



NATIONAL WORKSHOP ON NATURAL DISASTER MANAGEMENT & MITIGATION



Prof. Kapila Goonasekera (Vice-Chancellor, University of Peradeniya) addressing the Inaugural Session of the workshop held at the PGIS on June 24, 2005. Seated L to R are Dr. H A Dharmagunawardhane, Prof. C B Dissanayake, Prof. Lakshman Dissanayake (Director, PGIS), Dr. Allen Clark, Prof. K Dahanayake, Prof. B S B Karunaratne, Mr. L R K Perera and Mr. K R Abhayasinghe.

A one-day workshop on Natural Disaster Management and Mitigation organized by the Boards of Study in Earth Sciences and Physics of the Postgraduate Institute of Science (PGIS) was held at the PGIS on Friday 24th June 2005. Dr. H A Dharmagunawardhana (Dept. of Geology, Univ. of Peradeniya) and Mr. K R Abhayasinghe (Director, Dept. of Meteorology, Colombo) coordinated the workshop.

Prof. Lakshman Dissanayake (Director, PGIS) delivered the welcome address at the inaugural session and Prof. Kapila Goonasekera (Vice Chancellor, Univ. of Peradeniya) was the Chief Guest. Dr. Allen Clark, Executive Director, Pacific Disaster Center, Hawaii, USA was the Guest of Honor and his Keynote Address was focused on hazards and precautions in Tsunami events. Prof. C B Dissanayake (Dept. of Geology, Univ.

of Peradeniya) gave an overview of Natural Disasters in a Global Perspective.

The main objective of the workshop was to draw the attention of the responsible officers towards different types of natural hazards such as earth tremors, tsunamis, cyclones, lightning and landslides. Workshop was also an awareness programme on causes of natural disasters and methods and techniques used in their mitigation. There were three technical sessions chaired by Prof. Kapila Dahanayake (Dept. of Geology, Univ. of Peradeniya), Prof. B S B Karunaratne (Chairman, Board of Study in Physics) and Mr. L R K Perera (Chairman, Board of Study in Earth Sciences).

The resource persons of the workshop were: Prof. C B Dissanayake, Prof. K Dahanayake, Mr. N de Silva (Geophysicist, DEOCOM, NARA), Mr. S Weerawarnakula (Director, GSMB), Dr. K D W Nandalal (Department of Civil Engineering, University of Peradeniya), Mr. K R Abhayasinghe & Eng. Nuwan Kumarasinghe (Department of Meteorology), Mr. L Rupasinghe (CEL Lanka Pvt. Ltd., Colombo) and Mr. G H P Dharmaratne (Director-General, Department of Meteorology).

Forty four participants attended the workshop. At the end of every lecture sufficient time was given for questions/answers, suggestions and comments by the participants. A number of practical problems in installing Lightning Protection Systems were discussed during the panel discussion.

Workshop was partly sponsored by WRB-Brandix Center for Disaster Management & Mitigation and C E L Lanka (Pvt) Ltd, Colombo.



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Printed at:

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PGIS News

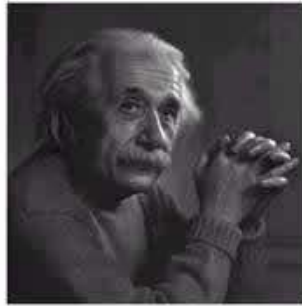
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Albert Einstein and the World Year of Physics - 2005



The United Nations and the International Union of Pure and Applied Physics (IUPAP) have declared the year 2005 as the World Year of Physics to mark the 100th anniversary of Albert Einstein's "miraculous year, 1905" in which he experienced a burst of genius highlighted by the publication of three illustrious papers describing ideas that have since influenced all of modern physics and the way we see the nature and the universe. By coincidence, this year is also the 50th anniversary of Einstein's

death in 1955. The conceptual mutiny he started by showing that time and space, matter and energy are all interconnected continues to shape our understanding of the nature, modern technology, science and technology policy and philosophy today.

In 1905, Einstein, one of the greatest physicists of all times, shook the world by publishing a series of papers, where he demonstrated the reality of molecules by explaining the Brownian motion, explained the photoelectric effect using the quantum nature of radiation and proposed the special theory of relativity dealing with the length contraction and time dilation when objects are moving with high velocities. No other set of academic papers in the 20th century had such a profound impact on both science and society. His paper on Brownian motion reinforced kinetic theory and laid the groundwork for quantum mechanics. In his paper on photoelectric effect Einstein showed that light consists of discrete particles known as "photons", for which he won the Nobel Prize for Physics in 1921. His theory of special relativity for which Einstein is best known, transformed our understanding of the relationship between space and time.

