



THE OPEN UNIVERSITY OF SRI LANKA

PGD /M.Sc. In Environmental Sciences Level 07 (2013)  
NEP 2202 Biodiversity Conservation And Management  
FINAL EXAMINATION 2013

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Date: 29 June 2013

Time.1.30 pm - 4.30 pm

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Answer any four (4) questions. Attach Table 1 & 2 of question 5 with the answer script.

**Question 1**

“In addition to the 670 species of indigenous vertebrate species (excluding marine forms) in the country, there are 272 species of migrant birds that visit the island annually. Endemism among indigenous vertebrates (sans the migrant birds) is about 42%, with highest endemism among amphibians, freshwater fishes and reptiles that are poor dispersers. Most invertebrate groups in the island have been incompletely surveyed, but a high diversity is documented among butterflies, dragonflies, bees, spiders 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:

- i. What is an indigenous vertebrate species? Explain in one paragraph in relation to phyla, subphyla and class.
- ii. Which level of biodiversity (i.e. genes, species, ecosystems) is exemplified by “high diversity” in this paragraph ?

- iii. **Species diversity.** Does it mean that there is a higher percentage of species found only in Sri Lanka among amphibians, fishes and reptiles than among birds, mammals and echinoderms?
- iv. Does the paragraph imply that species diversity is higher in vertebrates than among invertebrates?
- v. To what phyla, sub-phyla (where relevant) and classes do butterflies, dragonflies, bees, spiders and land snails belong to? Classify.
- vi. Which one of the groups mentioned in (v) is most distantly related to the others?
- vii. Which three groups mentioned in (v) are most closely related?
- viii. Which phylum you named is reputed to have the highest species diversity?
- ix. Which phylum you named is mainly found in marine environments?
- x. Which class you named has the highest impact on agricultural biodiversity? Mention a major positive impact and a negative impact in two sentences.

**Question 2**

- (a) Analyse in point form the advantages and disadvantages of *in-situ* and *ex-situ* conservation of the purple-faced langur ( a species of monkey) in Sri Lanka, explaining the differences in these approaches.
- (b) You have been asked to give advice to a friend living in **Molavia** where primate-human conflict has become a serious issue. The National Conservation Department is trying to translocate a troublesome population of 50 individuals of the lowland blue tailed macaque living in an urban area in the lowlands to a national park in the uplands where there is already an upland subspecies of blue tailed macaque. A Conservation NGO has joined with Green Peace to bring this action to world attention. Your friend wants to know:
  - (i) Discuss the impact of this type of introduction on genetic diversity of the species, and health of the introduced populations and existing animals.
  - (ii) What key action should have been taken before deciding on translocation of the lowland blue tailed monkeys?

**Question 3**

*“The Forest Department of a country in North America is engaged in conservation of the Douglas Fir while a country in Asia is engaged in conservation of a Shorea species.”*

- i. Classify these two plant species according to Kingdom and plant Division.
- ii. Which of these two species is naturally found in a biome that harbours the grizzly bear and caribou?
- iii. Name and describe the biome that contains *Shorea* species, including *the biome's geographic location on earth*, and notable features in terms of forest structure, specific characteristics of trees in this biome, specific features of climate and soil and a broad description of the type of animal life that is found here.
- iv. Which of the two biomes you mentioned could be expected to have a higher biodiversity and endemism?
- v. Name the genus of a common species found in old plantations of the forest Department which belongs to the same plant divisions as the Douglas fir.
- vi. Name a forest in Sri Lanka which is also a World Heritage Site and International Biosphere reserve which falls into the rainforest biome.

**Question 4**

- i. Which of the four systems recognised in the Biodiversity Conservation Action Plan (BCAP) of Sri Lanka of 1999 would contain the Bundala National Park forest considering that it is a Ramsar site?
- ii. State the 2 most relevant recommendations that are of direct relevance for successful management of the Bundala National Park in the 1999 Biodiversity Conservation Action Plan (BCAP) of Sri Lanka ? Explain why you selected these 2 recommendations.
- iii. What is the main law in Sri Lanka that governs conservation of the Bundala National Park and which organisation is directly responsible for implementing it?
- iv. The Bundala National Park is well known as a Ramsar site. It is also designated by UNESCO as an International Protected Area which has a Core zone, a Buffer Zone and a Transition Zone. To which IUCN category does this Protected Area belong (give name and IUCN category) ?
- v. Assign the following Protected Areas to the correct IUCN categories:  
(a) Bundala National Park, (b) Ritigala SNR, (c) Kanneliya- Dediya-gala- Nakiyadeniya Biosphere Reserve.

## Question no 5:

(a) Your friend's two children have observed these animals at the New Zealand Zoo and have brought back a handout. Help them to fill this matrix (Table 1)

Animal	Class	Sub class (only for mammals)	Eutherian mammals) (tick with a cross)	Presence in the Indo- Malayan zoo geographic region (tick with a cross)	Presence in the tundra biome (tick with a cross)	Presence in the grassland biome in the Afrotropic (formerly Ethiopian) zoo geographic region (tick with a cross)
Zebra						
Rhinoceros						
Lemmings						
Orang-utan						
Baboon						
Jungle fowl						
Toque macaque						
Echidna						
Giraffe						
Duck billed platypus						
Royal Bengal Tiger						
Capuchin monkey						
Ostrich						
Indian Gavia						
Grey langur						

(Multiple responses for a single species will not get marks)

(b). Once this table is completed, fill in Table 2 below:

According to the above table:	Number
Total species in Indo-Malayan zoo geographic region	
Total species in Grasslands of Africa	
Total species in tundra biome	
Total mammals	
Total birds	
Total Reptiles	
Total Amphibians	
Total fishes	
Total number of Eutherian mammals	
Total number of species belonging to sub-class Theria	
Total number of species belonging to infra-class Metatheria	
Total number of species belonging to sub-class Prototheria	

(Attached table 1 and 2 with the answer script.)

- c) What are the vertebrate classification “classes” that are represented by animals in Table 1?
- d). Which one of the species in Table 1 is the most closely related to us humans ? In which biome is this animal found naturally ?
- e). Which of the species in Table 1 are indigenous to Sri Lanka but also found elsewhere?
- f). Which of these species are endemic to Sri Lanka ?

**Question 6**

**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, and unsustainable exploitation. Equally threatened is the knowledge base on which the traditional medicinal system is based, as only a small portion of the traditional knowledge is documented: the majority remains recorded in ancient, obscure ola manuscripts scattered around the country or in the memory of elderly practitioners.

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

- i. Answer the following questions after reading this paragraph:
  - (a). Which is the most relevant article of the CBD in relation to gaining fair and equitable benefits from bioprospecting for medicinal products by a developed country party in the treaty of a developing country party?

(b). What are the 2 conditions imposed in the CBD on the developed country to assist the country of origin to benefit from such bioprospecting?

(c) Which Article (or sub-article) of the CBD relates most to use of traditional knowledge associated with the use of medicinal plants?

ii. Read this 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.”

- (a) What type of biodiversity value is assigned to forests by Makarieva et al ?
- (b) Which of the following ecosystem services are most applicable for the service provided by forests described in the above paragraph?
- (i) Provisioning, (ii) supporting, (iii) Regulatory and (iv) cultural services  
(underline the most correct response as gathered from the paragraph above)