POSTGRADUATE INSTITUTE OF SCIENCE
UNIVERSITY OF PERADENIYA

Master of GIS and Remote Sensing Degree Programme (SLQF Level 9)

Master of Science (M.Sc.) in GIS and Remote Sensing Degree Programme (SLQF Level 10)

1. INTRODUCTION

The Masters programme in GIS and Remote Sensing offered by the Postgraduate Institute of Science of the University of Peradeniya, seeks to provide a sound theoretical and practical knowledge and comprehensive training in the Geographic Information systems (GIS) and Remote Sensing (RS). The goal of this Masters programme is to provide opportunity for the participants, a critical understanding and competence in developing systems and tools for the acquisition, processing, transformation, analysis, storage, presentation and use of geo-spatial information. In addition, skills are developed to enable the participants to design and undertake research and development projects in various fields and also to actively engage in multidisciplinary research and development projects.

GIS and RS are rapidly evolving towards becoming standard tools, influencing everyday decision-making particularly among professionals. Even though this has been described as "Geoinformatics" by some of the professionals, the Postgraduate Institute of Science decided to name it as "GIS and Remote Sensing" due to its popularity. As a multi-disciplinary programme, it includes courses in Geographical Information System, Remote sensing, numerical methods and algorithms in RS and GIS, Digital photogrammetry, GPS and its applications, digital image processing etc. In addition, there are courses in application of GIS in various disciplines such as Earth Sciences, Land use planning, Disaster Management, Natural resources Management, Agriculture, Forestry, Wild life, Transportation and supply net work, Transmission and Telecommunication network etc. are included. The programme is designed for the students to use computers throughout the programme, enabling them to use the latest software available in the fields of GIS and Remote Sensing.

The Board of Study in Earth Sciences has regularly updated the M.Sc. programme in GIS and Remote Sensing, introducing new courses to suit national needs. This proposal introduces a five-credit independent study module to improve writing/oral communication skills as applied to GIS and Remote Sensing.

The proposed programme includes an optional research component and at the end of the course work, the students will have the option whether to obtain one year Masters degree or continue with another one-year research project (equivalent to 30 credits) selecting a suitable research topic in any of the fields mentioned above and submit a thesis. In this connection, the students are free to select an institution of their choice to conduct the research study. The Postgraduate Institute of Science would also help the students to find suitable institutions and topics for their research.

This Masters programme will thus prepare the candidate to take the challenge of meeting not only national needs in diverse areas as stated above, but also to continue toward a higher degree anywhere in the world.

2. AIMS AND OBJECTIVES

This programme aims at developing human resources in the fields of GIS and Remote Sensing. The objectives of the programme are;

1. To train personnel in the fields of remote Sensing and Geographic Information Systems and the related aspects at postgraduate level.

2. To Provide an opportunity to improve existing skills in GIS and Remote Sensing.

3. To provide a necessary background knowledge for research in Remote Sensing and GIS applications.

4. To provide necessary skills for use of GIS and Remote Sensing in management of natural resources.

3. PROGRAMME ELIGIBILITY

This programme is designed to suit professionals and young graduates who do not have any previous experience in the use of GIS or Remote Sensing. Candidates should have a strong background in at least one of the following subject areas: Computer science, Physical and Biological Sciences, Earth and Natural Sciences, Geography, Agriculture, Surveying, Engineering, Medicine or any other discipline that will be endorsed by the Board of Study in Earth Sciences of the PGIS.

The candidates who are employed and eligible for admission need to produce evidence of leave granted to follow the programme and a letter of release from the relevant Head of the Department/Institution.

4. PROGRAMME FEE

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

Category	Programme Fee	
	Master of GIS and Remote Sensing degree programme	M.Sc. in GIS and Remote Sensing degree programme
Local candidates	Rs 150,000/-	Rs 180,000/-
Foreign Candidates	Rs 300,000/-	Rs 360,000/-

Students registered for the Master of GIS and Remote Sensing degree programme shall pay the Programme fee in full or in two (1/2 at the registration and the balance at the end of the first semester) or three (1/3rd at the registration, another 1/3rd after 4 months from the date of registration and the balance after 8 months from the date of registration) installments. An additional payment of Rs. 30,000/- (or Rs. 60,000/- from foreign students) should be made at the end of the first year to continue for the M.Sc. in GIS and Remote Sensing degree programme. 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.