Einstein took the mankind beyond the world of everyday experience to show much more was going on in the universe than we could imagine. Many of Einstein's ideas, such as the theory of relativity or $E = mc^2$, are better known than they are understood. Physicists themselves are still grappling with a lot of his ideas. Einstein represents a lot of different things to different people, but he was famous for a reason. He changed the way we understand the nature and the universe. Einstein once remarked:

"One thing I have learned in a long life is that all our science, measured against reality, is primitive and child-like and yet it is the most precious thing we have."

Einstein's illustrious papers not only led to such modern miracles as the laser, global positioning satellites and the atomic bomb and nuclear energy, but also uncorked the fundamental questions that are still being addressed by cosmologists today - things like the fundamental nature of the atom, time and the universe.

The World Conference on Physics and Sustainable Development, to be held during 31st October - 2nd November 2005 in Durban, South Africa is expected to focus on how the Physics community work towards bringing more benefits to the developing world.

Prof. Lakshman Dissanayake

*Director, PGIS & Senior Professor of Physics,
University of Peradeniya;
Chairman, Asian Physics Education Network (ASPEN)*

The names of many disciplines in science and technology prefixed with the word “nano” are now popular fashions in science and technology. Fashions, whether it is in ladies dress or in science have nontrivial origins and implications. Here, “nano” refers to lengths around one to hundred nanometers. Length scales define the confines of various domains of physics. The smallest length scale physicists talk about, the so-called Planck length (10^{-35} m) is supposed be the dimension where Einstein’s General Relativity merges with quantum mechanics. The shortest length felt in an experiment happens to be much larger, it is about 10^{-20} m, a point where some structure of the electrons begins to appear. The largest length, the Hubble length (10^{26} m) measures the expanse of the universe. Nanoscale is versatile, rich in phenomena with the potential of revolutionary applications. It is the order of the size of large molecules, organelles in the living cell and a characteristic dimension of structuring in biological tissue. Some sort of critical size where the effects of individual atoms and molecules and their corporative behavior manifests at the same time, also happens at these lengths. Again the scale of demarcation of classical and quantum domains falls within the nano-region.

Micro (10^{-3} m) level architectural assembly was established technology for quite sometime. Some tools and techniques needed to do the same at the nano-level are beginning to appear. This explains why a boost for nanoscience and nanotechnology came so suddenly. Nanoscience promises a diverse variety of things ranging from further miniaturized electronics, nano-robots, catalysts, artificial brains and even “elixir of youth leading to immortality”. Although the progress achieved to date is not up to the level of exaggeration, nanoscience and nanotechnology would indeed lead to a technical revolution.

Many countries, developed as well as developing have invested much on nanoscience, foreseeing its economic potential and also because it is a fashion. Fashions arouse desire and curiosity that drives the world. Nanoscience is interdisciplinary physicists, chemists, biologists, engineers and workers in many other areas could profitably engage themselves in this enterprise, provided they possess an essential minimum of instrumentation. Sri Lanka is not short of the human resource for a nanoscience initiative. What the researchers lack are the tools for the nanoscale characterization and fabrication. The strategy suggested is to provide the essential minimum basic instrumentation to few identified groups and continue support. Funds needed for this are not unaffordable; it is probably much less than the amounts that go to the drain via other ventures.

Prof. Kirthi Tennakone
Director, Institute of Fundamental Studies (IFS)
Kandy

M.Sc. PROGRAMMES COMMENCED

(January – June 2005)

<i>M.Sc. Programme</i>	<i>Board of Study</i>	<i>Coordinators</i>	<i>No. of Students</i>
<i>Applied Statistics</i>	<i>Statistics & Computer Science</i>	<i>Dr. P Wijekoon (Dept. of Statistics & Computer Science, UPDN)</i>	<i>17</i>
<i>Computer Science</i>	<i>Statistics & Computer Science</i>	<i>Dr. A A I Perera (Dept. of Mathematics, UPDN)</i>	<i>46</i>
<i>Industrial Mathematics</i>	<i>Mathematics</i>	<i>Dr. W B Daundasekera (Dept. of Mathematics, UPDN)</i>	<i>10</i>
<i>Science Education (with specialities in Biology, Chemistry, Mathematics & Physics)</i>	<i>Science Education</i>	<i>Dr. S Karunaratne (Science Ed. Unit, UPDN) Dr. R Rajakaruna (Dept. of Zoology, UPDN) Dr. C Vithana (Dept. of Chemistry, UPDN) Dr. U N B Dissanyake (Dept. of Mathematics, UPDN) & Dr. V Seneviratne (Dept. of Physics, UPDN)</i>	<i>37</i>

UPDN \equiv *University of Peradeniya*



Prof. Lakshman Dissanayake, Director of the PGIS addressing the new MSc students during the Inaugural Session of M.Sc. Programmes 2005 held on May 20, 2005 at the PGIS Auditorium.

