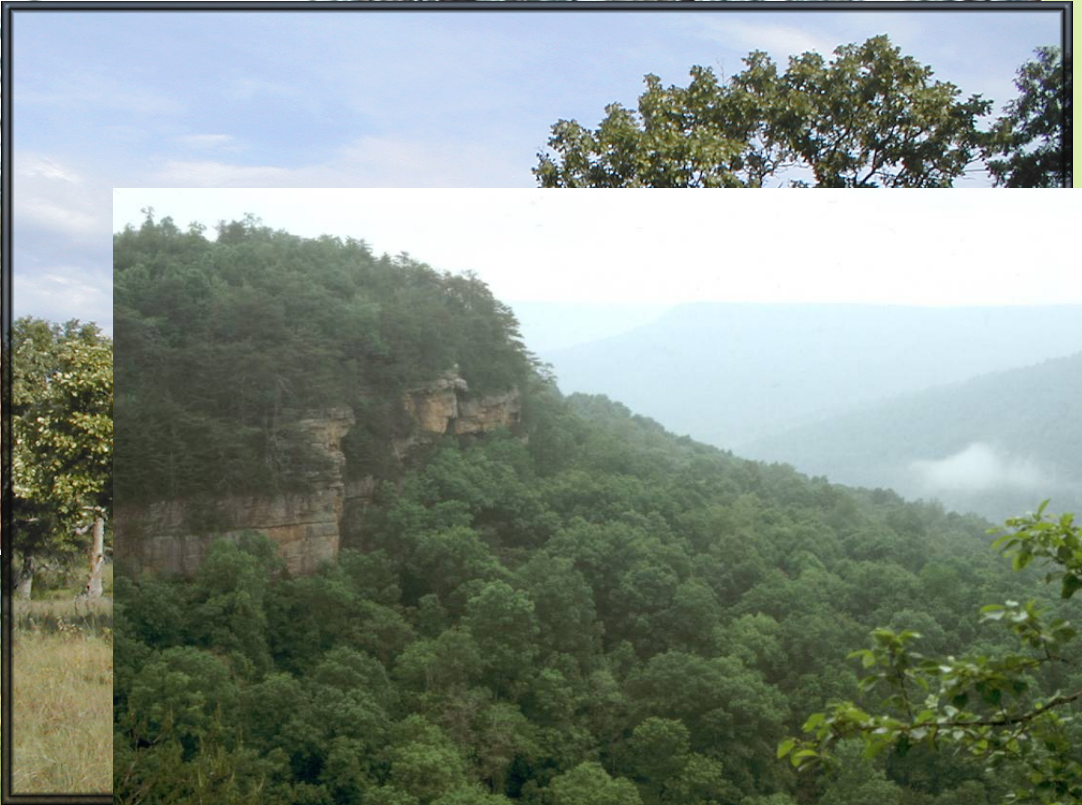
✿ Silvics -

- ✿ Tree Ecology: The base of knowledge regarding the nature of forest trees, how they grow, reproduce, and respond to changes in their environment

✿ Silviculture -

- ✿ Methods of handling the forest in view of its 'silvics' for a result desired by humans, modified in practice by social and economic factors
- ✿ Applied Forest Ecology
- ✿ Other definitions:
 - “The science and art of cultivating forest crops, based on knowledge of their silvics.”
 - “The theory and practice of controlling the establishment, composition, constitution, and growth of forests ...”

What is a forest?



What is a forest?

✿ Community -

- ✿ Any assembly of organisms living together, no particular ecological status being implied

✿ Stand -

- ✿ A community, particularly a contiguous group of trees, possessing sufficient uniformity in species composition, age class arrangement, and condition so as to form a distinguishable unit

✿ Forest -

- ✿ A collection of stands administered as an integrated unit, usually by one owner

Why 'control' the forest?

Three principal functions of forests:

✿ Protective-

- ✿ Reduce soil erosion, protect water supplies, improve water quality, provide habitat for animals and plants

✿ Productive-

- ✿ Wood products are the dominant income source
- ✿ Mushrooms, salal & ferns, wildlife

✿ Social-


- ✿ Employment, field sports, recreation, aesthetics

Why 'control' the forest?