5. THE PROGRAMME STRUCTURE AND DURATION

This programme consists of three options for completion.

5.1 Masters Degree by Course Work (SLQF Level 9)

The Master of GIS and Remote Sensing degree can be obtained by completing course work only (without conducting any research project).

Course work, comprising of theory courses, and laboratory and/or fieldwork, shall be conducted over a period of two semesters of 15 weeks each. The total duration of the degree, including examinations, shall be about 12 months. Satisfactory completion of a minimum of 30 credits of course work with a GPA of not less than 3.00 is required for the successful completion of the degree - SLQF Level 9 (Students who do not satisfy the above criteria but obtain a GPA in the range 2.75 to 2.99 for course work of 25 credits are eligible for the Postgraduate Diploma in GIS & RS - SLQF Level 8, and those who obtain a GPA in the range 2.75 to 2.99 for course work of 20 credits are eligible for Postgraduate Certificate - SLQF Level 7).

5.2 Masters Degree (SLQF Level 10)

In addition to Masters Degree with course work (5.1), the Masters Degree (Research) requires a research project. The duration of the entire programme shall be 24 months inclusive of 5.1. Completion of all the requirements of 5.1 with a GPA of not less than 3.00 is a prerequisite for the Masters Degree (Research). The research project for this degree should be conducted on full-time basis, and completed during the second year. The research component is allocated 30 credits, totalling 60 credits for the entire programme. After successful completion of the research project, the student shall be eligible for the award of the M.Sc. in GIS and Remote Sensing degree - SLQF Level 10 (Students who do not complete the research project within the stipulated time period shall be awarded the Master of GIS and Remote Sensing degree - SLQF Level 9).

5.3 Extension of the programme for M.Phil. (SLQF Level 11) or Ph.D. (SLQF Level 12)

After conducting research for a period of six months in the M.Sc. degree (research) programme, students who have demonstrated exceptional progress may apply for upgrading the degree status to M.Phil. The student should continue the research project and any additional research work/assignments recommended by the PGIS for a total of two years (60 credits of research) to qualify for the award of the M.Phil. degree (SLQF Level 11).

During the second year of research, students who have demonstrated exceptional and continuous progress may apply for upgrading the degree status from M.Phil. to Ph.D. The student should continue the research project and any additional research work/assignments recommended by the PGIS for another year on full-time basis (additional 30 credits) to qualify for the award of the Ph.D. degree (SLQF Level 12).

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Programme Summary

Course Code	Course Description	Lecture hrs.	Practical hrs.	No. of Credits
ESR 501	Fundamentals of Geographic Information Systems (GIS)	25	60	3
ESR 502	Remote Sensing and Aerial Photography	25	60	3
ESR 503	Database Management Systems	20	30	2
ESR 504	GPS and its Applications	15	45	2
ESR 505	Fundamentals of Space Technology*	30		2
ESR 506	Advanced Technologies in GIS	25	60	3
ESR 507	Advanced Mapping Technology*	15	45	2
ESR 508	Digital Photogrammetry*	15	45	2
ESR 509	Spatial analysis and Modeling	15	45	2
ESR 510	Applications and Development of GIS and Remote Sensing	25	60	3
ESR 511	Digital Image Processing in Remote Sensing*	10	60	2
ESR 512	Geostatistics in GIS*	25	60	3
ESR 513	Application and Development of Web GIS*	10	60	2
ESR 514	Numerical Methods and Algorithms in RS and GIS*	20	30	2
ESR 599	Independent Study	500 notional hrs.		5
ESR 699	Research Project on RS and/or GIS Applications**	3000 notional hrs. (one year duration)		30

** Optional Courses. Students are required to obtain 7 credits from optional courses.*
*** Compulsory for M.Sc. in GIS and Remote Sensing (SLQF Level 10).*

