Dynamics of coastal sand dune system and their drivers in the Ishikari coast, Hokkaido, Japan

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The coastal sand dune system, which has its own ecosystems and landscapes, is known as a green infrastructure with their various ecosystem services. But most of all them were developed for agricultural and residential land-use in Japan. Ishikari coast in which located north part of Japan, Hokkaido, is one of the well preserved natural sandy coast in Japan, and still keeping coastal sand dune system in natural. However, data for elucidating the coastal ecosystem and their multi functions is insufficient, although there are many studies focused on each function of the coast. Therefore, in this research, we focused on whole system of the coastal sand dune system to clarify the dynamics of the coastal sand dune system and the drivers influenced them through a year at Ishikari coast.

The results of coastal dunes topography survey revealed that erosion and sedimentation has repeatedly occurred through a year. The changes of altitudes were 1 m or more, and horizontal positions of shoreline were 40 meters per year. The topographic change of the coastal dunes has occurred noticeable in the non-vegetation zone, i.e. beach area. But there was no periodic change or a common tendency between the sites.

The climate data of the Ishikari coast shows a clear seasonal change that the temperature is low and the strong sea breeze dominates in winter, but warm and calm wind from inland dominates in the summer. Therefore, it is inferred from the EC value of the soil that salt which moves to inland by the wind decreases in the summer season.

There was clear zonation of vegetation in coastal sand dune depend on the distance from shoreline, dune plants were on the seaward of the dunes and inland plants were on the stabilized dune. While inland plants could not grow near shoreline, dune plants were widely distributed on the dunes. But the coverage rate of dune plants was small on stable dunes because of shading by tall inland plants.

The Ishikari coast was found to be typical coastal sand dune system with resilience, which has a zonation structure of vegetation. Although the influence of the seasonal change of the surrounding weather on the vegetation and the behavior of the landform, the temporal wave attack like summer storm has changed shoreline and foredune. However, it was revealed that the amount of change is largely suppressed by the establishment of vegetation.

Keywords: coastal sand dune system , green infrastructure, ecosystem based disaster risk reduction, resilience

