

POSTGRADUATE INSTITUTE OF SCIENCE UNIVERSITY OF PERADENIYA



M.Sc. in Biodiversity, Ecotourism & Environment Management

1. INTRODUCTION

The growth of international tourism in recent years has been dramatic. The World Tourist Organisation estimates that, during the next decade, the flow of tourists in the Asia-Pacific region would grow at an annual rate of some seven percent—double the global average.

Tourism is one of Sri Lanka's fastest growing industries with over 800 thousand foreign tourists visiting the country each year, although the tourist industry is presently facing a temporary set back and down by about 20% because of the activities of terrorists. It is a major source of foreign exchange, gross domestic product, income and employment. Most tourism trips are undertaken by international tourists for a range of reasons that include cultural, nature-related, historical and commercial purposes, on which Sri Lanka can offer much. Within this industry, ecotourism sector has emerged as a strong segment over this decade in Sri Lanka. The prospects for expansion of this trade, based particularly on international visitors, are significant.

Sri Lanka's tourism industry is a major user of biological resources. In addition to nature-based ecotourism, many aspects of tourism, through both marketing and actual experience, are dependent on Sri Lanka's natural environment. The strength of Sri Lanka's biodiversity will be a major factor in determining the expansion of the tourism industry. In turn, the tourism industry can be a major force in the conservation of biodiversity of Sri Lanka.

Sri Lanka, although a small island of about 66,000 km², is endowed with a profuse diversity of both flora and fauna. Together with the Western Ghats of India, it forms one of the twenty-five biodiversity hotspots of the world. The country has many Protected Areas, which provide the most important base for ecotourism. Among other natural resources of the country are many waterfalls, mountains, rivers, lagoons, coral reefs and the surrounding sea. There is also a rich cultural heritage in Sri Lanka which dates back to over 2,500 years. Several locations contain a great wealth of well preserved relics of the ancient civilization. These too are of utmost importance to the Sri Lankan ecotourism. Among other features that interest ecotourists are the local arts and crafts, local produce, traditional professions and traditional medicine.

Poor countries such as Sri Lanka that are rich in biodiversity benefit from the income the ecotourists bring in. Rural people benefit from ecotourism without having to overexploit the forests or wetlands, as benefits to local people is integral in ecotourism. However, ecotourism could lead to overuse of natural resources. Many ecotourist projects are not properly appraised. The guidelines that do exist mostly deal with the obvious issues such as changes in land use patterns, removal of forest trees, and frightening wildlife. What is not considered are the less obvious impacts such as transmission of disease to wildlife. Subtle changes to wildlife health through disturbance of their daily routines or increased stress levels, while not apparent to a casual observer, may cause lowered survival and breeding. The welfare of animals should be of paramount importance because without them there will hardly be any ecotourism. Ecotourism should be developed cautiously with careful attention to environmental damage.

Today, there is an alarming awareness regarding the urgent need for environmental protection in general and biodiversity protection in particular, biodiversity protection being a part and parcel of the broader environmental protection. Numerous opportunities and benefits can be derived by strategically integrating biodiversity and environmental conservation requirements with future tourism needs.

This M.Sc. programme deals with biodiversity and other natural resources, cultural heritage, local produce and traditional professions of Sri Lanka that interest an ecotourist. It would also show the importance of environment conservation and management in protecting biodiversity, natural resources and cultural heritage, which would in turn greatly benefit the ecotourism industry. Furthermore, it would discuss the negative impacts of ecotourism and how these could be mitigated. Identifying localities important for ecotourists and visiting those are an integral part of the programme. The programme will greatly benefit the young graduates who seek to engage in ecotourism as a profession, also those that are already in the tourist industry at managerial level, and particularly the graduate naturalists and guides who work freelance or in various tourist facilities. The programme will also be of immense importance to those that are interested in the conservation of biodiversity and other natural resources of Sri Lanka.

2. PROGRAMME ELIGIBILITY

Applicants for admission to the programme must have successfully completed a B.Sc. degree in Science or any other equivalent qualification acceptable to the Postgraduate Institute of Science, University of Peradeniya.