6. PROGRAMME CONTENTS FOR ESR 599 AND ESR 699

Course code	ESR 599
Course title	Independent Study
Credits	05
Compulsory/optional	Compulsory
Prerequisites	None
Time allocation	500 notional hrs.
Aims	Aims: The overall aim is to familiarize the student with concepts and methods involved in scientific research **Specific aims:** 1. To explain the scientific process in the conduct of research. 2. To develop skills to write a review paper and a scientific research proposal. 3. To develop skills to make a presentation. 4. To master the application of statistical methods on quantitative scientific data.
Intended learning outcomes	At the end of the successful completion of the course, students will be able to, 1. Describe the scientific method. 2. Conduct an independent review of literature on a selected topic in the area of GIS, Remote Sensing and/or GPS. 3. Write a formal scientific report conforming to the guidelines provided. 4. Transfer the knowledge gained through (2) and (3) above in the form of a presentation. 5. Complete a research proposal conforming to the guidelines provided. 6. Perform statistical analysis of quantitative data.
Content	*Review paper*: Review of literature; Development of the review paper in concise and professional manner and logical presentation of results that have been reported, writing the abstract, compilation of the list of references. *Proposal writing*: Interpretation and critical evaluation of results of published research; Formulation of a research problem: Concise literature review, justification, time frame, identification of resources, budgeting, etc. *Project*: Collection and statistical analysis of data on a topic associated with the review paper. *Seminar*: Presentation of literature and data collected on a given topic; Preparation of an abstract, preparation of slides.

Assessment criteria

Continuous assessment	End-semester examination
30%	Review paper 25% Proposal writing 10% Project 25% Seminar 10%

Recommended Texts:

1. Backwell, J., Martin, J. (2011) A Scientific Approach to Scientific Writing, Springer.
2. Postgraduate Institute of Science (2016) Guidelines for Writing M.Sc. Project Report/M.Phil. Thesis/Ph.D. Thesis

Course code	ESR 699
Course title	Research Project
Credits	30
Compulsory/optional	Compulsory
Prerequisites	None
Time allocation	3000 notional hrs. (one year duration)
Aims	Aims: The overall aim is to prepare the student to conduct a research independently. **Specific aims:** 1. To train students to apply scientific method in scientific research. 2. To train students to generate researchable hypotheses. 3. To train students to plan, design and conduct scientific research. 4. To gather reliable scientific data, analyse, and interpret. 5. To develop skills in scientific writing.
Intended learning outcomes	At the end of the successful completion of the course, students will be able to, 1. Apply the scientific method. 2. Design a research project. 3. Complete a research project. 4. Describe ethical issues in scientific research. 5. Explain the patenting process in research. 6. Make presentations at national/international conferences. 7. Produce a thesis conforming to the requirements of the PGIS. 8. Write manuscripts for publication in refereed journals.
Content	The students will conduct sufficient amount of laboratory/field work on a chosen research topic under the guidance provided by an assigned supervisor/s, make a presentation of research findings at a national/international conference, and produce a thesis.

Assessment criteria

Continuous assessment	End-semester examination
30%	Oral examination (20%) Thesis (40%) Conference presentation (10%)

Recommended Texts:

1. Backwell, J., Martin, J. (2011) A Scientific Approach to Scientific Writing, Springer.
2. Postgraduate Institute of Science (2016) Guidelines for Writing M.Sc. Project Report/M.Phil. Thesis/Ph.D. Thesis

Contents of other courses:

ESR 501: Fundamentals of Geographic Information Systems (GIS) (3 Credits)

Course Outline

Introduction to GIS, Definition, Overview, History and Concepts of GIS, Scope and Application areas, Purpose and Benefits of GIS, Functional elements of GIS, Required hardware and software for GIS, Required functions of GIS software, Installation of GIS, Mapping Concept – Map Elements, Map scales and representations, Map Projection, Geometric rectification, Data Structure – raster and Vector Data Structures, Input of geospatial data, Sources of data and input devices, Spatial database – concept of spatial database, Data Acquisition and Management Techniques, Data Manipulation and Analysis, Map Output Generation.

Laboratory Sessions

Spatial database development, Data input, Linking non-spatial and spatial database, database editing and updating, GPS data integration in GIS, Data manipulation and preprocessing, Spatial analysis, Map generation, Charting and tabular representation. Mini-project for GIS application.