- ✿ The purely natural forest is governed by no particular purpose, unless it be the unceasing struggle of all the component plant and animal species to perpetuate themselves
- ✿ Human purpose (society) introduces priorities for certain tree and animal species, stand structures, processes of development that have desirable characteristics
- ✿ When all three forest functions - protective, productive, social - are in balance, sustainability is achieved

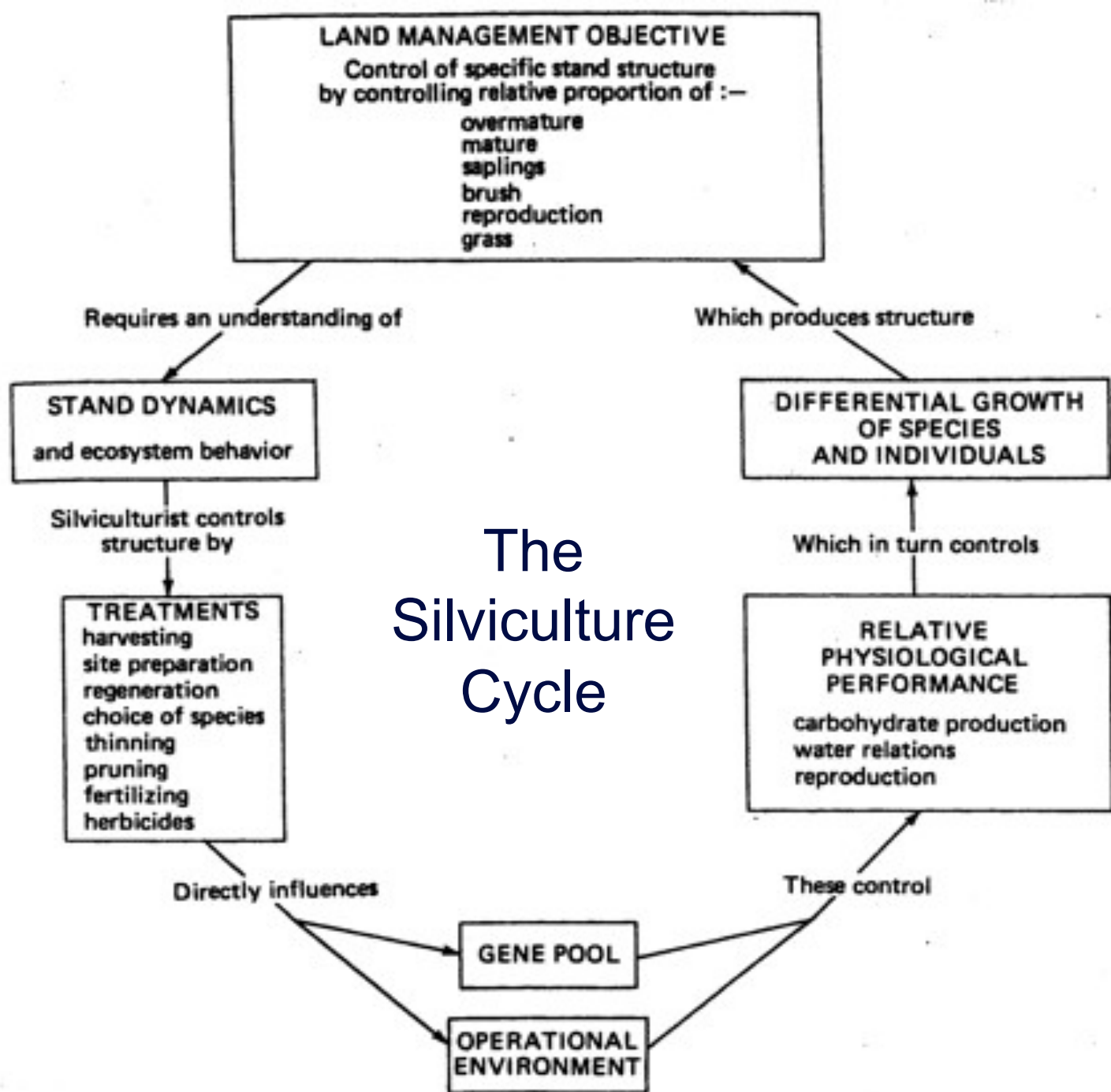
Why 'control' the forest?

- ✿ There must be a clearly defined management objective that describes what is to be achieved
- ✿ Silviculture then designs a strategy to create and maintain the kind of forest that will best fulfill those objectives
- ✿ Also ensures long term continuity of essential ecosystem services, leading to health and productivity of managed forest ecosystems - fundamental to sustainability



Controlling the forest requires clear objectives ...