The medium of instruction and examinations of the programme will be English. Therefore, candidates should possess an adequate knowledge of English language.

3. PROGRAMME FEE

(N.B. The Programme fees given below may be revised.)

Local candidates	Rs 140,000/-
Foreign candidates	Rs 280,000/-

Programme fee shall be paid in two instalments (*50% at the registration and the balance 50% within six months from registration*). Other payments including registration fee, medical fee, library subscription, examination fee and deposits (science and library) should be paid according to the procedure stipulated by the PGIS.

4. PROGRAMME STRUCTURE AND DURATION

This programme consists of course work and a research project. Course work, which includes many field visits, will be conducted over two semesters during weekends and some weekdays. The duration of the programme is about 18 months including the 6-month research project. In order to proceed with the research project, a student shall obtain a pass grade in each course and attain a final GPA of not less than 3.0 for 24 credits of course work. If a student obtains passes in all the courses and a GPA in the range of 2.75 to 2.99, then he or she shall be eligible for the 'Postgraduate Diploma in Biodiversity, Ecotourism and Environment Management' but not for the M.Sc. degree.* Such students may not proceed to the research project. After successfully completing the research project within the given time period, a student shall be eligible for the award of the M.Sc. Degree.

Programme Summary

Course Code	Course	Lecture hrs.	Practical/ Field Work hrs.	No. of credits
Semester I				
ENM 511	Environmental Biology	21	18	2
ENM 512	Population Ecology and Human Impact on Resources	24	12	2
ENM 513	Biodiversity and Its Conservation	24	12	2
ENM 514	Tourism and Ecotourism in Sri Lanka	24	12	2
ENM 515	Ecotouristic Potential of Sri Lanka	24	12	2
ENM 516	Promotion of Ecotourism	24	12	2
Semester II				
ENM 521	Management, Conservation and Sustainable Development	24	12	2
ENM 522	Legal Protection of Environment and Biodiversity	15	–	1
ENM 523	Pollution of Environment and Pollution Management	24	12	2
ENM 524	Habitat Management	24	12	2
ENM 525	Wildlife Management	24	12	2
ENM 526	Aesthetic Landscape Management in Tourist Facilities	10	10	1
ENM 527	Sri Lanka's Ecotourism Resource Base	15	30	2
ENM 599	Research Project	6 Months		6

5. PROGRAMME CONTENTS

ENM 511: Environmental Biology (2 credits)

Biosphere and major groups of plants and animals; Binomial nomenclature; Biogeographic regions and major biomes; Populations, communities and ecosystems; Energy flow and nutrient cycling (biogeochemical cycles); Adaptation of species to their habitats and available resources; Limiting factors, ranges of tolerance and distribution of biota; Resilience of environment and biota; Natural and man-made ecosystems; Mature and immature ecosystems; Major natural ecosystems of the world (aquatic and terrestrial); Major ecosystems of Sri Lanka.

ENM 512: Population Ecology and Human Impact on Resources (2 credits)

Principles of Population Ecology; Population growth and carrying capacity; Population dispersal; Age structure and sex ratio; Population regulation and Life history strategies; Cyclic populations; Survivorship curves and life-tables; Interaction among organisms: Competition, Predation and co-evolution, Mutualism; Human population dynamics and Demographic Transition; People's impact on natural resources; Landuse patterns; Urbanization.

ENM 513: Biodiversity and Its Conservation (2 credits)

Global biodiversity, its present degradation and decline; Biodiversity in the past; Biodiversity hotspots; Indigenous and exotic species; Endemic, Endangered and Threatened species; IUCN Red List of threatened species; Keystone and Umbrella species; Adverse impacts on biodiversity of habitat loss, overuse of resources, invasive species, pollution, and global climatic change; Viability of populations and species extinction; Island biogeography, Habitat fragmentation and loss of biodiversity; Sri Lankan biodiversity.

