

A succession originates in a water body (aquatic environment) is called **Hydrosere** or **Hydrarch Succession**. Such a succession does not necessarily lead to the development of a land community. If the water body is sufficiently large and with wave action, the succession usually results in the formation of a large aquatic climax community.

If the hydrarch succession starts from a comparatively small water body such as a pond, there is always a high probability for the formation of a terrestrial climax community. The important characteristics of hydrosere are given below:

Seral stages of Hydrosere

(1). Phyto-planktons stage

(2). Rooted submerged stage

(3). Rooted floating stage

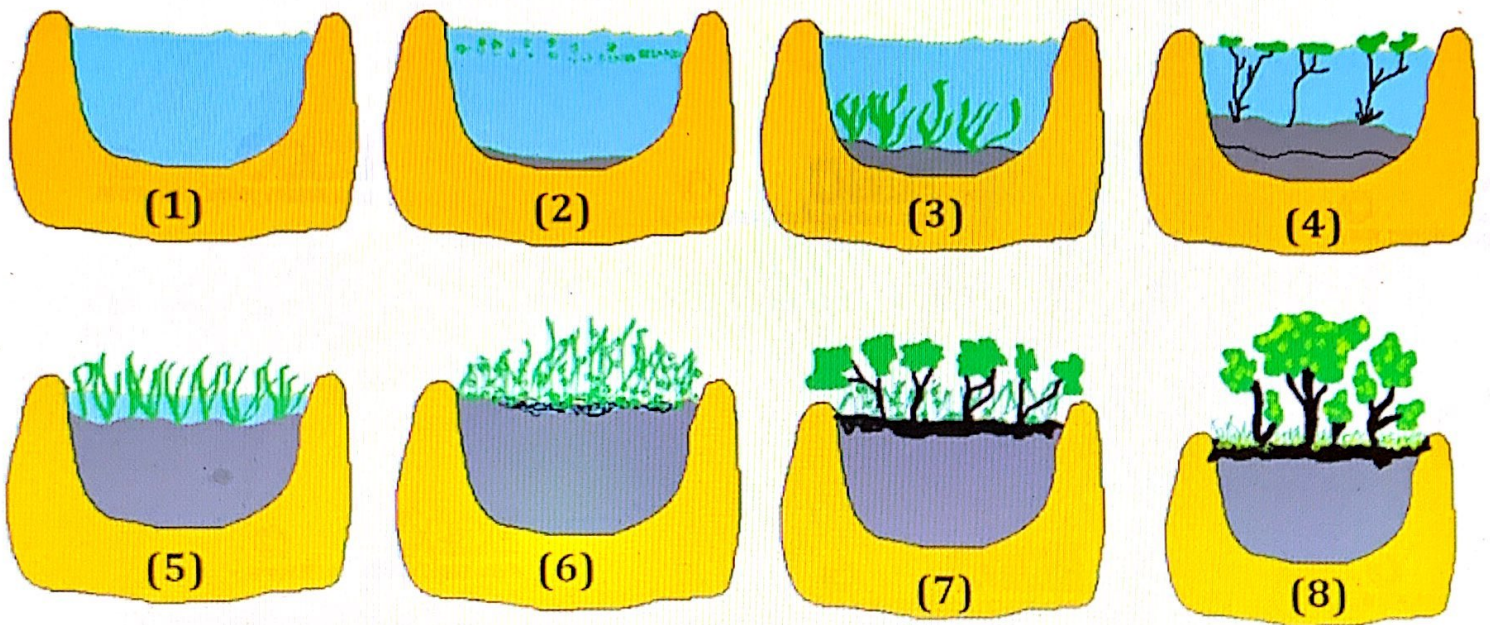
(4). Reed-swamp stage

(5). Sedge-meadow stage

(6). Woodland stage

(7). Forest stage

Hydrosere: Stages of Hydrarch Succession



(1). Newly formed water body; **(2).** Phytoplankton Stage; **(3).** Rooted Submerged Stage; **(4).** Rooted Floating Stage; **(5).** Reed-Swamp Stage; **(6).** Sedge Marsh or Meadow Stage; **(7).** Woodland Stage; **(8).** Forest Stage