**PUBLIC LECTURES AND SEMINARS PRESENTED AT THE PGIS
(January – June 2005)**



Prof. John Musselman addressing the participants attending the Seminar on “Pteridophyte Genus *Isoetes*”



A seminar presentation in progress at the PGIS auditorium

<i>Title of the Seminar</i>	<i>Presenter’s Name & Affiliation</i>	<i>Date</i>
‘Luminescent Sensors & Switches’	<i>Prof. A. Prasanna de Silva Professor of Chemistry, Queen’s University of Belfast, U.K.</i>	<i>January 3</i>
‘Earthquakes and Tsunamis – Geological Considerations’		<i>January 20</i>
<i>Early Warning Systems for Earthquakes & Tsunamis</i>	<i>Prof. K. Dahanayake</i>	
<i>Basics of Tsunamis</i>	<i>Mr. H. A. H. Jayasena</i>	
<i>Neo-Tectonics, Seismicity and Deformatin of the Lithosphere</i>	<i>Dr. W. Kehelpannale</i>	
<i>A new Plate Boundary near Sri Lanka – some recent studies</i>	<i>Prof. C. B. Dissanayake</i>	
‘Developing Young People’s Scientific Literacy and Capability’	<i>Prof. Bill Harrison Centre for Science Education Sheffield Hallam University, U.K.</i>	<i>February 22</i>
‘Pteridophyte Genus <i>Isoetes</i>’	<i>Prof. Lytton John Musselman</i>	<i>March 7</i>

Mary Payne Hogan Professor of Botany &
Chair, Department of Biological Sciences
Old Dominion University, Virginia, U.S.A.

'Bacteria vs. Sclerotinia: A Model System to Study Mechanisms in Biological Warfare on the Plant Canopy'	Dr. Dilantha Fernando Professor of Plant Pathology, Department of Plant Science, University of Manitoba, Canada	May 6
'Auxin Signaling in Plants – the Quest for the Auxin Receptor'	Dr. M. A. Nihal Dharmasiri Department of Biology, Indiana University, U.S.A.	May 26
'U.S. Higher Education and its Impact on Interantional Scholars: Some Personal Observations'	Prof. Indra de Silva Chair, Department of Communication Arts Xavier University, U.S.A.	June 23

VISITORS FROM FOREIGN UNIVERSITIES/INSTITUTES (January – June 2005)

- **Dr. Mark Windale**, Centre for Science Education, Sheffield Hallam University, U.K.
- **Dr. Allen Clark**, Executive Director, Pacific Disaster Center, Hawaii, U.S.A.
- **Prof. Jon Pearce**, The San Jose State University, California, U.S.A.
- **Dr. Cees van Westen**, Associate Professor, GIS for Natural Hazard Assessment, International Institute for Geoinformation Science and Earth Observation (ITC), The Netherlands.
- **Dr. Dinand Alkema**, Assistant Professor, Natural Hazard Assessment, International Institute for Geoinformation Science and Earth Observation (ITC), The Netherlands.
- **Prof. A. Prasanna de Silva**, Professor of Chemistry, Queen's University of Belfast, U.K.
- **Prof. Bill Harrison**, Centre for Science Education, Sheffield Hallam University, U.K.
- **Prof. Lytton John Musselman**, Mary Payne Hogan Professor of Botany & Chair, Department of Biological Sciences, Old Dominion University, Virginia, U.S.A.
- **Dr. Dilantha Fernando**, Professor of Plant Pathology, Department of Plant Science, University of Manitoba, Canada
- **Dr. M. A. Nihal Dharmasiri**, Department of Biology, Indiana University, U.S.A.
- **Prof. Indra de Silva**, Chair, Department of Communication Arts, Xavier University, U.S.A.

WORKSHOPS (WS), SHORT COURSES (SC) AND SEMINARS (S)
(January – June 2005)

<i>Event</i>	<i>Coordinator/s (Board of Study)</i>	<i>Period</i>	<i>No. of Participants</i>
<i>Active Teaching Learning Approaches in Science' for Junior secondary Teachers (ATLAS 4 & 5) (WS)</i>	<i>Dr. S. Karunaratne (Science Education)</i>	<i>March 21 - 24</i>	<i>46</i>
<i>Scientific Writing (WS)</i>	<i>Dr. N C Bandara (PGIS)</i>	<i>March 29</i>	<i>109</i>
<i>Challenges and Opportunities in Scientific Research for Young Researchers (S)</i>	<i>Prof. M A K L Dissanayake (PGIS)</i>	<i>May 12</i>	<i>124</i>
<i>Conservation and Management of Reservoirs in Sri Lanka (SC)</i>	<i>Dr. S. K. Yatigammana (Zoological Sciences)</i>	<i>June 6 -9</i>	<i>24</i>
<i>Natural Disaster Management and Mitigation (WS)</i>	<i>Dr. H. A. Dharmagunawardhane (Earth Sciences) Mr. K. R. Abhayasinghe (Physics)</i>	<i>June 24</i>	<i>44</i>