ENM 514: Tourism and Ecotourism in Sri Lanka (2 credits)

World tourism, Trends in global tourism; Status of tourism in Sri Lanka and role of tourism in the economy; Sustainable tourism; Potential benefits and adverse impacts of tourism; Recent performance by tourist industry; Negative impacts of tourism: Encouragement for poaching of wildlife, Illegal export of

wildlife and wildlife products, Stress on wildlife, Drug trafficking, Change of social and monetary values, Introduction of diseases; Effect of local diseases on foreign tourists; Principles and concepts of ecotourism; Notable characteristics of mass tourism and ecotourism; Ecotourism's benefits to local communities and its role in poverty alleviation.

ENM 515: Ecotouristic Potential of Sri Lanka (2 credits)

Ecotouristic potential: Focal attractions; Complimentary attractions; Support attractions; Natural systems such as waterfalls, mountains, escarpments, coastal features and their landscaping and underlying geology; Protected Areas, Forest Reserves; Coral reefs; Botanic gardens; Zoological gardens; Elephant orphanages; Culture: Cultural background, Built culture and living culture (tangible and intangible), Cultural Triangle and World Heritage Sites, Cultural Resources Management and Environment Conservation; Constraints for developing Sri Lanka as an Ecotourism Destination; Average Ecotourist Profile and Typology of an Ecotourist.

ENM 516: Promotion of Ecotourism (2 credits)

Ecotourism services: Sources of information, Infrastructure, Travel operators, Transport Facilities, Hotel and other facilities; Guides and naturalists; Guide books, maps and brochures; Recreation management; Potential for joint ecotourism with nearby countries; Financing tourism, Investment incentives and Foreign investment; Education and Training; Marketing and Promotion of Ecotourism products; Youth Development; Constraints to Tourism: Bureaucratic red tape, Language, Safety and Security problems; Health problems, Nuisance makers to tourists.

ENS 521: Environment Management and Sustainable Development (2 credits)

Basic principles of management; Management of terrestrial and aquatic resources; Sustainable development; Renewable and Non-renewable Resources; Environment management and ISO 14000 series of quality standards; Participation of people of peripheral communities and other stakeholders in management planning; Conflicts among stakeholders in management; Importance of traditional practices in management; Using management plans for decision making; Sustainable development and conservation of resources; Land use policies and legislation; State, Provincial Councils and Local Authorities, NGOs, private sector and others in management of natural resources; Management for multiple uses; Education and Research in conservation management; Resource development and Environmental Impact Assessment (EIA) in Sri Lanka.

ENM 522: Legal Protection of Environment and Biodiversity (1 credit)

Environmental policy, Constitutional provisions for environmental protection and management; Environmental protection by the Provincial Councils; Principles and concepts of environmental law; Practice and enforcement of environmental law in Sri Lanka; Introduction to the Acts and Statutes related to environment conservation and management. Legal instruments in environmental protection with special reference to Environmental Protection Licensing (EPL) Scheme, Load based license fee concept etc. Public participation in environmental policy-making; International conventions and protocols related to environment; Environmental ethics; Environmental education; Environmental watchdogs.

ENM 523: Pollution of Environment and Pollution Management (2 credits)

Air pollution: Sources and Effects of air pollution; Classes of air pollutants; Urban air pollution; Air pollution in developed and developing countries; Air quality standards; Acid rain; Photochemical smog; Global warming; Ozone layer depletion; Effects of atmospheric pollution on plants, animals, materials and human health; Water pollution: Aquatic environment and water resources; Types and sources of water pollutants; Agricultural run-off and Eutrophication; Algal toxins; Heavy metals, Pesticides; Thermal pollution; Effects of water pollution on biota; Indicator organisms; Soil and land pollution: Accumulation of solid waste; Ground water pollution; Solid waste cycles; Toxic effects and Methods of solid waste disposal: Economic, aesthetic and environmental problems pertaining to solid waste; Management of other types of waste such as biomedical, chemical and hazardous waste.