ESR 502: Remote Sensing and Aerial Photography (3 Credits)

Course Outline

Overview and concepts of Remote Sensing technology, basics of photogrametry, practical uses of aerial photographs/satellite photographs in various disciplines, fundamental characteristics of electromagnetic radiation, interaction of radiation with matter refraction , absorption , diffusion , emission with radiometric terms and units**,** concepts of spectral resolution and detection, Remote Sensing platforms, Satellite System and sensors, active and passive sensing systems, visual-digital interpretation, overview of RS Applications, Introduction to RS image processing. Image enhancement. geometric correction. RS Image classification,

Laboratory Sessions

Visual interpretation of aerial photographs for land use, land pattern analysis, geological and structural analysis as well as manipulation and analysis of remote sensing images,
Text Books and References:

ESR 503: Database Management Systems (2 Credits)

Course Outline

Introduction to databases, database management systems, hierachical model, relational database, principles and technologies of object-oriented programming, object oriented database, Concept of spatial database, design of spatial database.

ESR 504: GPS and its Applications (2 Credits)

Course Outline

The earth, Spherical Earth & Mathematical Model, Rotations of the Axis of the Earth, True North, Absolute and Relative coordinate systems for Positioning on the Earth, Ellipsoidal model of the Earth and Mathematical model, Mean Sea Level, Equipotential surfaces & Geoid, Geoid undulations. Positioning, Introduction to GPS, Map Projections and Coordinate Transformations, GPS Basic Concepts, Kinematic and Post Processed Differential GPS, GPS Accuracy and Precision, Database Management and Data Dictionaries, Navigation with GPS, Map production and update, GPS/GIS Applications.

Laboratory Sessions

Hands on sessions with GPS equipments, Real-life case studies, location of a ground point with different coordinate systems, navigation, GPS survey, Electronic data downloading, conversion of GPS data to GIS.

ESR 505: Fundamentals of Space Technology (2 Credits)

Course Outline

Elements and Tools for Aerospace Systems and their applications. Status of the World Space Projects. Management of Space Projects. Principle of Space Flight Mechanism. Application Satellites. On-board Space Subsystems. Operation and Utilization of Aerospace Systems and Low Cost Space Projects. Principle of Flight Mechanics, Flight Dynamics; Ultralight to Rocket, Orbital Mechanics, Navigation, Guidance and Control, Application Satellites Earth Observation Satellites, Meteorological Satellites, Communication, Broadcast, and IT Satellites, Optical and Microwave Sensors and, Other Mission Equipments

ESR 506: Advanced Technologies in GIS (3 Credits)

Course Outline

State of the Art of GIS Technologies, Developments in GIS Technology, Various applications of GIS, Accuracy of Geo-spatial Databases. DEM Generation 3D map display, TIN Algorithms. 3D-GIS Models, Acquisition of 3D Geo-spatial Data, Generation of 3D Geo-spatial Databases, Visualization and Virtual Reality, Examples for 3D GIS Modeling, Analysis of Discrete Entities in Space, Spatial Analysis using Continuous Fields, Map Algebra and Cartographic Modeling, Point Operations, Spatial Analysis Using Convolution, Deriving Surface Topology and Drainage Networks, Spatial Regression Analysis and Modeling Customization and Automation in GIS, Customization to End User Needs, Introduction to Programming in GIS, Automation in GIS Functionality, Introduction to Web GIS.

Laboratory sessions

Database import and export using SQL, Statistical analysis, Regression analysis of spatial data, Advance data analysis, 3D modeling in GIS, Map algebra and cartographic modeling, Hotlinking, Automation and customization, Programming in GIS, Internet GIS.

ESR 507: Advanced Mapping Technology (2 Credits)

Course Outline

Advanced methodology of mapping technology. Concepts of Automated Cartography Automated map recognition. Morphological Filtering Binary Image Feature Extraction, Topological Properties, Map scanning and processing. Geometric correction. Map feature extraction. Raster-vector conversion. Recognition of contour maps. Cadastral Map Recognition Map Line Feature Extraction, polygon Generation, Multi-relations based Checking,, Generation of Triangulated Irregular Network (TIN)

Laboratory Sessions

Introduction of Auto-2D System and Testing MM Operators, Pre-processing for Scanning Maps, Example of Contour Map and Cadastral Map Recognition

ESR 508: Digital Photogrammetry (2 Credits)

Course Outline

Introduction to digital photogrammetry, overview and history, concepts of digital photogrammetry. Fundamentals of Digital Photogrammetry, Analog, Analytical and Digital Photogrammetry, Photo Scanning and Geometric Correction, Image Filtering, image Segmentation, Image Feature Extraction, Acquisition of digital images, direct digital recording, scanning of analog images, basic operations of digital images, statistical characteristics of digital images, Geometric transformation, Image classification, Image feature extraction, Image matching, DEM generation, Orthophoto generation, Topographic and thematic mapping. Applications.