REPORTS FROM THE COORDINATORS OF WORKSHOPS & SHORT COURSES

4th & 5th WORKSHOPS ON 'ACTIVE TEACHING & LEARNING APPROACHES IN SCIENCE' FOR JUNIOR SECONDARY TEACHERS (ATLAS 4 & 5)

The 4th and 5th workshops on Active Teaching and Learning Approaches in Science (ATLAS) were held at the PGIS from March 21 – 24, 2005 and 46 science teachers and education officers participated. The principal resource person of the workshops was Dr. Mark Windale from Sheffield Hallam University, UK.

ATLAS workshops were organized through the Higher Education Link (HEL) programme between Centre for Science Education of Sheffield Hallam University (SHU) and Board of Study in Science Education of the PGIS. Aims of these workshops were to introduce science teachers and education officers to a range of effective, active & student-centered teaching and learning approaches to encourage collaborative learning and raise motivation and achievements of students.

ATLAS model consists of five workshops:

- (1) *Introduction to ATLAS*
- (2) *Experimental and Investigation Science*
- (3) *Writing*
- (4) *Using ICT effectively in the Science Classroom*
- (5) *Train the Trainees*

For the 4th ATLAS workshop, Dr. Mark Windale introduced participants to search information from the internet. He introduced Multi Media School Science package to do simulation for visualizing science, modeling processes for scientific investigations, processing and analyzing data using spread sheets and to see science across the opportunity to copy some of the lessons into compact diskettes. This exposure was new to most of the participants and they were very enthused and were interested in knowing more about such web sites. They wanted to tryout all lessons and evaluating materials in the given package.

5th ATLAS workshop was aimed at training the participants to serve as trainees so that they can conduct sessions to other teachers. In the workshop the participants had to implement the approaches that they have learnt in developing and using curriculum materials in the training sessions. The participants were highly impressed by the workshop proceedings. They showed outstanding understanding and capability in using the approaches. They have gone through the paradigm shift exemplifying best practices in active student-centered teaching and learning. As the British Council HEL support terminates from March 31, 2005, new sources of funding would be necessary, if these training workshops are to be continued.

Coordinator: Dr. S. Karunaratne

WORKSHOP ON SCIENTIFIC WRITING

A one-day workshop on Scientific Writing was held on 29th March 2005 at the PGIS auditorium in order to help postgraduate students to write theses, papers and reports. Workshop participants (109) were PGIS students registered for M.Sc., M.Phil. & Ph.D. degree programmes. The breakdown was as follows: *M.Sc. in Analytical Chemistry (8); M.Sc. in Applied Statistics (6); M.Sc. in Computer Science (8); M.Sc. in Industrial Chemistry (6); M.Sc. in Industrial Mathematics (1); M.Sc. in Medical Physics (7); M.Sc. in Plant Sciences (18); M.Sc. in Science Education (37); M.Phil./Ph.D. programmes (16); Occasional Students (2).*

The workshop consisted of lectures/discussions on various aspects of postgraduate thesis/project report writing. The topics covered at the workshop were: *Structure and layout of a thesis/project report; Ethics; Title & Abstract; Computer Aided Literature Survey; Introduction & Bibliography; Experimental/Materials and Methods; Results, Interpretation & Conclusion.* Resource persons were Professors B. M. R. Bandara, M. A. Careem, K. Dahanayake, M. A. K. L. Dissanayake, J. P. Edirisinghe, C. V. S. Gunatillake (all from the Faculty of Science), J. S. Edirisinghe (from the Faculty of Medicine), and Dr. P. M. K. Alahakoon (from the Faculty of Agriculture), University of Peradeniya.

Coordinator: Dr. N C Bandara

SEMINAR ON CHALLENGES AND OPPORTUNITIES IN SCIENTIFIC RESEARCH FOR YOUNG RESEARCHERS; Formation of the PGIS - Young Researchers' Forum (YRF)

A seminar on 'Challenges and Opportunities in Scientific Research for Young Researchers' was held at the PGIS on May 12, 2005. There were 124 participants attending this seminar. The objective of the seminar was to expose young researchers, mainly the M.Phil./Ph.D. students of the PGIS and young academic staff active in research to the importance of engaging in research and the challenges and opportunities encountered by them.

