ESM803 – Tutorial Questions for discussion next Wednesday 31st August.

Total marks – 20 marks (worth 15% of CW)

Review the video and slides for Lecture 1. Also read Chapter 3 of the Text Reference " Sustainability – A Comprehensive Foundation"

Q1. Select any two Climate System components and briefly discuss the interaction taking place, and how the interaction affects the climate of the earth. **6 marks (3m/climate system)**

Solution: The climate system consists of the five components

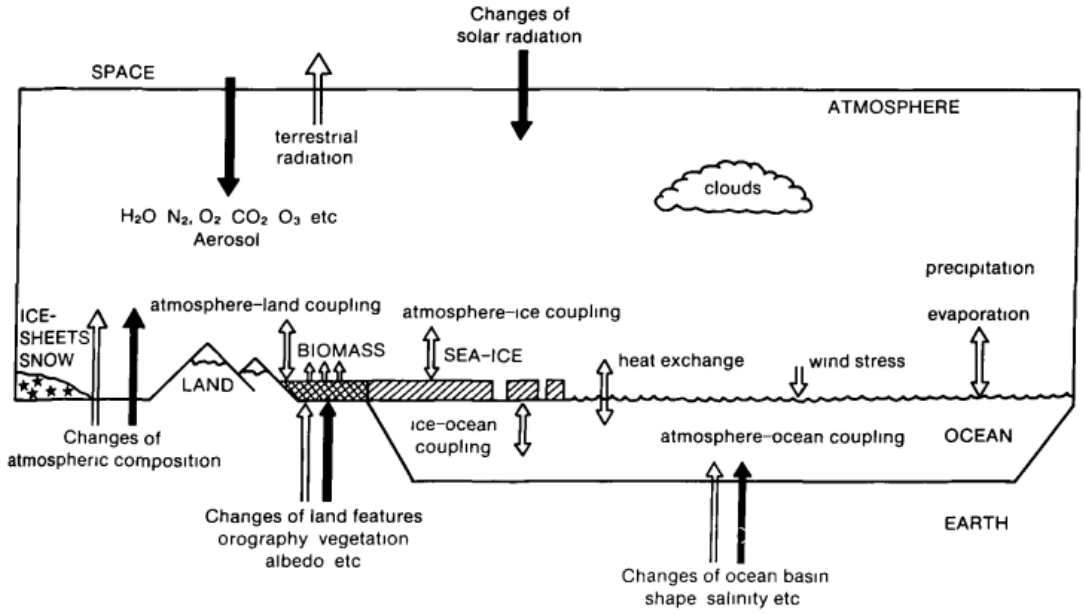
•Atmosphere

•Ocean

•Cryosphere (ice)