ENM 524: Habitat Management (2 credits)

Forest types and grasslands in Sri Lanka; Spatial distribution; Vegetation dynamics; Successional and cyclical changes; Deforestation and reforestation with special reference to Sri Lanka; Forest dieback; Forest conservation and management; Roles of the Forest Department and Department of Wildlife Conservation in forest management; Forest protection and law enforcement; Important timber species and

extraction of timber and other forest produce for sustained yield; Use of maps, aerial photographs, satellite imageries; GIS, its capacity and application; Management of Wetlands; Coastal habitat Management: Coral and sandstone reefs, estuaries and lagoons, mangroves, sea-grass beds, salt marshes and sand dunes, and their management; Coastal zone developmental activities, Effects of storms and tsunamis on the coastal zone.

ENM 525: Wildlife Management (2 credits)

Wildlife management strategies and techniques; Categories of Protected Areas; Design, establishment and management of reserves and Protected Areas; Forest corridors; Genetically Effective Population Size (EPS); Viability of populations and Extinction of species; Concept of Minimum Viable Population (MVP); Rescue and recovery of near extinctions. Management of threatened and endangered species; *In-situ* and *ex-situ* conservation; Animal rights of captive wildlife; Mitigation of conflicts with wildlife; Economics, Politics and Ethics pertaining to conservation; Use of Protected Areas and Buffer Zones for human needs; Legislation on trading (import and export) wildlife (including ornamental species) and wildlife products; International conventions related to wildlife conservation (e.g. CITES, RAMSAR) and their relevance to Sri Lanka; Impact of biotechnology on the conservation of biota.

ENM 526: Aesthetic Landscape Management in Tourist Facilities (1 credit)

Landscape design in tourist facilities such as hotels and kabanas; Landscaping and maintenance; Assessment of needs of ecotourists; Use and enhancement of available landscape features to give maximum facilities to the ecotourists; Using plants for their aesthetic appeal; Quarantine measures; Horticulture and garden layout plans; Greenhouse management; Nursery production and management; Gardens of herbs, spices and medicinal plants; Aquaria and Terraria; Demonstrating local arts and crafts production, local professions and local medicinal practice and exhibiting natural products within tourist facilities; Providing nature-based outside activities that interest ecotourists; Duties of a freelance/tourist facility-employed naturalist and ecotourist guide.

ENM 527: Sri Lanka's Ecotourism Resource Base (Field-oriented) (2 credits)

Natural phenomena: mountains (climbing); waterfalls, caves, sea (diving and surfing), rivers (boating, canoeing & kayaking and white water rafting) and lagoons (boating); Specific Tropical Rain Forests and Dry Forests and Forest plantations; Tea plantations; Ornamental plants, Medicinal plants, and Spice plants; Specific sites to observe fauna such as Reef fauna, Butterflies, Major fish species of both freshwater and marine, Ornamental fish species, Amphibian diversity, Salient and threatened lizards and snakes, Song birds, raptors and aquatic birds, Resident and migratory birds, Large mammals and small mammals; Specific heritage sites in the Cultural Triangle; Ancient irrigation systems; Remnants of colonial influence; Traditional medicine and arts and crafts; Sites of Traditional professions, Cottage industries, Local crafts and Local produce.

ENM 599: Research Project (6 credits)

The candidates shall carry out a research project of 3-6 months duration on an environmental management, biodiversity or tourism issue, approved by the Board of Study in Environmental Science (BSES) and the PGIS, and under the supervision of a competent person(s) approved by the BSES and the PGIS. A candidate may propose a research topic on his/her own to be considered by the BSES. The project may be carried out at any department of the University of Peradeniya or at any other institution where facilities are available, subject to the approval of the BSES and the PGIS. However, in the latter case, in addition to an external supervisor at the work place, the work has to be supervised by an internal supervisor of University of Peradeniya, both supervisors approved by the BSES and the PGIS. At the end of the research project each candidate shall present his/her results in the form of a written project report in the format approved by the PGIS. The project report shall be evaluated by a competent examiner. Project shall also be presented in the form of a seminar to a panel approved by the BSES and the PGIS.

6. COURSE EVALUATION

Course evaluation will be as stipulated in the current PGIS Hand Book.

