

A landscape photograph showing a valley filled with a dense forest of young, green coniferous trees. In the background, there are rolling hills covered in a darker, more mature forest. The sky is overcast and grey. The text 'Chapter 3: Ecosystem as Basic Unit of Ecology' is overlaid in white, sans-serif font in the center of the image.

Chapter 3:
Ecosystem as Basic Unit of Ecology

Ecology defined

Scale of interest

- Focus on the interrelationships between living organisms and both their biotic (living) and abiotic (non-living environment).

Valueless

**Social value systems
determine use**

Levels of Organization in Ecology

- Autoecology: individual life history and environmental response
- Population ecology: groups of organisms of the same species
- Synecology/Community Ecology: description / quantification of natural assemblage of different species and interactions among them
- Ecosystem Ecology: biotic community / non-living environment - descriptive or functional

Ecology is Valueless

- Scientific, political, and public interest
- Socioeconomic decisions based on ecology
- Ultimately, many sources of information determine ecological policy

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What is an Ecosystem?

- “not only the organism-complex, but the whole complex of physical factors forming what we call the environment” (Tansley 1935)
- “Any unit that includes all organisms (i.e. community) in given area integrating with the physical environment so flow of energy leads to clearly defined trophic structure, biotic diversity, and material cycles is an ecosystem (Odum 1971).

What is an Ecosystem? –Cont'd

- “A community along with the environmental factors and physical forces acting on it” (Perry 1994)
 - E.g. a community of Douglas-fir and western hemlock, its soils and associated mineral elements, atmosphere, seasonal rainfall and temperature patterns, and associated disturbance events.

Main Attributes of Ecosystems

1. Structure - composed of biotic and abiotic subcomponents

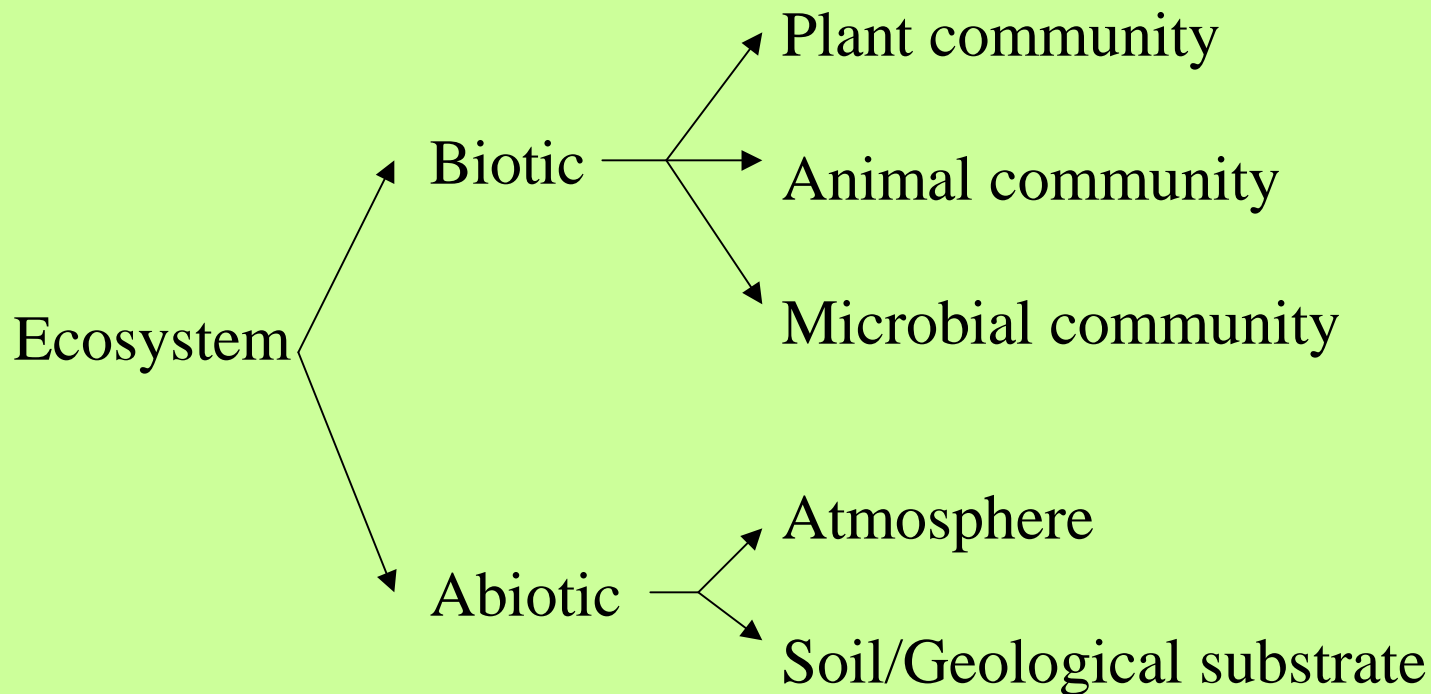
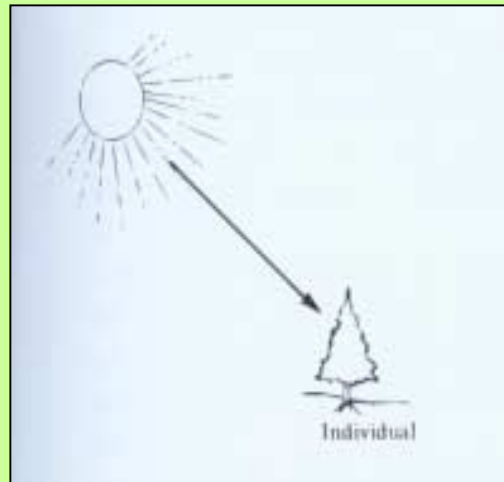


