

1. Crustose Lichen Stage 2. Foliose Lichens Stage 3. Moss Stage 4. Herbs Stage 5. Shrub Stage 6. Xerophytic Trees Stage 7. Forest Stage.

Like hydrosere, a xerosere also completes in a series of several orderly steps; each seral stage being characterised by peculiar type of plant community and reaction.

Xeric succession commonly occurs on bare rock surfaces (Lithosere) resulting from glaciation or from erosion by wind and water.

The rocky habitat shows many extreme xeric conditions. As the rock is directly exposed to sun, the temperature of rock surface goes very high. There is no water and nutrient holding device on the exposed smooth surface of rock. In such a xeric habitat only those plants can survive which can resist the extreme drought.



**The various stages of succession are described below:**

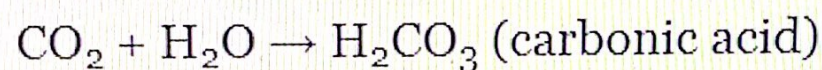
**1. Crustose Lichen Stage:**

The pioneer colonisers on the bare area are crustose lichens which occur on the rock surface in the form of membranous crusts.

Important crustose lichens are Rhizocarpus, Lacidea etc. These plants grow only when water becomes available in the habitat. In dry periods the pioneers, though they appear to be desiccated, remain alive. Their spongy nature enables them absorb excess amount of water and minerals. These lichens migrate through their spores and soredia and their migration is facilitated by wind and water. The lichens secrete carbonic acid in excess. That acid is formed when excess  $\text{CO}_2$  liberated in respiration combines with water.



**The reaction completes in the following way:**



The carbonic acid reacts with the rocky materials and loosens the rock particles. The corroded rock particles together with decaying lichens make the first thin layer of soil on the rock surface. Nitrogenous compounds formed from the atmospheric gases during the lightning are brought to the soil by rains. Now the habitat becomes less fit for the existing plants and consequently primary colonisers begin to disappear from there.

## **2. Foliose Lichens Stage:**

After accumulation of little soil and humus, the rock surface, previously occupied by crustose lichens, now becomes covered with xeric foliose and fruticose lichens, e.g., Dermatocarpon Parmelia, Umbilicaria, etc. These lichens have delicate leaf like thalli which cover the rocks and overshadow the pre-existing crustose lichens. When the supply of light is cut off the crustose lichens begin to die. Foliose lichens absorb and accumulate water and minerals and check evaporation of surface water.

They also secrete carbonic acid which further pulverizes or loosens the rocks into small particles. The water retaining capacity of the habitat increases with the further accumulation of soil particles and humus. Gradually the conditions become less favourable for the existing foliose and fruticose lichens.



### **3. Moss Stage:**

When the habitat is changed, the existing foliose lichens start disappearing and in that area xerophytic mosses grow and become dominant. These plants usually grow in the crevices and depressions of the rocks where enough rock particles, humus and moisture are accumulated. Like lichens, mosses are also adapted to survive in extreme drought. The xerophytic mosses develop rhizoids which penetrate deep into the rocky soil.

They cover the previous lichens and successfully compete with them for water and mineral nutrients. The decaying older parts of mosses form a thick mat over the rock surface. As this mat becomes more thick, it increases the water holding capacity of soil. Thus the habitat becomes relatively more wet. Now the next seral community may replace the moss community.

#### **4. Herbs Stage:**

When the soil increases in thickness, the herbaceous vegetation, which consists mainly of annual and perennial herbs, develops very quickly. Increased moisture content of the soil favours the growth of herbs. The roots of these plants penetrate down almost to the level of unpulverized rock where they secrete acids and accelerate the process of rock disintegration.



---

In this way the thickness of soil on the rock surface increases to a considerable extent. Decaying leaves stems, roots and other parts of the plants become deposited on the soil surface in the form of humus. This further increases the water holding capacity of the soil. These reactions make the habitat more suited for woody plants than to the existing herbs.



## **5. Shrub Stage:**

With the change of habitat, herbaceous vegetation also shows the sign of degeneration and xerophytic shrubs gradually occupy the area.

Roots of shrubs also reach the surface of unpulverized rocks and corrode sufficient quantity of rock particles which make the soil more massive. Decaying leaves, twigs and roots of these shrubs also enrich the soil with humus. These important reactions bring about such conditions in the habitat as are most suited to the trees rather than to shrubs and herbs.

## **6. Xerophytic Trees Stage:**

Now the xerophytic trees invade the area which has been occupied previously by shrubs. The first trees growing in such areas are dwarf and widely spaced. With the increase in the water holding capacity of the soil these trees gradually disappear and subsequently the mesophytic types will develop.



## **7. Forest Stage:**

The mesophytic trees are deeply rooted and their roots are profusely branched hence they can absorb sufficient quantity of water and nutrients. These mesophytic trees grow densely and become dominant because their seedlings are shade tolerant. In the shade of mesophytic trees some shade loving herbs and shrubs which are well adapted to humid atmosphere and in soil also appear and they form their own communities. After very long interval when complete harmony develops between the plant communities and their environments the climax stage established which remains unchanged unless some major environmental changes disturb it.



Successions on the bare areas do not always advance exactly in the sequences described above. Suppose on a bare rock sand and gravels are deposited and succession starts on it, then the possibilities are there that some beginning stages may not develop. All and herbs, shrubs or even trees may appear as initial colonizers on such a habitat.

Succession on the sand-dunes starts with drought resistant grasses. The grass vegetation is followed by shrubs and trees. Primary succession on open land may lead to a grassland vegetation rather than a forest climax.