During the seminar several key resource persons delivered lectures on important issues: Prof. Kirthi Tennakone (Director, Institute of Fundamental Studies) on '*Fundamental vs. Applied Research*'; Prof. Lakshman Dissanayake (Director, Postgraduate Institute of Science) on '*Idea Generation for Research*'; Prof. Sirimali Fernando (Chairperson, National Science Foundation) on '*Opportunities for Research - The Role of the NSF*'; Dr. Trishantha Nanayakkara (University of Moratuwa) on '*Towards a new Research Culture in Sri Lankan Universities*'; Prof. Veranja Karunaratne (Dept. of Chemistry, University of Peradeniya) on '*Challenges for Young Researchers*'; Prof. H Abeygunawardane (Dean, Faculty of Vet. Medicine & Animal Sc.) on '*Writing a Good Research Proposal*'; Prof. Sarath Edirisinghe (Dept. of Parasitology, University of Peradeniya) on '*Research Ethics*'.



Prof. Sirimali Fernando (Chairperson, National Science Foundation - NSF) addressing the audience.

PGIS - Young Researchers' Forum (YRF)

The seminar concluded with the formation of the PGIS Young Researchers' Forum (PGIS-YRF). A committee was elected unanimously with Ms. Vinitha Thadani as the President and Mr. Dionysius Guanakkan as the Secretary. The committee received blessings from Prof. Kirthi Tennakoon, the Director of the Institute of Fundamental Studies (IFS) and a leading researcher in Sri Lanka.



Prof. Lakshman Dissanayake (Director, PGIS) introducing the newly elected YRF office bearers to Prof. Kirthi Tennakone (Director, IFS) and to the audience.

The main objective of the YRF is to provide an arena to

- (a) interact and exchange information pertaining to scientific research in order to disseminate knowledge and extend collaboration among other groups (local and foreign) with similar interests.
- (b) realize the potential of young researchers as the next generation of scientists.
- (c) generate a research climate that allows for creativity, open communication and free flow of ideas and talents.
- (d) create a platform to bring to the attention of the authorities and the government, the problems faced by young researchers in carrying out scientific research in Sri Lanka.
- (e) promote public awareness and the importance of scientific research.

The membership of YRF is open to

- (a) all postgraduate students currently registered at the Postgraduate Institute of Science, and University of Peradeniya,
- (b) young research scientists and university staff, who are active in scientific research at universities and other institutes.

The activities of YRF include:

- (a) organizing a regular series of seminars where members can present and discuss their research findings,
- (b) organize special seminars by invited guest scientists on various topics of scientific interest,
- (c) any other activity for the purpose of dissemination of scientific knowledge, especially among the younger generation of scientists, and
- (d) make recommendations to the authorities and to the government on issues affecting young researchers and for creating an environment conducive for productive scientific research in Sri Lanka.

Coordinator: Prof. M A K L Dissanayake

***SHORT COURSE ON CONSERVATION AND MANAGEMENT OF RESERVOIRS
IN SRI LANKA***

Reservoirs in Sri Lanka have supported agriculture and domestic water requirements for thousands of years. Unfortunately, water quality of many reservoirs is thought to have deteriorated due to direct and indirect human influences. Direct human influences that could impact water quality include the dumping of untreated domestic and industrial effluents into reservoirs and the regulation of water levels, while indirect human influences mainly include the introduction of exotic fish and changes in climatic conditions. Some reservoirs have already become seriously polluted, especially in highly populated



Prof. H P M Gunasena (Executive Director, CARP) addressing the Inaugural Session of the short course on ‘Conservation and Management of Reservoirs in Sri Lanka’ held at the PGIS on June 6, 2005.

urban areas. Additionally, some reservoirs are menaced by salinization, which could severely affect rice cultivation, the main staple food of 19 million people in Sri Lanka. Large alterations in the chemical state of these reservoirs should result in changes of their aquatic communities. Already, diversions of rivers into reservoirs in the drier part of the country have resulted in major limnological changes.

Therefore, in order to address these issues, the Board of Study in Zoological Sciences of Postgraduate Institute of Science conducted a 4-day short course on “*Conservation and Management of Reservoirs in Sri Lanka*” from 6th to 9th June, 2005 at the PGIS.

Prof. H P M Gunasena (Executive Director, CARP) was the chief guest at the inaugural session held on June 6, 2005 at the PGIS. Prof. S H P P Karunaratne (Acting Director of the PGIS & Chairman, PGIS Board of Study in Zoological Sciences), Prof. V Kumar (Dean, Faculty of Science, University of Peradeniya) and Dr. S K Yatigamma (Workshop Coordinator) also addressed the audience.