(1). Phytoplankton stage:

- Phytoplanktons will be pioneer community in the hydrosere.
- Algal spores are brought into the water in the initial stages of the succession.
- These algal spores germinate and quickly colonize in the water body.
- They multiply and grow for some time. They fix light energy (photosynthesis).
- Blue green algae, green algae, diatoms, bacteria etc. the plankton communities.
- Large number of minute free floating zoo-planktons will also appear.
- Various growth activities of these planktons and their death add nutrients to soil and water.
- After their death, they settle down at the bottom of the pond to form a layer of muck.

(2). Rooted submerged stage:

- Ø Nutrients are added to the soil and water by the death and decomposition of planktons.
- Ø Subsequently a soft muddy bottom with rich silt forms.
- Ø Due to the formation of muddy bottom, the water depth becomes shallower.



Ø Once the water depth is reduced to about 10 feet, the complete light penetration becomes easy.

Ø This promotes the growth of rooted submerged hydrophytes.

Ø These plants will be completely submerged in the water.

Ø Example: *Hydrilla*, *Vallisneria*, *Utricularia*, *Chara*, *Ceratophyllum*

Ø The nutrient rich muddy bottom helps to quickly flourish their population.

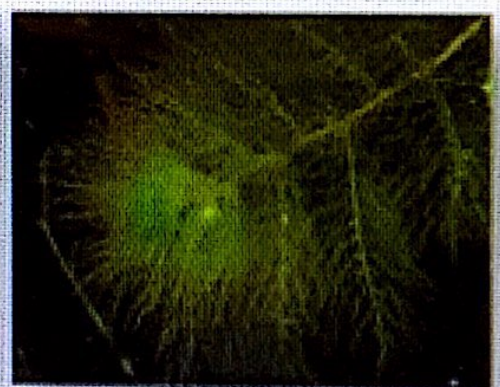
Submerged Hydrophytes



Hydrilla



Vallisneria



Utricularia



Chara



Ceratophyllum

(3). ***Rooted floating stage:***

- When the depth of water reaches about 4 to 8 feet, the submerged vegetation starts disappearing from their original place.
- Death and decomposition of these rooted plants add more nutrients to the soil.
- This further increase the width of bottom soil or silt.
- In this condition, rooted floating **hydrophytes** starts to appear.

- These rooted floating plants quickly cover the water surface and their floating leaves completely cover the water body.
- As a result of this, the light penetration into the water is inhibited and this results in the complete disappearance of submerged plants.
- Examples of rooted floating plants: *Nelumbium*, *Nymphaea*, *Trapa*

Plants of Rooted Floating Stage



Nelumbium



Nymphaea



Trapa

image source: cc – wikipedia

Free floating plants can also develop: *Azolla*, *Lemna*, *Wolffia*, *Pistia*, *Salvinia*

Free Floating Hydrophytes



Lemna

Salvinia

Azolla



Pistia

Wolffia

image source: cc – wikipedia

(4). Reed-swamp stage:

- The Reed-swamp stage is also called the Amphibious Stage.
- The water level very much reduced (reduced to 1 to 3 feet).
- The level of soil and silt increases and in this condition, the rooted floating plants cannot survive there.
- The soil becomes more fertile by death and decay of plants.
- In this stage, the rooted floating plants are replaced by plant communities which can survive both in water and terrestrial conditions (hence the name amphibious stage) will develop.
- Most of these plants will be rooted, but their shoots are exposed to the air. They have well-developed rhizome.
- Plants in this stage form very dense vegetation over the area and this will prevent the light penetration to the lower portion.

Ø At this condition, the remaining rooted floating or free floating or submerged plants of the previous seral stage disappears.

