Name: _____

Date: _____

Class: _____

IB Environmental Systems and Societies

3.1 Introduction to Biodiversity

Significant ideas:

Biodiversity can be identified in a variety of forms including species diversity, habitat diversity and genetic diversity.

The ability to both understand and quantify biodiversity is important to conservation efforts.

Biodiversity: Variety of life on Earth

Types of Biodiversity

1. SPECIES DIVERSITY

a) Outline what is meant by "species diversity"

Refers to the variety of species per unit area; it includes both the number of species present and their relative abundance

b) Look at the data comparing fish species in two ponds

	Pond A	Pond B
Fish species 1	30	54
Fish species 2	25	13
Fish species 3	36	0
Fish species 4	18	3
RICHNESS	4	4
EVENNESS	high	low
D	3.9	1.6

number of species

relative abundance of each species

i) Complete the boxes to state the species **richness** (a number) and species **evenness** ("more even" or "less even") for each pond.

ii) Using the Simpson's Reciprocal Index (D) to ascertain which of the ponds has a higher species diversity. SHOW YOUR WORKING.

$$D = \frac{N(N-1)}{\Sigma n(n-1)}$$

N = total number of all organism found
n = number of individuals of a particular species

$$= \frac{109(108)}{30(29) + 25(24) + 36(35) + 18(17)}$$

$$= 3.9$$

$$= \frac{70(69)}{54(53) + 13(12) + 3(2)}$$

$$= 1.6$$

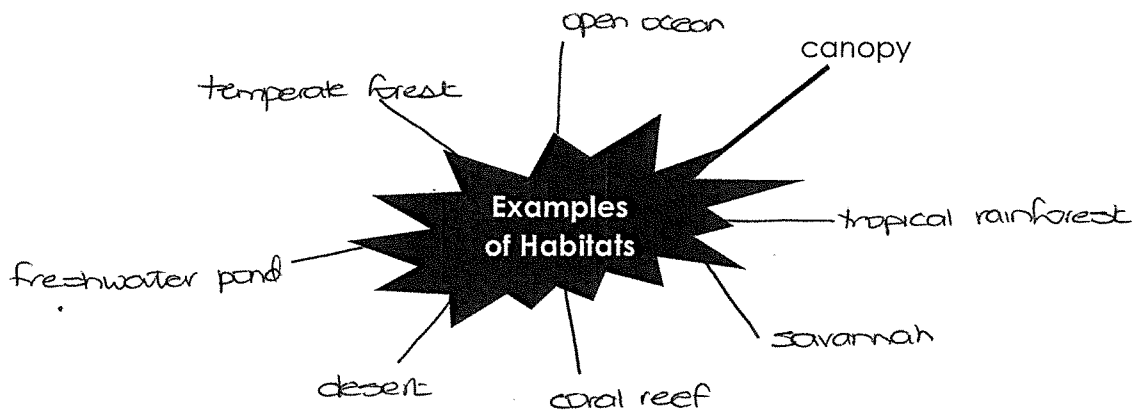Pond with the highest species diversity = Pond A

2. Habitat diversity

a) Outline what is meant by "habitat diversity"

refers to the range of different habitats in an ecosystem
or biome

b) Complete the spider diagram to list as many habitat types as you can think of.

temperate forest

open ocean

canopy

Examples of Habitats

freshwater pond

tropical rainforest

savannah

desert

coral reef

3. Genetic diversity

a) Outline what is meant by "genetic diversity"

refers to the range of genetic material present in a
population of a species

b) With reference to **two named examples**, describe what is meant by "low genetic diversity" and "high genetic diversity".

High genetic diversity means high genetic diversity between different
individuals within different populations of a species
Large populations and a wider range of populations increases genetic
diversity   e.g humans, European red fox (found across Europe)
Low genetic diversity results from smaller populations or a
narrow range of populations   e.g grey seals (found mainly on
the Farne Islands)

Biodiversity – Why Bother?

1. Outline the relevance of a diversity index

It is a way of referring to the heterogeneity (variability) of a community, ecosystem or biome at the species, habitat or genetic level. It is a subjective judgement and correct terms need to be used for its meaning to be relevant

2. Outline why it is important to quantify biodiversity

They are a tool to measure complex ecosystems, and so important to conservation efforts so that areas of high biodiversity are identified, explored and appropriate conservation put into place. When comparing communities that are similar then low diversity could be evidence of pollution, eutrophication or recent colonization of a site

3. Explain why assessing changes in biodiversity over time can be important.

The ability to assess changes in biodiversity in a given community over time is important in assessing the impact of human activity in the community. For comparisons to be made the same sampling method, similar habitats and similar groups of organisms should be studied.

4. Biodiversity data can be used to designate an area as a biodiversity hotspot.

a) Define "biodiversity hotspot".

A region with a high level of biodiversity that is under threat from human activities. eg. Caribbean Islands

b) List the criteria used to designate an area as a biodiversity hotspot.

The region must have at least 1500 vascular plants as endemics (it must be irreplacable). It must have 30% or less of its original natural vegetation (it must be threatened)