



THE OPEN UNIVERSITY OF SRI LANKA

M.Sc. In Environmental Sciences Level 08 (2016)

NEP 2214 Biodiversity Conservation and Management

NBT 1

Date: 28th August 2016

Time.09.00 am -10.00 am

Answer all the questions.

Answers should be written in the space given.

Question 1

“Sri Lanka has 670 species of indigenous vertebrate species (excluding marine forms) in the country, and about 272 species of migrant birds that visit the island annually.

Endemism

among indigenous vertebrates (minus the migrant birds) is about 42%, with highest endemism among amphibians and reptiles that are poor dispersers. Most invertebrate groups in the island have been incompletely surveyed, but a very high diversity is documented among butterflies, dragonflies, spiders, freshwater crabs and land snails.”

Source: Ministry of Environment, 2011.

Your friend’s daughter who is in year 11 has read this paragraph in a book and wants to know the following:

1a. What is an indigenous vertebrate species? Explain in one paragraph using phyla and subphyla.. (use separate sheet if necessary)

1b. Which level of biodiversity (i.e. genes, species, ecosystems) is described as having “high diversity” in this paragraph ?

1c. What are the vertebrate classes mentioned in this paragraph with “highest” number of species found only in Sri Lanka?

1d. Does the paragraph imply that species diversity is higher among invertebrates than among vertebrates?

1e. To what phyla, subphyla and classes do butterflies, dragonflies, spiders, freshwater crabs and land snails belong? Fill in the blanks below (Ignore shaded cells)

Species group (common name)	Phylum	subphylum	Class
Butterflies			
Dragonflies			
Freshwater crabs			
Spiders			
Land snails			

Answer the following questions in relation to the answers you provided in the above table.

1f. Which one of the above species groups is most distantly related to the others? :

1g. Which two groups are most closely related?

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1h. Which phylum is reputed to have the highest species diversity?

1i. Which taxonomic class is known to have the highest impact on agricultural biodiversity?

1j. Mention a major positive impact and a negative impact on agriculture by members of the taxonomic Class you mentioned in 1j.

Question 2

“The Forest Department of Canada is engaged in conservation of the Douglas Fir while the Forest Department in Sri Lanka is engaged in conservation of an Orchid species found only in the Sinharaja forest.”

2a. Classify these two plant species according to **Kingdom** and plant **Division**.

	Kingdom	Division
<i>Douglas fir</i>		
<i>Orchid species</i>		

2b. Which of these two species is naturally found in the biome that harbours the grizzly bear and caribou?

2c. Name the biome that contains the rare Orchid species.

2d. Describe the biome that contains the orchid species mentioned above (Mention the *biome's geographic spread on earth, and notable features in terms of forest structure, specific characteristics of plant life in this biome; features of trees, climate and soil in this biome; and a broad description of the type of animal life that is commonly found in this biome*). **(use a separate sheet for the description if necessary).**

2d. Which of the two biomes that provide habitat for the Douglas fir and Orchid (in Sinharaja) could be expected to have a lower biodiversity and endemism?

2e. Name a forest in Sri Lanka within the rainforest biome, which is a World Heritage Site and an International Biosphere Reserve.

Question no 3:

3a. Your friend's two children have observed these animals at the New Zealand Zoo during a trip abroad and have brought back a handout. Help them to fill the matrix in Table 3.1

(E means endemic to Sri Lanka)

Animal	Class	State sub class (only for mammals)	Presence of species in the Afrotropic (formerly Ethiopian) zoo geographic region (tick presence with a cross)
Zebra			
Rhinoceros			
Reindeer			
Mountain gorilla			
Baboons from Tanzania			
Jungle fowl (E)			
Toque Macaque (E)			
Echidna			
Giraffe			
Oryx			
Duck billed platypus			

Siberian tiger			
Ostrich			
Indian gharial-giant crocodile			

3b. Help the children to fill Table 3.2 below in relation to the animals in Table 3.1:

	Number of species
Total species that occur in the grassland biome of the Afrotropic zoo geographic region	
Total species in tundra biome	
Total number of vertebrates	
Total birds	
Total reptiles	
Total amphibians	
Total fishes	
Total number of Eutherian mammals	
Total number of species belonging to infra-class Metatheria	

3c. Which species in Table 3.1 is the most closely related to us humans ?

