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ABSTRACT

This autoinstructional program deals with the study of man and his environment. No prerequisite knowledge or experience is suggested. Behavioral objectives are suggested. Equipment needed is itemized and a 30-minute period of time is suggested. The script for the student includes a study guide sheet consisting of several questions to be answered relevant to the behavioral objectives. A short bibliography is included. (EB)

SUCCESSION - CHANGE IN COMMUNITIES

Prepared By

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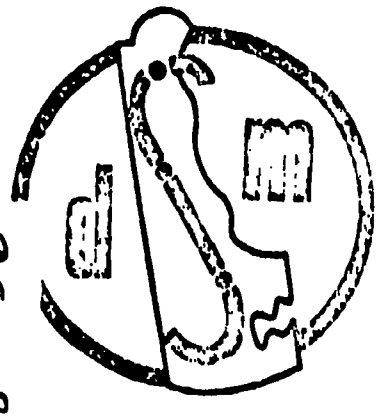
June 30, 1973



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TEACHER'S GUIDE

PACKET NUMBER	581.5243 D
SUBJECT	Man and Environment
TITLE	Succession - Change in Communities
PREREQUISITES	None
BEHAVIORAL OBJECTIVES	1. To describe the succession process in temperate deciduous forest ecosystems. 2. To assess the importance of species diversity to ecosystem stability.
EQUIPMENT	Slide projector - 8 slides Cassette player - tape Student's Study Guide Teacher's Guide Script
TIME	30 minutes
SPACE REQUIRED	Carrell or table

BIBLIOGRAPHY

Edward J. Kormandy, 1969, Concepts of Ecology. Prentice-Hall

Robert H. Whittaker, 1970. Communities and Ecosystems. Macmillan Company.

SCRIPT

SUCCESSION (CHANGE IN COMMUNITIES)

MUSIC

When we look at a woods and see large trees, we tend to think that the trees were always there. But, were they? When we look at bare ground, do we ever wonder if the ground will remain bare? Most of us have seen Lums Pond or Becks Pond, but how many of us ever realized that these ponds will someday cease to exist? Most of us are likely to think that the woods were always there, that bare ground remains bare ground and that ponds live on forever. We fail to realize that living plant and animal communities change. Change is an important part of nature. But, often the change is so slow that many months or years must pass before we can see the change. This lesson is about gradual changes that occur in communities. We will use the term succession to describe this gradual process of change.

Place SLIDE #1 in the viewer. (PAUSE) This slide shows some bare ground. All the plants and animals have been removed from the surface. Bare ground does not remain bare for long. We might say that it is "fair game" for any seeds or spores that can grow there. Not all seeds or spores, however, can play the game of colonizing the bare ground. The bare ground is a very harsh environment and only certain plants can successfully colonize it. Now turn the cassette player off while you attempt to answer questions 1 and 2 on your study guide. (PAUSE)

Let's take a look at your answer to question 1. A number of conditions make the bare ground a tough place for plants to grow. First, the

sunlight is very bright on the bare ground making it impossible for shade-loving plants to grow. And, second, since the sun is very bright, the soil is likely to dry out fast making it impossible for moisture-loving plants to live. Third, when it rains, topsoil and seeds may be eroded away. And, fourth, the soil may be very poor in nutrients. How did you do on question 2? In answering this question you may have thought about the kinds of plants that grow on bare ground around housing developments before grass is planted or the kinds of plants that grow on plowed fields that are not planted in crops. These plants are usually wild grasses and weeds such as rag weeds and dandelions. You should <u>not</u> have included such plants as maple trees, oak trees, moss, ferns, and dogwood trees on your list. These plants can not play the game of colonizing the bare ground. (PAUSE)

Now, place SLIDE #2 in the viewer. This slide shows what the bare ground would look like if we left it alone for about 5 years. You can see grass and numerous kinds of weeds. Notice that there are no shrubs or trees. What do you suppose would happen if we left this field alone for another 5 years. Would the grasses and weeds still be there? Since this whole lesson is about change you probably suspect that the grasses and weeds will disappear. But, if they disappear what will take their place? Turn the cassette player off while you answer question 3. (PAUSE)

Place SLIDE #3 in the viewer. (PAUSE) This slide shows what the field

might look like 5 years later. Notice that some grass is still present but you can also see shrubs such as blackberry, vines such as honeysuckle, and trees such as sweet gum. If we left the field alone for another 10 years, what would you expect to find growing in the field? Turn the cassette player off and answer question 4. (PAUSE)

Place SLIDE #4 in the viewer. (PAUSE) This slide shows the field 10 years later looking pretty much like a woods. The trees that you see are mostly aspen trees. There may also be small hickory, oak, and maple trees. You can also notice green bushes in the woods. These are mountain laurel bushes. Mountain laurel does not grow in open fields because it needs the shade of trees. You do not see blackberry bushes or grass in this woods. It seems that some species are dying out while new ones are appearing. How can you account for the disappearance of the grass and blackberry species? Turn the cassette player off and answer question 5. (PAUSE) How did you do with question 5? One good answer is that the trees make too much shade for grass and blackberry bushes to survive. We all know how dark it is in the woods.