Fig. 3-2

Main Attributes of ESs – Cont'd

2. Function - Energy exchange between living community and physical environment – usu. Solar radiation captured by green plants for PSS



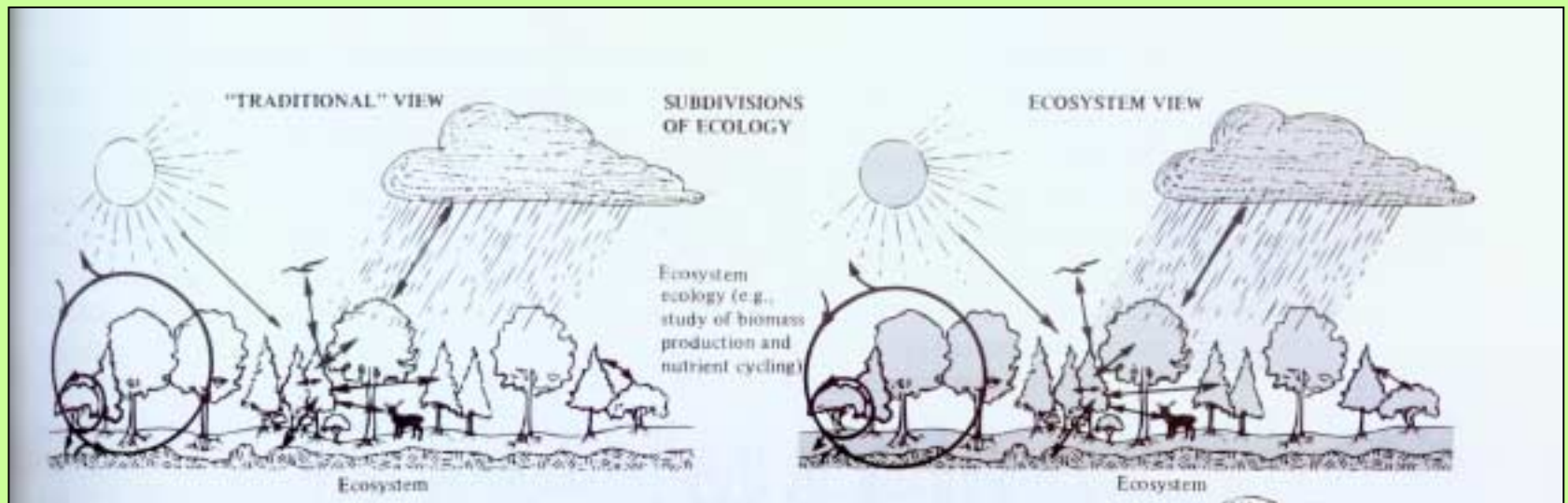
Main Attributes of ESs – Cont'd

3. Complexity - high levels of biological integration
 - Accurate prediction requires knowledge of the next level above
 - E.g.: future of a Douglas-fir population
 - inherent growth abilities
 - intraspecific competition
 - susceptibility to disease enemies
 - Recognition of the effects of outside elements: i.e. effect of other species, other biotic, climatic, hydrologic, and edaphic variables.