ESR 509: Spatial Analysis and Modeling (2 Credits)

Course Outline

Use of GIS in attribute and spatial queries, single and multilayer operations, geometric modeling, point pattern analysis, reclassification and coverage building, surface analysis, raster grid analysis, various types of overlay operations and spatial operations in GIS, Buffer analysis, fuzzy spatial analysis, Basic geostatistical components for spatial analysis, proximity analysis, connectivity analysis, diffusion modeling, establishment of objectives and criteria for analysis, data preparation for spatial operations, evaluation and interpretation of results.

ESR 510: Application and Development of GIS and Remote Sensing (3 Credits)

Course Outline

Application of GIS in Cartography and map making, geological mapping, Natural resources exploration and management, Environmental planning and management, Disaster management, environmental impact assessment, Geological and Hydrological modeling, coastal zone management, Irrigation system management, Agricultural planning and development, Forestry management, fishery and marine applications, Coastal zone management, Epidemics and Disaster Management and mitigation, Archeology, Planning and management of Transport networks, Telecommunication tower networks, Water supply and distribution networks, Electrical distribution networks, Navigation system development, GIS for business planning and managements etc.

Students are requested to compile a mini project report on the application of GIS in any selected discipline.

ESR 511: Digital Image Processing in Remote Sensing (2 credits)

Course Outline

Image Data Handling in computer system. Image Model in Computer Memory, File format, Image Processing Algorithm and Implementation. Image statistics and contrast enhancement, Spatial enhancement, spectral enhancement, radiometric enhancement, Color Composite, Manipulation and data fusion, Texture Analysis, Segmentation, Image Classification, Image matching, Image Compression - JPEG file handling, RS data and DEM for 3D Visualization and Mapping, Digital Elevation Model, Coordinate System, Shading Model, Z-Buffer Model, Topographic feature extraction, Real-time RS mapping techniques.

Laboratory Sessions

Modifying / making computer programs in C for image analysis. Programming for image file I/O, creating/reading images in popular image formats, statistical analysis, contrast enhancement, filtering.

ESR 512: Geostatistics in GIS (3 credits)

Course Outline

Methods of statistical learning theory, spatial statistics, and modeling, mapping distances, allocation, shortest path, accumulation surfaces, interpolating to Raster, terrain analysis, spatial prediction and risk analysis, spatial sampling and monitoring network design etc., Interfaces between geo-statistics and GIS, integration of geostatistics and GIS, mutual benefits, statistical problems of error propagation and uncertainty in GIS, etc., Application of geostatistical methods in the Earth and Environmental Sciences, in Agriculture and Forestry, Epidemiology and Health Sciences, Econometrics and Telecommunications, Interfaces between (geo-) statistical software systems, spatial database management systems and visualization and mapping software systems.

ESR 513: Application and Development of Web GIS (2 Credits)

Course Outline

Implementing Web-GIS Solutions using Open Source Software (OSS). Meta-data Management and Clearing House concepts, Interoperability and Standardization Issues Related to Spatial Data, Installing and using OSS tools such as GRASS GIS and Minnesota MapServer.

Laboratory Sessions

The Laboratory session will provide hands on experience on using OSS for developing, managing and serving spatial and geo-referenced multimedia contents on the Web.

ESR 514: Numerical Methods and Algorithms in RS and GIS (2 Credits)

Course Outline

Fourier transform and Image Filtering, Overview of Numerical Methods in Digital Image Processing and GIS, GIS and RS systems design and development: fundamentals. Principles in software development: data structures, methods, algorithms. Language description and software development : VC++, VC# .Net, Data structure for GIS and RS: vector description and storage, raster structures. Basic computational geometry,

Basic algorithms in GIS and RS: resolution of some common geometric problems: positions, tessellation, vectorization, interpolation, buffering, line following, classifications (adjacency, proximity), Image processing and algorithms for RS: mathematical morphology, filters, textures, sampling, cartography, vector codification, graphic languages and image codification. 3D representation and perspective.