•Biosphere

•Geosphere

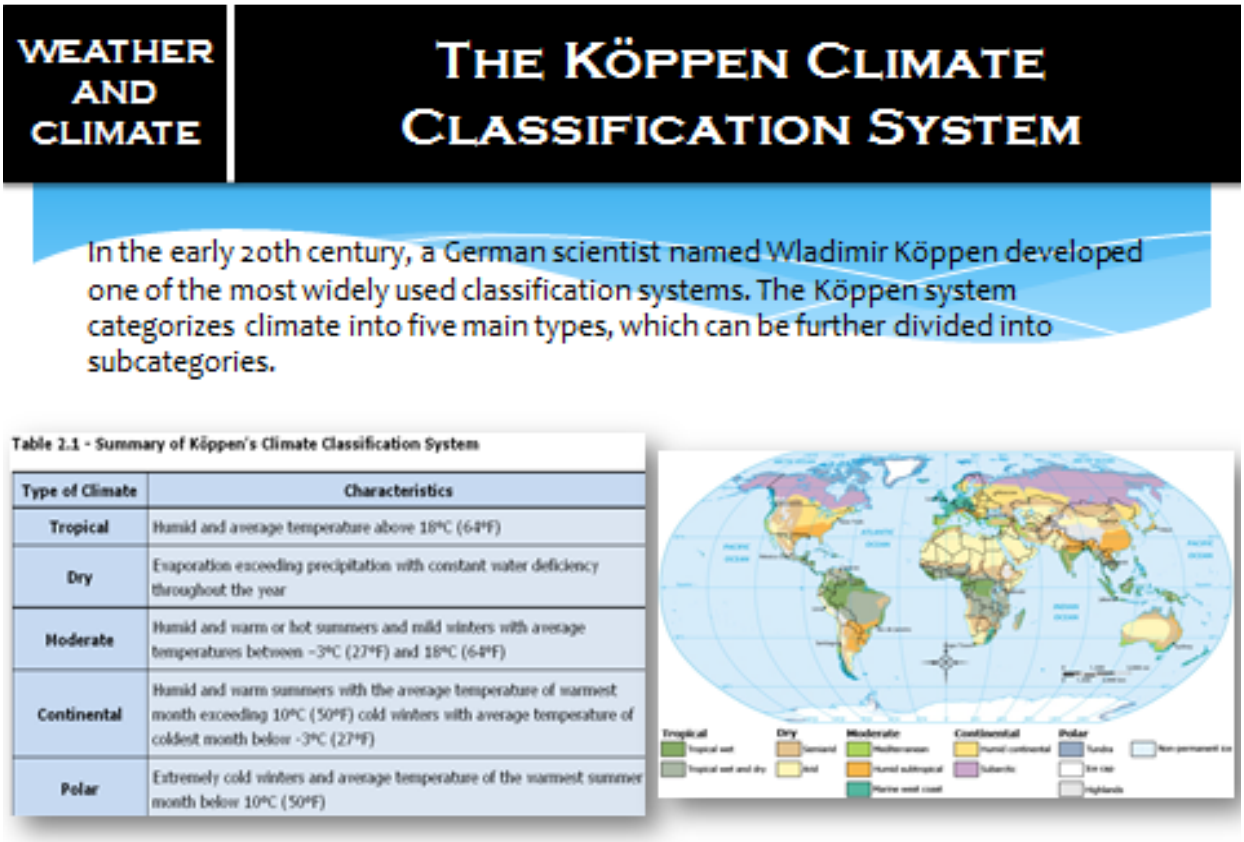


Q2. The Koppean Climate Classification system – what are the 5 main types of climate identified by this scientist? (**2 marks)**

Solution:

The Köppen climate classification divides climates into five main climate groups, with each group being divided based on seasonal precipitation and temperature patterns. The five main groups are A (tropical),

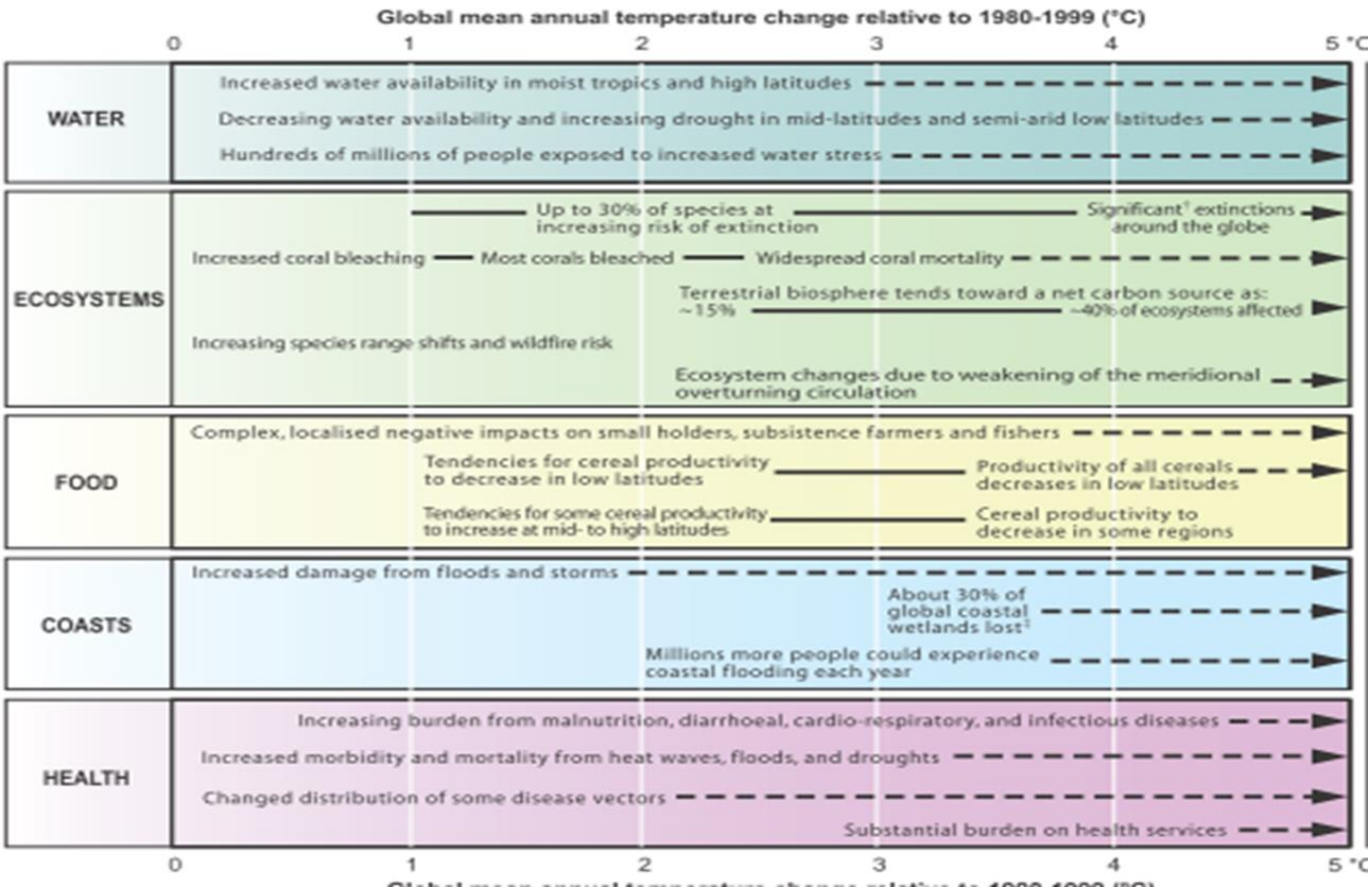
B (arid), C (temperate), D (continental), and E (polar). Each group and subgroup is represented by a letter.