Main Attributes of ESs – Cont'd

4. Interaction and interdependency – i.e. change in one effects another
 - E.g. An overstory tree dies, then a suppressed understory tree can grow
5. Temporal - change over time
 - DYNAMIC – and ESs are capable of coping with disturbance

Traditional vs. Ecosystem View of Ecological Subdivisions



Ecosystem Level: Views are identical.

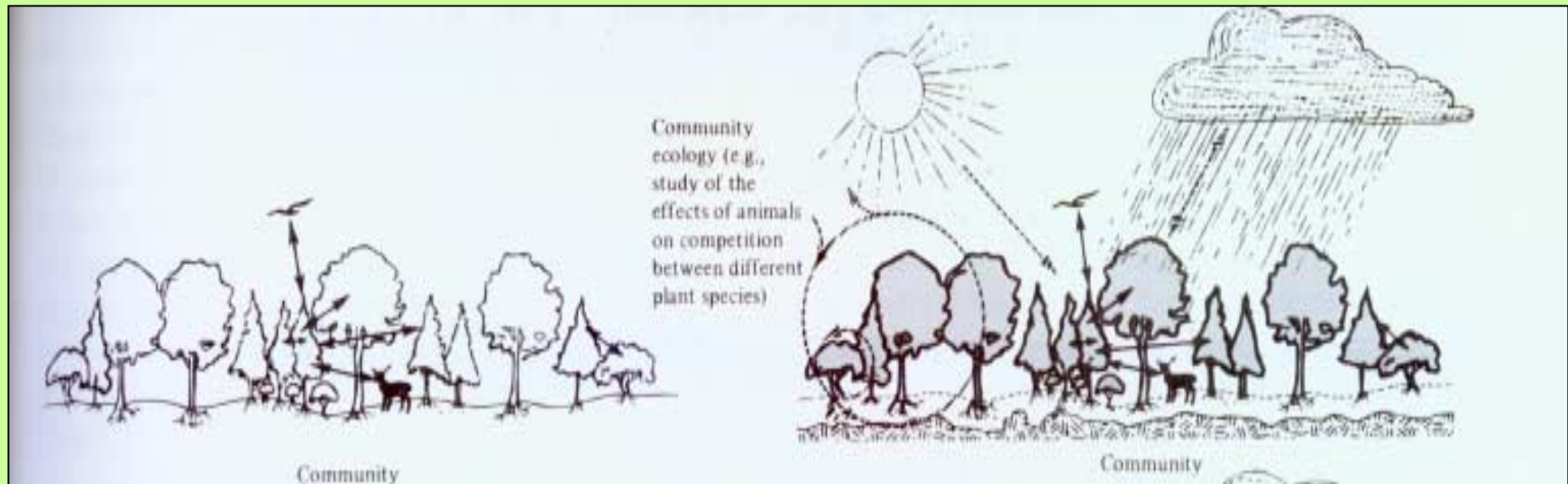
Fig 3.3

Ecosystem View

Shaded Organisms: explicitly studied

Un-shaded: recognized as determinants, but not explicitly studied

Traditional vs. Ecosystem View of Ecological Subdivisions



Community Level: Views differ.