The course was designed to provide the participants with a knowledge to understand the existing problems of various reservoirs and to establish appropriate management strategies. The CARP provided partial sponsorship for the programme. Topics covered included: *Aquatic systems of Sri Lanka, Importance of water as a global resource, Human interference on*

water resources, Need for water management, Methods of water management, Pollution & Existing problems of reservoirs in Sri Lanka, and The use of bioindicators in effective reservoir management.

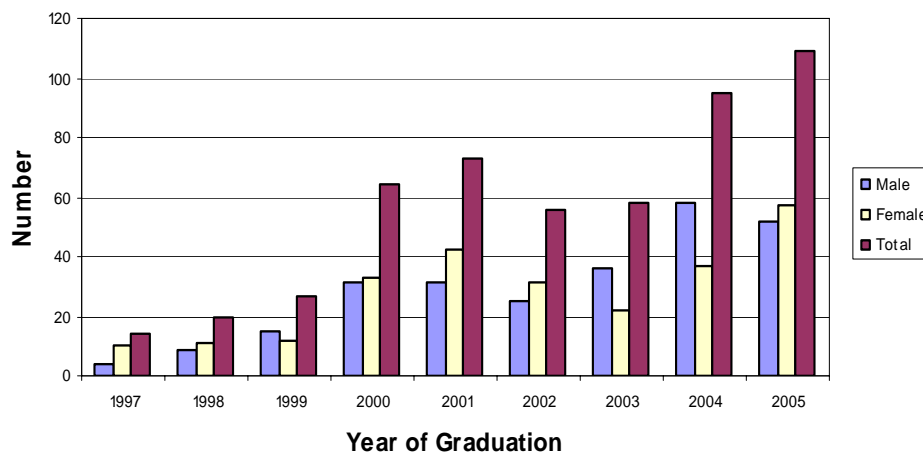
All of the above issues were addressed in detail using the latest scientific techniques. For instance, indicator organisms have been used in limnological studies to infer limnological changes such as eutrophication, salinization and lake level fluctuations both qualitatively and quantitatively. In addition, some organisms have been used in order to understand complex changes in food webs such as competition and predation. Furthermore, zooplanktons have been used in order to infer changes in habitat, including changes in the abundance of macrophytes, temperature and oxygen. Habitat alteration can directly or indirectly be related to environmental changes such as climate and pollution. Therefore, changes in populations of aquatic organisms structure can be used to better understand environmental changes in lakes and reservoirs. Further, understanding of the current problems of our reservoirs, such as eutrophication and development of toxic algal blooms is an essential part in the field of agriculture especially because these problems eventually can cause health problems to both human and livestock. On the other hand understanding of the effect of agrochemicals on reservoir ecosystems is also necessary to sustain long-term better health of this resource.

There were lively discussions at the end of each lecture and therefore the participants had the opportunity to present any problems in the aforementioned problems especially relevant to their field of interests, such as fisheries, irrigation and domestic water supplies. Ultimately the course helped in understanding the environmental conditions and the existing problems of our reservoirs. In addition it also helped the participants to understand the sustainable exploitation of this precious resource as the country is heading towards an intense agricultural development. Finally the short course provided the opportunity for the participants of the different disciplines of utilization and management of reservoirs of Sri Lanka to meet and share their knowledge and establish links among themselves.

The response received from the participants in the evaluation of the workshop was very positive and they expressed the view that continuation of this type of workshops in the future would be greatly beneficial.

Coordinator: Dr. S. K. Yatigammana

HIGHEST NUMBER OF PGIS STUDENTS TO GRADUATE IN 2005



Number of PGIS students graduated by year

PGIS is happy to announce that, 109 postgraduate students (3 - Ph.D.s, 10 - M.Phil.s and 96 - M.Sc.s) will be graduating this year. These graduates will receive their degrees at the Peradeniya University Annual Convocation on 21st December 2005. This is the highest number of postgraduates from the PGIS receiving their degrees at an annual convocation.

DEGREES AWARDED (January – June 2005)

Ph.D. & M.Phil. Research Degrees

Title of the Thesis

Ph.D. – Environmental Sciences

V. D. K. Abeyratne Monitoring air quality using low cost techniques and assessing the impact of air pollution on vegetative crops

M.Phil. – Plant Sciences

B. K. H. C. Munidasa The climate and flowering phenology of eight *Shorea* species in Sinharaja rain forest, Sri Lanka

M.Sc. Degrees (by course work with a research project of 3 – 6 months duration)