Q3. "The changing atmospheric temperature affects the different parts of the world in the same way". Do you agree or disagree with this statement? (Refer slide 12 of Lecture 1) **2 marks**

Solution:

Key impacts as a function of increasing global average temperature change(Impacts will vary by extent of adaptation, rate of temperature change, and socio-economic pathway). Ref. IPCC Report (Refer diagram)



Q4. Natural Climate change – what are the causes – explain

Solution (4 marks)

a) Plate tectonics (rearranging Earth's continents, moving them closer or farther from the equator and the poles)

b) Volcanic activity (changing the reflectivity and composition of the atmosphere)

c) Variations in Earth's orbit (the natural, cyclic change in our planet's orbit, axial tilt, and wobble)

d) Solar variability (whether the Sun varies in its radiation output and whether sunspots affect the output).

Q5. Explain the causes the of anthropogenic climate change.

Solution (2 marks)

Nitrogen

Oxygen

Carbon Dioxide

Why potential Green House gas is only CO2?

Climate change induced by human activity may occur due to changes in the composition of the Earth's atmosphere from waste gases due to industry, farm animals and land clearing, or changes in the land surface reflectivity caused by land clearing, cropping and irrigation. These gases include several, such as carbon dioxide, methane and oxides of nitrogen, that can absorb heat radiation (long-wave or infra-red radiation) from the Sun or the Earth.

Q6. Read the Text Reference "Sustainability – A Comprehensive Foundation" Chapter 3: Discuss the meaning of the terms 'insolation' and 'albedo'. Explain how 'insolation' and 'albedo' affects the climate of the earth.

Solution:

'Insolation' - is the measure of the amount of solar radiation falling on a surface, is a very important factor in determining the climate of the Earth. At the equator, sunlight falls almost directly (concentrated over a smaller area when compared to the polar regions where the insolation angle is greater, sunlight hits obliquely) – 2 marks

'Albedo' - Albedo is a measure of how reflective a surface is. The higher the albedo the more reflective the material: a perfectly black surface has zero albedo, while a perfectly white surface has an albedo of 1 - it reflects 100% of the incident light. – 2 marks

Submit your answers by email to Ulukalesi.tamata@fnu.ac.fj for assessment by next Wednesday. This worth 10% of the Coursework.