3d. Which of the primate species in Table 3.1 is found in Sri Lanka and no where elsewhere in the world?

Question 4

4.1 Read the following paragraph and answer the questions below

Medicinal Plants - Sri Lanka's prized biodiversity

Plants and their products have been systematically used in Sri Lanka for treating illnesses for over two thousand years, and a total of 1,414 plant species are listed for their traditional medicinal use. These include several endemic species which are becoming increasingly rare and under threat of extinction. Approximately 200 species of medicinal plants are in common use, and of these, 50 are heavily used in ayurvedic medicinal preparations. In total, 79 species are now considered threatened. Dwindling supplies are exacerbated by the rapid depletion of natural habitats, the increased export of a selected number of plant species leading to unsustainable exploitation.

Source: The Biodiversity Conservation Action Plan of Sri Lanka, 1999.

4.1.a. What type of biodiversity value is exemplified in the paragraph given above?

- | | |
|--------------------|---------------------|
| (i) Indirect value | (iii) Bequest value |
| (ii) Direct value | (iv) Ethical value |

(Underline most correct answer)

4.1.b. Explain your answer for 4a with reference to the above paragraph in one sentence.

4.1.c. What is meant by the term “under threat of extinction” in the above paragraph? Does it mean that in the future these species may no longer be found -

- (i) In forests of the world (ii) In Sri Lanka, (iii) In the whole world?
(Underline most correct answer)

4.1.d. Explain your answer in 4.1.c briefly:

4.1.e. What are the main causes of threat for the species mentioned in the above paragraph ?

4.2. Read the following paragraph and answer the questions below:

Beyond carbon storage: the Congo Basin forest as rainmaker by Denis J. Sonwa

Scientist, Center for International Forestry Research

“Responses to climate change are grouped into two main categories: mitigation (reducing greenhouse gas emissions responsible for climate change) and adaptation (adjusting livelihoods and life styles due to the influences of climate change). Amongst adaptation strategies ecosystem-based adaptation (EBA) is an approach that promotes ways to use natural resources and biodiversity to help develop adaptation strategies for vulnerable communities. In this context, recent studies highlight the role that the Congo Basin forests play in generating rainfall both regionally and in the continent as a whole. Pokam et al. studied how the climate of the Congo Basin is primarily a result of moisture from the Atlantic Ocean and the recycling process of evapotranspiration. Makarieva et al. suggests that forest cover in the region acts like a pump moving oceanic moisture towards the continent to eventually become rainfall in that region.”

4.2.a What type of biodiversity value can be assigned to forests according to the suggestion by Makarieva et al ? (underline correct answer)

- (i) Indirect value
- (ii) Direct value
- (iii) Ethical value
- (iv) Bequest value

4.2.b Which of the following ecosystem services are most applicable for the service provided by forests described in the above 4.2. paragraph? (underline the most correct response by reading the paragraph above)

(i) Provisioning, (ii) Regulatory (iii) Cultural

4.2.c In which zoogeographic region does the Congo Basin (of Africa) occur?

4.3. Read the following paragraph and answer the questions below:

A very rare endemic Orchid species was found in a private land near a stream at the boundary of the Sinharaja Forest in 1994. Only 5 plants of this species remain there now due to pollution and habitat disturbance. A micro-hydropower plant being constructed may cause these five plants to disappear. There is no way to stop this project in the near future as it occurs in a private land.

4.3.a Considering the above facts, should the Forest Department engage in *ex-situ* or *in-situ* conservation of the Orchid as the priority action to save it from extinction? Support your answer with a brief explanation.