Title of the Research Project

M.Sc. – Analytical Chemistry

1. M. H. G. N. Fernando Adsorption of zinc on kaolinite in the presence of calcium and magnesium
2. D. N. Gunasena Adsorption and desorption behavior of phosphate on kaolinite
3. D. A. R. Silva Adsorption of mercury (II) by kaolinite
4. A. M. T. S. Attanayake Adsorption of thiram by soil
5. K. A. D. Padma Prasangi Efficiency of removing arsenic from drinking water using aluminum oxide and ferric oxide
6. J. K. B. M. Jayawardane Adsorption of cadmium (II) by kaolinite
7. K. B. Wijewardena Synthesis and characterization of photochromic 5-chloro-4,6-dimethyl-2-hydroxy benzaldehyde

M.Sc. – Computer Science

R. Nagulan An automated identification system for Sri Lankan anopheline mosquito species by spot analysis

M.Sc. – Engineering Geology & Hydrogeology

R. M. W. K Rathnayake Formulation of a groundwater potential index in Sri Lanka

M.Sc. – Environmental Science

1. M. C. K . Abeyratne Biological monitoring of sulfur dioxide in ambient air using Bryophytes
2. C. D. M .S Dissanayake Monitoring air quality at Galaha junction using active and passive sampling methods
3. M. S. Vithanage Mechanistic modeling of arsenic retention on natural red earth in simulated environmental systems
4. P. H. D. A. Ariyawardana Removal of nitrate from drinking water by oil coated sand filter
5. C. N. B. Wijeratne Designing the sanitary land fill site in the upper Kotmale hydropower project area at Talawakele
6. R. H. C. Priyanthi Utilization of *Sargassum* to remove Cadmium in waste water

M.Sc. – Fish and Wildlife Management

1. B. A. D. S. Jayawardane Management and rehabilitation of young elephants at elephant transit home, Udawalawe
2. L. G. S. Lokugalappatti Diversity of the ground-living amphibian fauna in the campus of the University of Peradeniya, Sri Lanka

M.Sc. – Oceanography

1. H. A. K .S. Ariyaratne Numerical model for simulating shoreline change
2. W. M. M Lasantha Ocean colour remote sensing: Bay of Bengal during North-East monsoon
3. S. B. H. Ranmadugala Influence of seasonal sea level variability of salt-water intrusion in Kelani river basin
4. H. K. R. Thushara Dispersion and water exchange in strongly restricted inlet lagoon: Rekawa lagoon, South coast of Sri Lanka

M.Sc. – Physics of Materials

1. W. D. D. Wijesiri ¹H NMR study of the role of alumina fillers in conductivity enhancement in the PEO based solid polymer electrolytes
2. N. M. V. K. Nawarathna Schottky junctions with some conducting polymers
3. Sankar Poopalasingam Thin film growth at finite temperature

M.Sc. – Science Education

1. D. M. M. E. W. K .Bandara Some experiments and demonstrations in introductory fluid dynamics
2. D. L. Delapola An exercise in teaching the topics “Equilibrium of a rigid body under the action of coplanar forces” and “ Complex numbers” of the GCE (A/L) syllabus by the guided discovery method
3. S. K. Laggoda Development of a computer-based study package: states of matter for GCE (A/ L) Chemistry
4. T. Suthakaran Identification of learning difficulties in phase equilibria in chemistry among GCE (A/L) students and some suggestions to overcome difficulties identified
5. M. M. Wickremasinghe Improvement of students’ achievement in learning section 6.5: pollution of the environment of A/L biology syllabus through activity based learning
6. N. Jeganmohan Assessment of conceptual knowledge of GCE (Advanced Level) students using the force motion concept inventory
7. P. S. Chandrani Preparation of supplementary book on agrochemicals for GCE (Advanced Level) students
8. R. A. A. S. R. Ranasinghe The concept of function in the secondary school mathematics education in Sri Lanka
9. T. K. Y. Pathiratne Tittawella lake / marshland as an outdoor laboratory for a biodiversity study for GCE (A/L) Students
10. M. S. K. Gunatilaka Study on difficult areas of GCE (Advanced Level) molecular genetics and preparation of supplementary study material
11. M. W. P. D. Gunawardana A field study, preparation and evaluation of a study guide on insect diversity and insect pests in a rice field for GCE (A/L) Biology syllabus
12. K. A. S. Hemantha Kumari Novel teaching package to enhance learning ability of A/L biology students
13. J. H. A. Chandrasiri Supplementary book on common salt and petroleum refining industry for the GCE (Advanced Level) students
14. W. D. H. M. Wijeratne A comparison of mathematical skills and numerical problem solving skills of GCE (A/L) students, offering chemistry
15. V. Arasakesari Developing a computer – based study package for GCE (A/L) students on matter and radiation in physics
16. K. S. J. P. Perera Computer Aided Learning (CAL): multimedia lesson for electronics unit in GCE (A/L) Physics
17. P. K. Sivalingam Enhancing electronics concepts through life related experiments for GCE (Advanced Level) Physics students