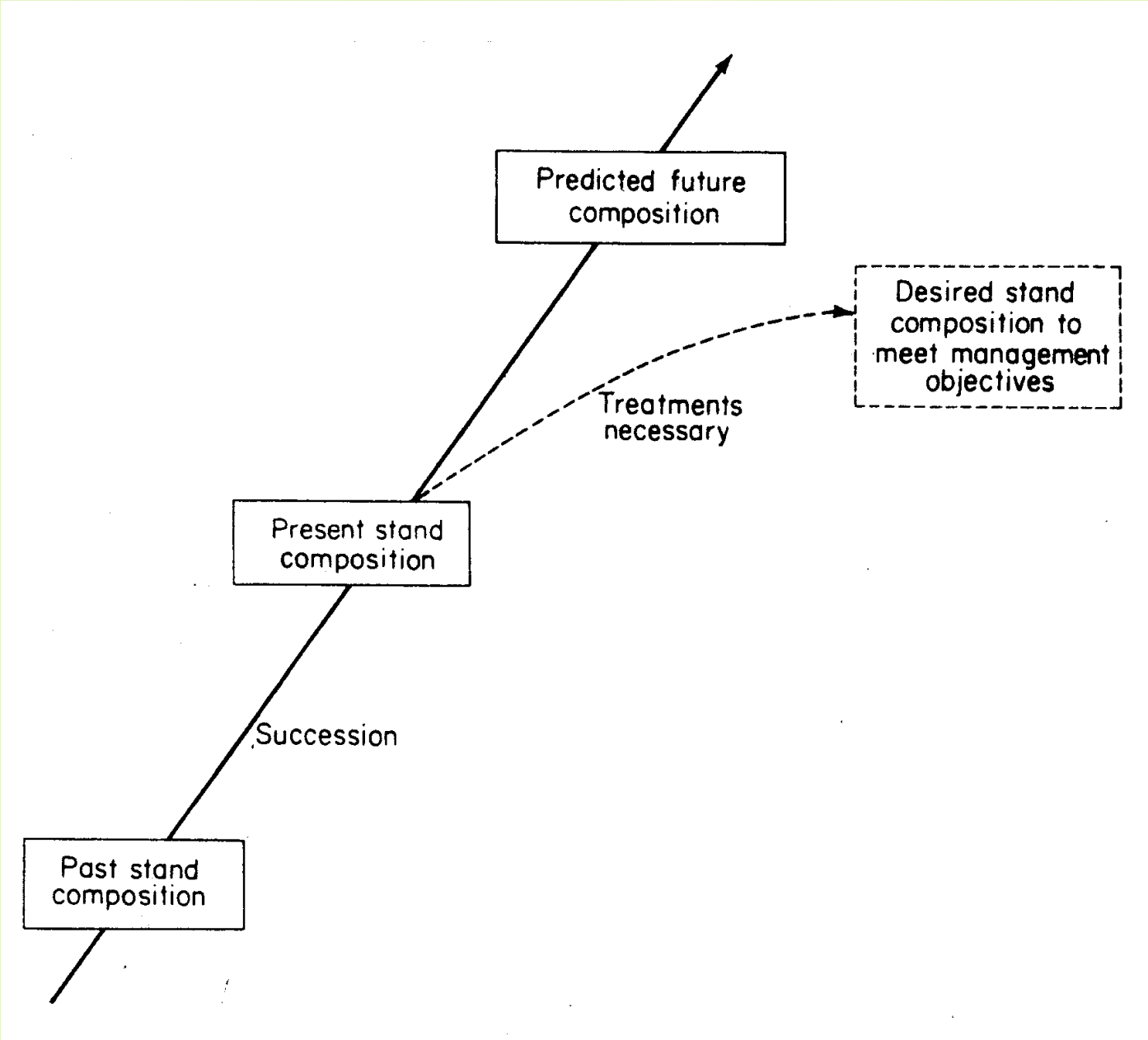
Whether the objective is for wood, water, wildlife, recreation, range, or more likely, some combination thereof, it can be interpreted in terms of the **composition** (species mixture), **constitution** (age arrangement), and **stand structure** (sizes, spatial arrangement, density) that is most suitable to meet that objective



Role of the Silviculturist:

- ✿ A silviculturist is an ecologist, a manager of resources and people, and is business savvy; alert to the needs of the land and the status of markets
- ✿ The silviculturist is partly creating a new ecosystem, but mostly adapting to the one that already exists - applied ecology
- ✿ The silviculturist develops a prescription that integrates a sequence of treatments into a coordinated plan aimed at meeting particular objectives; thus needs ability to predict the likely consequences of prescribed treatments

Stand dynamics ...



