

UNIVERSITY OF COLOMBO – SRI LANKA
FACULTY OF ARTS
SPECIAL DEGREE EXAMINATION IN ARTS (GEOGRAPHY) – PART III
FIRST SEMESTER END EXAMINATION – 2022
GYG 4182 – Applied Biogeography
Two (2) hours

This question paper consists of two (02) parts, five (05) questions and four (04) pages.
Answer **three (03)** questions selecting at least **one** from each part.
The use of calculators is allowed.

Part I

- 01.(i). Briefly explain the functional approach of biogeographical studies. (04 Marks)
- (ii). Citing suitable examples, briefly explain the use of functional approach in ecological biogeography studies. (06 Marks)
- (iii). "Biogeography has an important role to play in the research on ecosystem functions"
Elaborate on this statement. (10 Marks)
- 02.(i). Briefly describe the major threats to biodiversity. (04 Marks)
- (ii). Briefly explain how theory of Island biogeography can be applied to manage threats to biodiversity. (06 Marks)
- (iii). Discuss the major impacts of climate change on biodiversity hotspots in the world. (10 Marks)
- 03.(i). Briefly describe the Payments for Ecosystem Services (PES) scheme. (04 Marks)
- (ii). Explain the advantages and disadvantages of PES in biodiversity conservation. (06 Marks)
- (iii). Citing suitable examples, discuss the importance of PES scheme in relation to the success of *in situ* conservation while improving the local livelihoods. (10 Marks)

Part II

04 (i). Table 1 provides the data on tree species identified in the South Eastern quarter of the Salgala forest reserve, Sri Lanka. Vegetation sampling was carried out along a transect and the plot size was 10 m x 10 m. Five plots were sampled. Only tree species were enumerated.

Using the data provided in Table 1, find out the diversity and abundance of tree species in each sample (plot) using appropriate methods and interpret your results.

Table 1: Tree species and their individuals in Salgala forest reserve, Sri Lanka (Endemic species are denoted by Asterix *)

Species		Sample				
Local name	Scientific name	S1	S2	S3	S4	S5
1.Dun*	<i>Doona congestiflora</i>	2	1	2	4	2
2.Nataw	<i>Xylopiya parvifolia</i>	1	2	2	3	3
3.Na*	<i>Mesua ferrea</i>	1	1	1	1	2
4.Welipiyanna	<i>Anisophyllea cinnamoides</i>	0	0	1	1	1
5.Wal jambu	<i>Syzygium spissum</i>	3	2	1	1	1
6.Kekuna*	<i>Canarium zeylanicum</i>	3	2	3	1	1
7.Badulla*	<i>Semecarpus nigroviridis</i>	1	2	3	2	4
8.Pelan*	<i>Putranjiva zeylenica</i>	0	1	1	2	2
9.Galkaranda	<i>Hamboldita laurifolia</i>	16	14	6	8	6
10.Hora*	<i>Dipterocarpus zeylanicus</i>	0	1	1	2	3
11.Dawata	<i>Carallia brachiata</i>	1	2	1	1	2
12.Etamba	<i>Mangifera zeylanica</i>	4	2	1	2	0
13.Domba	<i>Calophyllum inophyllum</i>	1	2	2	3	4
14.Makulu	<i>Hydnocarpus venerate</i>	0	0	0	2	1
15.Kitul	<i>Caryota urens</i>	0	0	0	0	0
16.Hal*	<i>Vateria capallifera</i>	0	1	1	3	2
Land elevation of the sample (m)		220	235	272	286	332
Soil Depth (m)		1.1	1.2	1.39	1.4	1.47

(08 Marks)

(ii). Table 2 provides the results of the rotated component metrics related to a Principle Component Analysis (PCA) performed for the entire Salgala forest reserve. Total of 19 samples considered for the analysis considering 8 variables. The data depicted in Table 3 used for the PCA analysis.

- a) Interpret the results of Principle Component Analysis (PCA) using the data provided in Table 2, Table 3 and the results derived from 4 (i).

(05 Marks)

- b) Discuss the importance of statistical analysis methods in analyzing vegetation data to assess the spatial variations of species diversity.

(07 Marks)

Table 2: Rotated component matrix of vegetation survey of Salgala forest reserve

Variables	Component 1	Component 2
1. Shannon Diversity	0.965	0.018
2. Species abundance	0.919	0.233
3. Number of endemic species	0.940	0.022
4. Soil pH	0.874	0.081
5. Rock cover	-0.865	-0.046
6. Land elevation	0.682	0.613
7. Soil depth	0.4738	0.673
8. Slope of the land	-0.172	0.958

Extraction method: Principal Component Analysis. Rotation method: Varimax with Kaiser Normalization.

Kaiser-Meyer-Olkin measure of sampling: adequacy=0.619

Bartlett's Test of Sphericity: approx. chi-square=169.266, df=28, Sig.=0.000.

Table 3: Vegetation survey data in Salgala forest reserve

Sample	Shannon Diversity	Species abundance	Endemic Species	Land elevation (m)	Slope of the land (Degree)	Soil depth (m)	Rock cover (%)	Soil pH
1			4	220	24	1.1	11	5.1
2			7	235	23	1.2	9	5.4
3			7	272	37	1.39	5	5.6
4			7	286	35	1.4	7	5.6
5			7	332	39	1.47	3	5.4
6	2.46086	0.908719	6	327	34	1.43	1	5.4
7	2.21706	0.924587	5	293	36	1.37	4	5.3
8	2.14680	0.895285	5	279	41	1.34	2	5.3
9	1.02092	0.632641	4	271	46	1.24	15	5.3
10	1.02112	0.680058	3	267	53	1.26	12	5.2
11	1.05899	0.670013	3	261	56	1.23	16	5.2
12	1.14811	0.691437	4	257	54	1.27	21	5.1
13	1.17049	0.527189	4	268	42	1.29	18	5.1
14	2.00153	0.714893	5	281	47	1.32	19	5.3
15	1.99743	0.725213	4	264	41	1.31	9	5.2
16	1.61471	0.671284	4	237	34	1.3	8	5.2
17	1.02175	0.521342	3	224	31	1.2	12	5.1
18	0.94731	0.412384	3	193	23	1.1	19	5.1
19	0.86173	0.489712	3	180	24	0.8	23	5.1

05.(i). Presuming that you are assigned to carry out an assessment of anthropogenic impact on an ecosystem, selecting a wetland or forest area known to you.

a) Propose a title for the study, state possible research questions and set objectives of the study.

(03 Marks)

b) Propose a data collection method considering DPSIR framework as indicated below:

- Driving forces
- The resulting environmental pressures
- The state of the environment
- The impacts resulting from changes in the environmental quality
- The social response to these changes in the environment

(07 Marks)

(ii).Discuss the strengths and weaknesses of DPSIR framework when recommending the data analysis methods in achieving the given objectives of the 5.(i.a) and propose possible solutions to overcome the shortcomings.

(10 Marks)