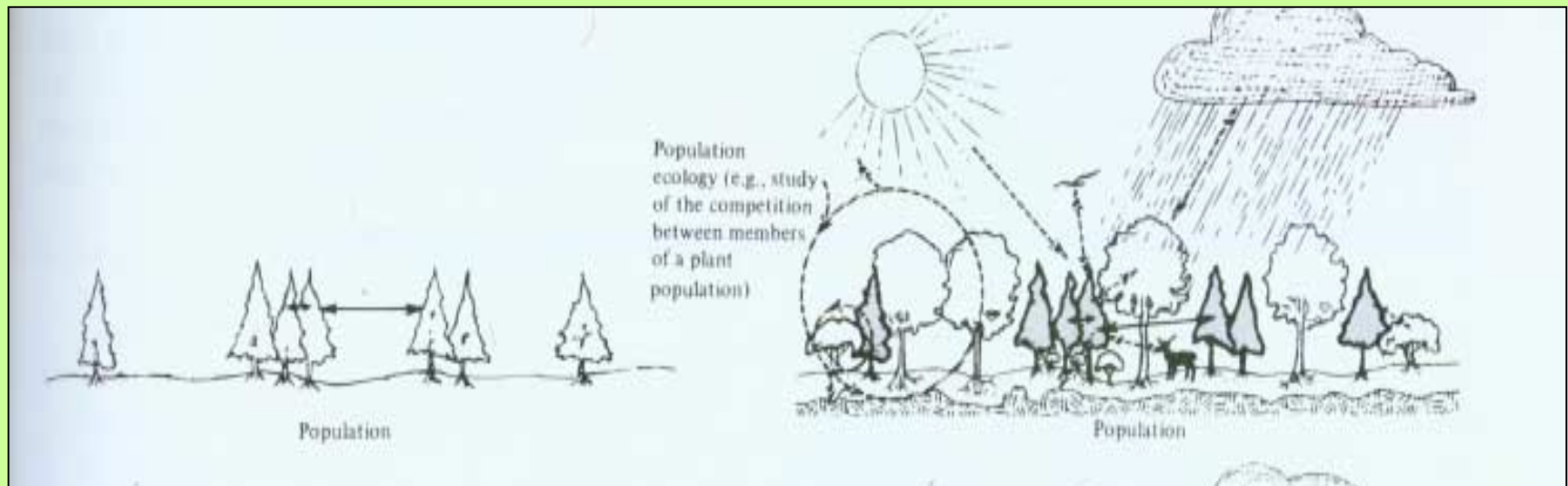
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Ecosystem View

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Traditional vs. Ecosystem View of Ecological Subdivisions



Population Level: Views differ.

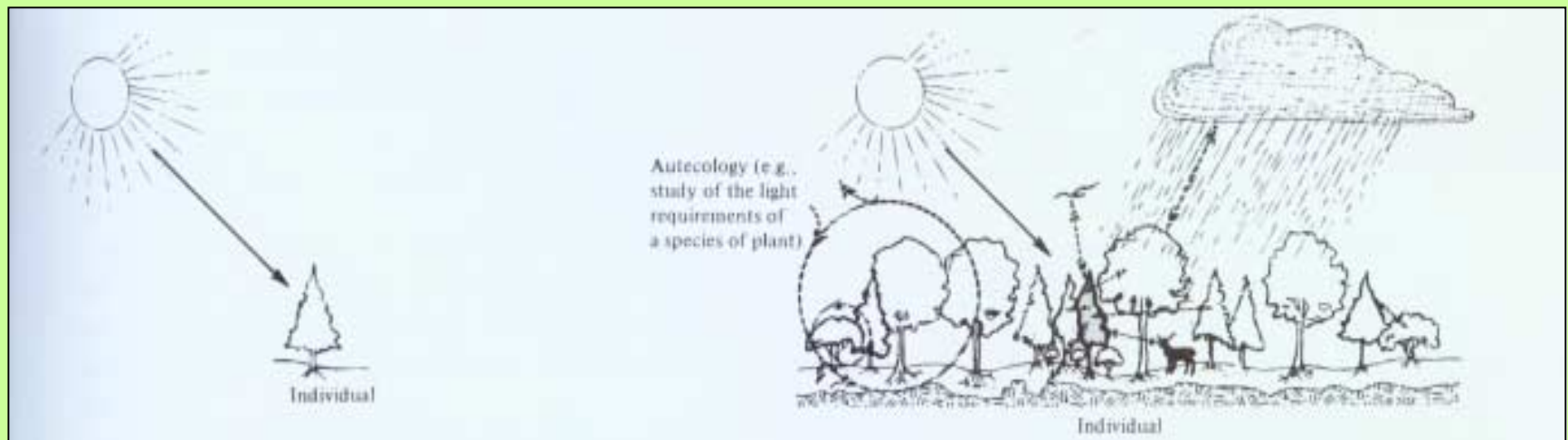
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Ecosystem View

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Traditional vs. Ecosystem View of Ecological Subdivisions



Individual Level: Views differ.

Fig 3.3

Ecosystem View

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Un-shaded: recognized as determinants, but not explicitly studied