Q20

The Coastal dune ecosystem is very vulnerable to changes, however the biophysical interactions that make the coastal dune ecosystem unique also improve its resilience, and ability to survive rapid and gradual changes. These interactions between the biophysical environment lead to the diversification of the coastal dune ecosystem and it's functioning.

Coastal dune ecosystems are located on every continent in the world except for Antarctica. They are formed when wind and ~~tidal~~ wave tidal action transport sand to the back of the beach.

The atmospherical process are important in the development and functioning of coastal dunes. Wind movements from the atmosphere is one of the main contributers to the development of the sand dunes.

The wind is able to transport the sand from the beaches and sediment from river run-off

to form the dunes, this process is known as accretion.

The prevailing wind movements also determine the shape and type of dune produced including fore dunes, parallel dunes and parabolic dunes. This interaction between the atmosphere and lithosphere assist in the development as well as functioning of the coastal dune ecosystem. The different types of dunes are formed in various areas of the ecosystem. The foredunes are ~~a~~ the dunes formed closest to the beach, these dunes create a 'welled' effect, protecting the sediment and sand particles lower on the ground from being exposed to the wind which can cause erosion. The other two types of dunes are formed further back from the fore dunes, through such processes as blowouts and washouts. These occurences are a result of atmospheric and hydrological processes.

The use of wave action is another process important in the diversity and functioning of coastal dune ecosystems.

Wave and tidal currents are responsible for providing materials for dune development. This occurs through collection of sediment.

However hydrological processes are do not always have positive effects on coastal dune ecosystems. During heavy storms, the excess precipitation, is often too severe for dunes to withstand and as a result erosion occurs. This causes sand particles to be washed away leaving unstable dunes.

The resilience of coastal dune ecosystems is evident in their ability to redevelop. The susceptibility of coastal dunes to rapid changes such as heavy storms and large tidal action, provides various forms of functioning to redevelop.

The hydrological processes that allow for coastal dune resilience includes washouts and

other forms of wave action which reform the dunes behind the beach.

However, it is not just atmospherical and hydrological processes that can effect the functioning of coastal dune ecosystems, but also human interactions.

The constant interference by humans can have severe impacts on the formation of coastal dunes and its vegetation.

The ~~plant~~ flora found in dune ecosystems often have many adaptations to the sometimes harsh environment. Plants such as 'marram grass' and 'Pig face' are particularly adaptable to the sandy environment. However the introduction of foreign species of flora and fauna in coastal dune ecosystem can effect the interactions causing instability of the dunes. Foreign plant species can attract necessary nutrients from the native plant life, causing them to die, disrupting the interactions.

The use of coastal dunes as accessways by humans can also disrupt the stability of the area. This can occur through erosion, as the sand and vegetation get trampled, however ~~[illegible]~~ humans are now beginning to realise the impact their interference ~~[illegible]~~ can have on coastal dune ecosystems and their functioning.

From Source D in the stimulus booklet the map of Barrow Island provides areas of coastal dune ecosystems, with the evidence of human protection. In AR 2589, it shows the coastal dunes to be an area of conservation and restriction. This management strategy decreases the impact parts of the biosphere, mainly that of humans have on coastal dune ecosystem.

However, the ~~[illegible]~~ biophysical interactions which contribute to the functioning of coastal dune ecosystems are able to maintain its resilience

to ensure future survival, of a very vulnerable ecosystem.

The location of coastal dune ecosystems contributes to the vulnerability, with the areas being very open and susceptible to ~~this~~ harsh biophysical interactions, but it is because of this that makes coastal dune ecosystems unique.

[redacted]