7. TEACHING PANEL

- Prof. K.G.A. Dahanayake, Dept. of Geology, Univ. of Peradeniya.
B.Sc. (Cey.), Ph.D. (Nancy)
- Prof. Mangala de Silva, Dept. of Zoology, Univ. of Peradeniya.
B.Sc. (Cey.), Ph.D. (Edin.)
- Prof. Padma K. de Silva, Dept. of Zoology, Univ. of Peradeniya.
B.Sc. (Cey.), Ph.D. (Lanc.)
- Prof. M.A.K.L. Dissanayake, Dept. of Physics, Univ. of Peradeniya.
B.Sc. (Cey.), M.Sc., Ph.D. (Indiana)
- Dr Udeni Edirisinghe, Dept. of Animal Science, Univ. of Peradeniya.
B.Sc.(Cey.), M.Sc. (Perad.), Ph.D. (Perad.), LL.B. (Open Univ. Sri Lanka)
- Dr G.W.A.R. Fernando, Dept. of Physics, The Open Univ. of Sri Lanka, Nawala, Nugegoda.
B.Sc. (Perad.), M.Phil. (Perad.), Ph.D. (Mainz)
- Prof. I.A.U.N. Gunatilake, Dept. of Botany, University of Peradeniya.
B.Sc. (Cey.), Ph.D. (Cantab.)
- Prof. H.M.D.R. Herath, dept. of Sociology, University of Peradeniya.
B.A. (Perad.), M.A. (Delhi), Ph.D. (Perad.)
- Prof. O.A. Ileperuma, Dept. of Chemistry, Univ. of Peradeniya.
B.Sc. (Cey.), Ph.D. (Arizona)
- Prof. S.A.M. Kularathne, Dept. of Medicine, University of Peradeniya
M.B.B.S. (Perad.), M.D. (Col.), M.R.C.P. (UK), F.R.C.P. (Lond.)
- Prof. S.A. Kulasooriya, Emeritus Professor of Botany, C/o Dept. of Botany, University of Peradeniya.
B.Sc. (Cey.), Ph.D. (Lond.)
- Dr. M.M.A.N. Navaratne, Dept. of Chemistry, Univ. of Peradeniya.
B.Sc. (Perad.), Ph.D. (Hawaii)
- Dr Anoma Perera, Dept. of Botany, Univ. of Peradeniya
B.Sc. (Perad.), D. Phil. (Oxon.)
- Mr Rohan Pethiyagoda, Wildlife Heritage Trust, 95 Cotta Road, Colombo 8.
B.Sc. (Lond.), M.Phil. (Sussex)
- Prof. H.M.D.N. Priyantha, , Dept. of Chemistry, Univ. of Peradeniya.
B.Sc. (Perad.), Ph.D. (Hawaii)
- Dr K.U. Tennakoon, Dept. of Botany, University of Peradeniya.
B.Sc. (Perad.), Ph.D. (West Australia)
- Dr D.R.I.B. Werellagama, Dept. of Civil Engineering, Univ. of Peradeniya
B.Sc. (Perad.), M.Sc. (AIT), Ph.D. (Japan)
- Dr Siril Wijesundara, Royal Botanical Gardens, Peradeniya
B.Sc. (Perad.), M.Phil., Ph.D. (New York)
- Dr Sudharma Yatigammana, Dept. of Zoology, Univ. of Peradeniya
B.Sc. (Perad.), M.Sc. (Perad.), Ph.D. (Queens)

OUTSIDE EXPERTS

- Mr Chandra de Silva, Ranweli Holiday Village, Waikkal
B.Sc. (Open Univ. Sri Lanka), Founder President, Ecotourism Society of Sri Lanka
- Mr B.S.C. Gamage, 283, Nidahas Mawatha, Thalagama North.
B.Sc. (Col.), M.Sc. (Perad.), Attorney-at-law
- Mr W.A.D.D. Wijesooriya, EIA Division, Central Environmental Authority, Battaramulla
B.Sc. (Kel.), M.Sc., ITC (The Netherlands)

PROGRAMME COORDINATORS

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