Ø **Example:** *Typha*, *Sagittaria*, *Polygonum*

Plants of Reed-Swamp Stage



Typha



Sagittaria



Polygonum

(5). Sedge Marsh or Meadow Stage:

- Ø Water level further decreases and the filling process results in the formation of a marshy soil.
- Ø The marshy soil is unsuitable for the pre-existing community (reed-swamp community).
- Ø Plants of *Cyperaceae* and *Poaceae* start to develop and they predominate in the area.
- Ø The rhizomes of these plants are well developed and they are interconnected to each other.
- Ø They form mat-like vegetation over the top of the soil.
- Ø The luxurious growth of these plants will modify the current soil.
- Ø These plants have a high rate of transpiration and they remove a large amount of water from the soil results in further reduction of moisture.
- Ø Due to loss of water by transpiration, the soil becomes exposed to air for the first time.

⊘ Once the soil is exposed to the air, the nutrients such as ammonia and sulfides become oxidized to nitrates & sulfates. Oxidation also results in the breakdown of other complex organic components in the soil to simple compounds.

⊘ All these ultimately results in the formation of **Terrestrial Soil**.

Plants Sedge Meadow Stage



(6). Woodland stage:

- Ø In this stage, some shrubs and medium sized trees will starts to appear.
- Ø These plants will prevent the light penetration to the bottom region and hence the marshy vegetation in the body gradually shrinks.



- The soil will stay dry in most of the time.
- Shrubs and herbs gradually predominates the area.
- Shedding of leaves from the shrubs and trees results in the huge accumulation of humus in the soil.
- A variety of decomposers of bacterial and fungal groups in the soil quickly break-down these organic matter results in a further increase of fertility of the top soil.
- **Example of plants:** *Salix, Eupatorium, Alnus, Acacia, Cassia, Terminalia*

Plants Woodland Stage



Salix



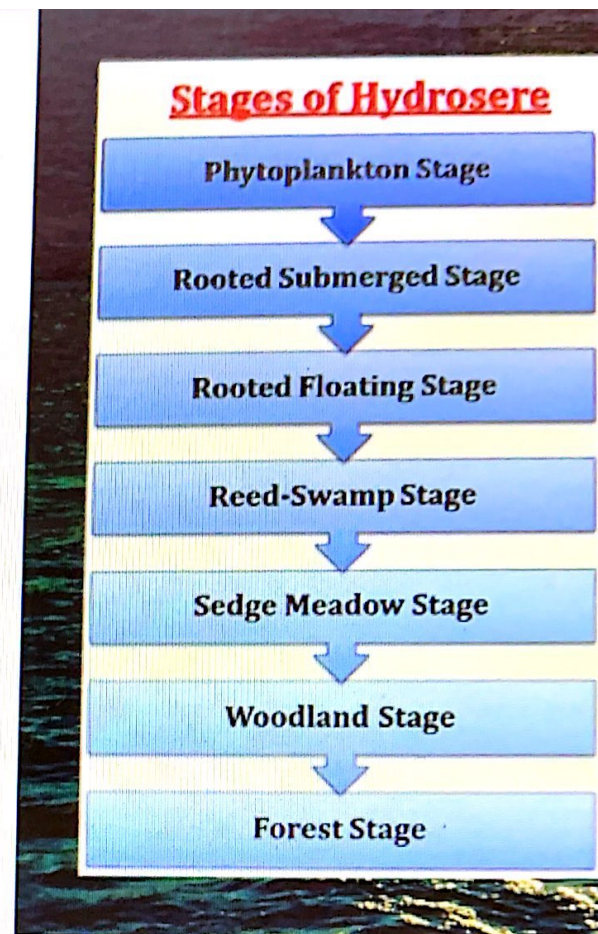
Eupatorium



Acacia

(7). Forest stage:

- Forest stage is the climax community in hydrarch succession.
- The woodland community is invaded by large tree forms.
- Tree forms gradually predominate the area and their canopy covers the entire area.
- The light penetration to the lower canopy becomes reduced and this results in the reduction of herb and shrub population.
- This condition also promoted the occurrence of large wooded climbers. These climbers (lianas) will climb over the trees for sunlight.
- The climate of the region determines the type of forest (evergreen, deciduous etc.)



◊ Example of plants: *Shorea*, *Quercus*, *Acer*

Plants Forest Stage (Climax Community)



Shorea



Quercus



Acer