CYCLIC SUCCESSION IN SALT MARSH VEGETATION INVOLVING HALOSARCIA INDICA AND SALICORNIA BRACHIATA IN SRI LANKA

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Salt marsh vegetation is a type of marine vegetation found closer to the sea, which is regularly inundated by sea-water and composed of deep mud and peat. In Sri Lanka this area is dominated by dense stands of halophytic plants: Halosarcia indica (synonym: Arthrocnemum indicum), Salicornia brachiata and Suaeda spp. (Dassanayake and Fosberg, 1987).

Halosarcia indica (Arthrocnemum indicum) is a perennial herb with woody base. It has prostrate and erect shoots, becoming corky with age (Figure 01). Salicornia brachiata is an erect annual herb with much branched shoots. Woody base is not commonly found (Figure 02). When consider the vegetation dynamics of salt marshes in Sri Lanka these two species (H. indica and S. brachiata) show a characteristic sequential change called cyclic succession (Pemadasa et al., 1979).

Cyclic or non-directional succession means small number of species replaced by each other over short period of time (Glenn-Lewin et al., 1992). This cyclic succession begins without any large environmental interruption, which is required for other successions. Each species follow a series of phases viz; pioneer, building, mature and degenerate (Watt, 1947; Kershaw, 1975).

During the pioneer phase, starting with H. indica as an example, first plant begins to grow from seeds, which are blown in by the wind or washed in by sea. In the second phase (building phase), pioneer species grow, ages, and alters its surroundings where they enter into the mature phase. Further, in this phase the first species may develop space and second species start to germinate. During the final degenerating phase, the firstly grown dominant species degenerates and dies, paving way to the second species to dominate (Figure 03).

The phase development of H. indica incorporated with the ‘hummock and hollow’ cyclic change of environment. When H. indica begin to grow as a pioneer plant, sand particles brought in by the wind accumulates around its seedlings and get trapped. Eventually this results in the development of hummocks and H. indica enters into its next phase. When H. indica is in its building and mature phases other plants cannot grow or colonize well. The erect branches maintain the general level of the hummock. Wind erosion is prevented by the prostrate shoots that cover the entire hummock (Figure 04 and Figure 05).
However, shoots of *H. indica* become less firm and produce smaller branches when the plant is ageing. Therefore the centre of old hummock becomes moderately open. But the boundary of open area is covered by well branched, properly growing shoots and these prevent the wind erosion (Figure 06 and Figure 07).

The open areas created by the death of the older shoots of *H. indica* are colonized by the second species *Salicornia brachiata* associated with *Cynodon dactylon*. These do not prevent wind erosion and therefore eventually hummock begins to erode, where the hummock becomes more or less flattened and hollow. This initiate a new cycle which goes through the same sequence of pioneer, building, mature and degenerate phases (Figure 08 and Figure 09) (Pemadasa *et al.*, 1979).

Note: This cyclic succession was observed and photographs were taken during my field visits (June 2013-Feb 2014) in Jaffna peninsula at Pannai area.
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References:


Genetic variations in salt tolerance exist, and the degree of salt tolerance varies with plant species and varieties within a species. Among major crops, barley (Hordem vulgare) shows a greater degree of salt tolerance than rice (Oryza sativa) and wheat (Triticum aestivum). The degree of variation is even more pronounced in the case of dicotyledons ranging from Arabidopsis thaliana, which is very sensitive towards salinity, to halophytes such as Mesembryanthemum crystallinum, Atriplex sp., Thellungiella salsuginea (previously known as T. halophila) [3, 13, 14]. Plants develop various physiological and biochemical mechanisms in order to survive in soils with high salt concentration. Principle mechanisms include, but are not limited to, ion homeostasis and compartmentalization. Sri Lanka Bundala national park, monkeys, elephants and more. Elephants encounter in Safari Bundala. The vegetation mainly consists of Acacia scrubs including Dichrostachys cinerea, Randia dumetorum, Ziziphus sp., Gymnosporia emarginata, Carissa spinarum, Cassia spp. The trees of the forest are Bauhinia racemosa, Salvadora persica, Drypetes sepiaria, Manilkara hexandra (Palu in Sinhalese), and less common Chloroxylon swietenia, Azadirachta indica, and Feronia limonia. Halophyte plants thrive in the national park's environmental conditions. Salicornia brachiata and Halosarcia indica are examples of salt-tolerant plants.