7. PROGRAMME EVALUATION

Evaluation of Course work

Based on the scheme given below, the overall performance of a student in a given course shall be evaluated by the respective instructor(s) and a grade shall be assigned.

Evaluation Scheme

- For all courses a minimum of 80% attendance is expected.
- The evaluation of each course (except independent study and research project) shall be based on within course and end of course examinations, and assignments. The weightage of marks given below can generally be used as a guideline in the computation of the final grade, except for Independent Study and Research Project.

End of course examination	50 - 60%
Continuous assessments (mid-semester examination, assignments, etc.)	40 - 50%

- Courses with laboratory and/or fieldwork shall be evaluated, where applicable, on a continuous assessment basis.
- The minimum grade a student should achieve to pass a course is C.
- Students will be informed of the evaluation scheme by the instructor at the beginning of a given course.

Grade Points and Grade Point Average (GPA)

The Grade Point Average (GPA) will be computed using the grades earned for core courses and optional courses, taken for credit.

On completion of the end of course examination, the instructor(s) is/are required to hand over the grades of a given course to the programme coordinator who will assign the Grade Points using the following table:

Grade	Grade Point
A+	4.0
A	4.0
A^-	3.7
B^+	3.3
B	3.0
B^-	2.7
C^+	2.3
C	2.0

F 0.0

The Grade Point Average (GPA) will be computed using the formula:

$$GPA = \frac{\Sigma c_i g_i}{\Sigma c_i},$$ where c_i = number of credit units for the i^{th} course, and g_i = grade point for the i^{th} course

Make-up Examinations

'Make-up' examinations may be given only to students who fail to sit a particular examination due to medical or other valid reasons acceptable to the PGIS.

Repeat Courses

If a student fails a course or wishes to improve his/her previous grade in a course, he/she shall repeat the course and course examinations at the next available opportunity. However, he/she may be exempted from repeating the course, and repeat only the course examinations if recommended by the teacher-in-charge or M.Sc. Programme Coordinator. The student may repeat the same course or a substituted (new) optional course in place of the original course. A student is allowed to repeat five credits of coursework free-of-charge. The maximum number of credits a candidate is allowed to repeat is fifteen. The maximum grade, a candidate could obtain at a repeat attempt is a B and he/she is allowed to repeat a given course only on two subsequent occasions.

Evaluation of Research Project

Research project will be evaluated on the basis of a written report (M.Sc. Thesis) and oral presentation (see Section 6.0 of the PGIS Handbook for the format of the Thesis).

8. TEACHING PANEL (NEED TO BE UPDATED)

Dr. S.P. Abeysundara, Senior Lecturer, Dept. of Statistics & Computer Sciences University of Peradeniya
B.Sc, (Peradeniya), PhD (Texas)

Dr. H.H.P.K. Abeysundara Dept. of Statistics & Computer Sciences, University of Peradeniya
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Dr. TWMTW Bandara Senior Lecturer, Dept. of Geography, University of Peradeniya
B.A, (Peradeniya), MPhil (Norvey), PhD (Madras)

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B.Sc.(Kelaniya), MSc (USA).

Dr. Jayalath Edirisinghe, Department of Civil Engineering, University of Peradeniya
B.Sc. (Perad.), M.Sc. (Ehime), PhD (Ehime)

Dr. E.P.S.K. Ediriweera, Dept. of Science & Technology, Uwa Wellassa University, Badulla
B.Sc, *(Peradeniya),* PhD (*UK)*

Dr. Jagath Gunatilake, Department of Geology, University of Peradeniya
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Dr. Lal Samarakoon, Director, GIS Application Center, AIT, Bangkok, Thailand

B.Sc (Kelaniya)., M.Sc. (Saga), PhD (Ehime)

Dr. Amara Satarasinghe, Director, Dept. of Census and Statistics, Colombo
BSc., MSc., PhD (Perad.)

Mr. S. Sivanantharajah, Senior Supirintandant of Survey, Survey Department, Colombo
B.Sc. (Perad.), MSc (ITC- The Netherlands

Dr. Nitin K. Tripathi, Asian Institute of Technology, Bangkok
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Dr. Udaya W.A. Vitharana, Head/Department of Soil Science, Faculty of Agriculture, University of Peradeniya
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PROGRAMME COORDINATOR

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