Treatments

- ✿ Fall into two broad categories
 - ✿ Methods of reproduction
 - ✿ Tending & intermediate cutting

Treatments - Methods of Reproduction

✿ Harvesting

- ✿ Stands of trees are not immortal. Most situations will govern an optimum size or age to which trees should be grown. The period of years required to reach this is the 'rotation.' Usually followed by regeneration or reproduction cuttings.

✿ Site preparation

- ✿ May involve disposal of slash, treatment of the forest floor & competing vegetation and may involve burning, mechanical, or chemical variations

✿ Regeneration/choice of species

- ✿ Species composition is controlled by regulating the kind and degree of disturbance during periods when new stands are being established. Desirable species and genotypes are readily controlled by planting or artificial seeding. If planting, decide on suitable species, density, and spatial arrangement to meet objectives

Treatments - Tending & intermediate cutting

✿ Release Treatments – correct a situation deemed untenable in light of ownership goals (a.k.a. “Restoration,” sometimes “salvage”)

✿ Weeding:-

- ✿ Applied in young stands to release favored species from ground vegetation, vines and shrubs

✿ Cleaning:-

- ✿ Applied in young stands to release favored species from the dominance of another

✿ Liberation [cutting]:-

- ✿ Freeing young growth trees not past sapling stage from competition of older, over-topping trees

Treatments - Tending & intermediate cutting

✿ Thinning

- ✿ Applied any time before regeneration period to control growth or quality of residual trees by cutting individuals of the favored species to redistribute growth potential

✿ Fertilizing

- ✿ Site amelioration or improvement with soil amendments

✿ Pruning

- ✿ Involves thinning branches in order to improve aesthetics, produce knot free (clear) logs, reduce ladder fuels, or increase vertical structure/ diversity

Constraints on silviculture options:

- ✿ Ecological
- ✿ Managerial
- ✿ Social

Ecological constraints on silviculture options:

✿ Site quality

- ✿ Fertility of soil, depth, texture, bulk density, elevation, aspect, slope, etc.

✿ Existing vegetation

- ✿ Certain treatments will be aimed at retarding development of some components while releasing others

✿ Micro-environment

- ✿ Light intensity, temperature, evaporative stress, available soil moisture, etc.

✿ Pests

- ✿ Current or potential presence of animals, insects, disease, etc. (i.e.. Gophers, deer, bear, spruce tip weevil, mistletoe)

Managerial constraints on silviculture options:

✿ Technical

- ✿ Operational requirements of equipment, limits on allowable harvest

✿ Policy

- ✿ Might prescribe practices near highways, other visible areas

Social constraints on silviculture options:

✿ Legal

- ✿ National, state, county ordinances

✿ Special Interests

- ✿ Conservation groups, hunting lobbies, recreation groups, other interest groups

Very brief history:

- ✿ Land management objectives have rapidly become more complex and more intensive - this requires outputs to be highly quantifiable and predictable
- ✿ **'40' s and 50' s** - Society demanded that we not be reliant upon imported timber so 'silviculture' became synonymous with 'timber management'
- ✿ **'60' s and '70' s** - Society recognized other uses of the forest: aesthetics, recreation, wildlife, hunting, water yield and quality, range & forage - the age of 'multiple use' had dawned
- ✿ **'80' s, '90' s & beyond** - emphasis has shifted to ecosystem management & control of the landscape as a whole. Silviculture is applied to the stand, but its effects carry through to ecosystem and landscape

Silviculture looks to the future ...

- ✿ Using a systems approach enables the silviculturist to predict likely treatment outcomes, minimizing undesirable consequences
- ✿ Sustainable forestry depends on scale-appropriate decisions (Aldo Leopold)
 - ✿ Everything cannot be maintained everywhere simultaneously
 - ✿ All components are preserved in appropriate areas across the landscape

Silviculture looks to the future ...

- ✿ Silviculturist must keep up on literature!
 - ✿ Read Chapter 1, 7, 10 in Smith, et al.
 - ✿ Read primer on Forest Ecology (website)
- ✿ Classroom activity, lectures / notes, guest lectures, textbook, supplemental readings, field trips, labs, Problem Sets, ...
- ✿ Website
 - ✿ <http://courses.washington.edu/fm323/>