Place SLIDE #5 in the viewer. (Pause) This slide shows what the woods with aspen trees would look like if we could come back in another 15 or 20 years. Notice that the aspen trees are gone. They have died out. They, like all the other plants before them, couldn't stand the competition. What you see in this picture is large oak, hickory, and

other trees. These large trees were able to grow above the aspen trees shading them out and thus killing them. Now you will probably gues that something will come along and replace the oak, maple and other large trees, but you are wrong. If the environment is undisturbed, the large trees will remain indefinitely. When this happens we say that the community has reached a climax. The term climax refers to a community that has reached a steady-state. In other words, it doesn't change much anymore.

Climax communities tend to remain the same year after year provided there are no disasters such as floods, fires, diseases, or disturbances by man. Turn the cassette player off and answer question 6. (PAUSE)

We have just studied a typical example of succession. We have seen one type of plant replace another type as the dominant plant in the community. This change is called succession. Now we will consider some other things which occur during the succession process. Some stages of the succession process have more species than others. What do you suppose happens to the number of species in a community as succession continues? And, what happens to the amount of dead and decaying matter that accumulates on the ground as the succession process proceeds? Turn the cassette player off and answer questions 7 and 8. (PAUSE)

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Another important thing to consider as succession proceeds is stability. Stability comes from the word stable which means steady and unchanging. A stable community is not likely to be upset or destroyed easily. The grass and weed stage is more stable than the bare ground stage. The shrub stage is more stable than the grass and weed stage. The small tree stage is more stable than the shrub stage. And, the climax large tree stage is more stable than the small tree stage. Thus, you can see that as succession proceeds, the community becomes more stable and is less likely to be upset or destroyed. The reason for this is not obvious but involves the larger number of species present as succession proceeds. The more species present, the greater is the stability.

Place SLIDE #6 in the viewer. (PAUSE) This is a photograph of a cornfield. This plant community consists of only one species and for this reason is called a monoculture. Turn the cassette player off and answer question 9.

Monocultures tend to be very unstable communities because if something happens to the one plant species the whole community is destroyed.

But if the community is a climax forest that has hundreds of species, losing of one, two or several species would still mean that there would be many other species left to take over and keep the forest healthy. One of the most important trees in the forests around here used to be

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the chestnut tree. But the chestnut trees got a fungus disease and by the late 1940's the chestnut was almost extinct in eastern North America. However, since there were so many other trees such as oak, hickory, and beech to fill the gap left by the chestnut, the forest was not destroyed. Thus, there is value in having a diversity of species. Since man has plowed under many natural communities and replaced them with monocultures, he worries that he may have set up very unstable communities over much of the earth.

Place SLIDE # 7 in the viewer. (PAUSE) Succession is not restricted to land environments. It also occurs in other environments such as the pond shown in this slide. Ponds and lakes change. They fill in with silt. Plants growing in ponds and lakes die. They fall to the bottom, decay and eventually contribute to the pond becoming more shallow. Ponds and lakes eventually become very shallow and are called swamps, or bogs. The swamps and bogs will eventually get dry enough for trees to grow on them and eventually a forest will grow where the pond once existed. It can be said that ponds and lakes get old and die. When they die they turn into swamps which then turn into forests. Turn the cassette player off and answer question 10.

This lesson on succession is now complete. You have learned that succession is a gradual change which produces a more stable community. (MUSIC)

STUDY GUIDE

SUCCESSION (CHANGE IN COMMUNITIES)

1. List several things which make bare ground a very harsh environment for plant growth?

2. What kinds of plants can be expected to grow on bare ground?

3. What kinds of plants will probably replace the grasses and weeds in the community?

4. What kinds of plants will probably grow in the field after the shrubs, vines, and small trees?

5. Why do plants such as grass and blackberry bushes disapper as succession proceeds?

6. What does the term climax mean?

7. Which has the most species?

   a. bare ground stage or grass and weed stage _____

   b. grass and weed stage or shrub stage _____

   c. shrub stage or small tree stage _____

   d. small tree stage or large tree stage _____

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8. Which of the following has the largest amount of dead and decaying material?

   a. bare ground stage

   b. grass and weed stage

   c. shrub stage

   d. small tree stage

   e. large tree stage

9. Is a monoculture such as a cornfield stable or unstable? Explain.

10. What will eventually happen to ponds such as Lums Pond and Becks Pond? Explain your answer.