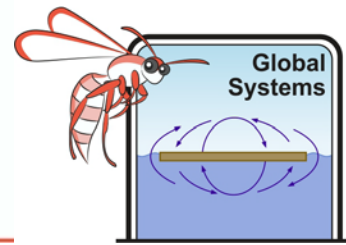


Climate Change and Biodiversity – Teachers Notes



Most ecosystems can survive slow natural climate change. The living things or their seeds and spores can colonise new areas as the change proceeds. For ecosystems to be able to survive change there needs to be biodiversity. That is a variety of different species and a variety of characteristics within each species. That way they can respond to most changes.

Climate has changed many times in the recent past in Western Australia. Our extensive grassed plains of the Pilbara coast have alternated between savanna and rainforest ecologies at least four times over the past two million years in response to slow natural cycles of warming and cooling. Some species, such as our extinct megafauna of giant kangaroos and wombats the size of cows, died out about 50,000 years ago when the new climatic conditions did not provide them with sufficient food. Other smaller members of their group through the process of natural selection replaced them. These could survive on smaller amounts of tough grasses and leaves as do the kangaroos and emus that now inhabit the same area. This change is only possible if species have many possibilities within their gene pool and the change is slow.

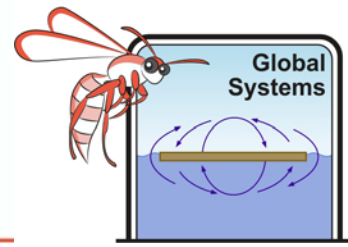
The expected rate of change due of the Enhanced Greenhouse Effect is rapid
We already have indications that:

1. Global temperatures are increasing rapidly. The period 2006 to 2016 had nine of the ten hottest years in Australia in recent times. Enzyme efficiency in plants and animals is temperature dependent.
2. Sea levels are rising rapidly. Both terrestrial and marine organisms will be affected.
3. Carbon dioxide levels in the atmosphere and ocean are rising rapidly. Increased acidity will affect skeletal development of marine creatures
4. Rain patterns are changing. Severe summer cyclones are expected to be more frequent in the tropics bringing an increase in summer rain and rain-bearing depressions will less frequently cross the southern coast increasing desertification.
5. Desertification is increasing and with it problems with increasing salinity



Mangrove forests have existed along our coastline for millions of years. Unique among the world's trees, they can survive in and filter salt water. They are the anchor species for an ecosystem upon which many species of birds, fish, crabs and crocodiles depend. They provide clean water, food and fresh air for humans. Their roots are very efficient carbon sinks.

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Visit:

http://www.mangroveswatch.org.au/index.php?option=com_content&view=category&layout=blog&id=84&Itemid=300201 and answer the following questions.

Mangrove forests

1. How many species of mangrove are there in WA? **19**
2. Are different species of mangroves able to colonise many different types of coastlines? **Yes.**
3. Are different species of mangroves able to tolerate a variety of tidal ranges? **Yes**
4. From answers 1 to 3 can we say there is biodiversity between species of mangroves? **Yes**
5. Where is the greatest variety of mangrove species found in WA? **The northern coastline.**

Climate change and mangrove forest

6. How will the expected increase of tropical cyclones affect northern mangroves? **It will damage trees, and roots. Increased upstream erosion will deposit more mud on the aerial root systems that they use for obtaining oxygen. Many will die. Increased rainfall from the storms however may enable mangrove forests to spread further across estuaries.**

Visit <https://theconversation.com/rising-seas-threaten-to-drown-important-mangrove-forests-unless-we-intervene-49146>

7. The research group measured mangrove growth and rise in sea level. Could all the mangroves keep pace with water rise? **No, growth of most species lagged behind the water level rise**
8. How are mangroves affected by rising water levels? **They “drown” as their air roots are now under water and they cannot take in oxygen.**
9. Will sea level rise affect biodiversity in mangroves? **Yes.**
10. Suggest how the death of specific species of mangroves would affect their local ecosystem? **In an ecosystem each species depends on others for food shelter etc. The loss of the anchor species would affect all other species.**