Postgraduate Diplomas (by course work only)

Diploma – Engineering Geology & Hydrogeology

D. M. M. Nanayakkara

Diploma – Science Education

S. G. Ratnadivakara

ABSTRACTS OF Ph.D./M.Phil. THESES

Ph.D. (Environmental Sciences)

Monitoring air quality using low cost techniques and assessing the impact of air pollution on vegetative crops

V. D. K. Abeyratne, PGIS & Department of Chemistry, University of Peradeniya

Human interference with the atmosphere has created or intensified problems, which are now causing air pollution concerns on a global scale. The cities of Kandy and Anuradhapura are expected to have a higher degree of air pollution owing to its geographic location and due to transboundary pollution respectively. Hence this study aimed to develop low cost, environmentally friendly air quality monitoring methods. Passive & Active sampling methods were used to analyze three gaseous pollutants; NO₂, SO₂, O₃ and PM₁₀ in Kandy. Same gaseous pollutants except PM₁₀ were measured in Anuradhapura using passive sampling method. This study also aims to provide a user friendly AQI, for use by laymen based on both the individual and composite criteria pollutants. Possible consequences of air pollutants for agricultural crops in Sri Lanka or its production have scarcely been explored. In order to fulfill this gap pollutant effects on plants were evaluated using low cost active and passive bio monitoring methods.

In the passive sampler method the pollutant is trapped on a paper filter impregnated with a special developing solution. In the active sampling method the pollutant is trapped into special absorbing media. The trapped pollutants were then analyzed using spectrophotometric and turbidimetric methods. Particulate matter was collected using glass fiber filters and determined gravimetrically. For the sampling period of 15th February 2002 - 31st December 2004, the data reveal that NO₂, SO₂ and O₃ analyzed exceed the recommended air quality standards of Sri Lanka on about 14%, 41% and 28% occasions respectively for Kandy while the corresponding exceedences in Anuradhapura were 0%, 21% & 27% respectively. PM₁₀ analyzed during the sampling period in Kandy exceeds the recommended US EPA standard on about 80% of the occasions. AQI for the composite criteria pollutants in Kandy and Anuradhapura represent “Good” categories on 57% and 100% occasions respectively. A significant effect on transboundary pollution was recorded from both cities during the sampling period.

In the active bio monitoring method, sensitivity of 24 vegetable species to ambient air pollution and ozone was assessed using the open top chamber method. Growth differences of vegetative plants were observed in chambers supplied with filtered and non filtered air during the dry climatic period. The effects of ozone observed on plants above the critical level can be classified into nine categories. In the passive bio monitoring method, attempts were made to observe the stomatal response under different pollutant concentrations using the nail varnish method. A significant effect of SO₂ on stomatal pore opening was observed in the plant *Argyrea populifolia*.

Supervisor: **Prof. O. A. Ileperuma** (*University of Peradeniya & PGIS*)

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Climate and flowering phenology of eight *Shorea* species in Sinharaja rain forest, Sri Lanka

B. K. H. C. Munidasa, *PGIS & Department of Botany, University of Peradeniya*

The Sinharaja rain forest canopy is dominated by species of *Mesua* and *Shorea*, the majority of which are endemic to Sri Lanka. A 17-year database on flowering of selected individuals of these *Shorea* species recorded at fortnightly intervals since 1985, was analyzed in this study. The field data had been collected as a percentage of the observable part of the crown in flower buds and in open flowers. To understand the climate and the climatic changes of the area, time plots were prepared from 1984 – 2002 for three climatic parameters (rainfall, maximum and minimum temperatures and the number of dry days). Annual, seasonal and monthly scales of these parameters were studied to find out the differences between El-Niño, La-Niña and normal events. The effect of environmental parameters on the flowering of *Shorea* species was assessed using the Spearman rank correlation coefficient.

The results of the present study based on this long-term data set showed strong deviations in all three climatic parameters from the average climate of the study area. Wet season irradiance or a reduction of rainfall during the southwest monsoon period was observed in two out of three *El-Niño* years. A bimodal flowering pattern, with peaks in March/May and November/December was shown by the *Shorea* species. Two flowering patterns, annual flowering and supra-annual flowering, were observed among the eight *Shorea* species. Time of bud emergence among the study species in the community was observed in September, February or August. Bud maturation varied over a period of 1 - 11 months. Flowering among the eight *Shorea* species was staggered in a given year. Intraspecific synchronization was evident in the flowering of each of the *Shorea* species in Sinharaja. Among the eight *Shorea* species studied, monthly rainfall significantly affected flower bud production only in *S. congestiflora*, *S. disticha* and *S. cordifolia*.

Supervisors: **Prof. C. V. S. Gunatilleke** (*University of Peradeniya & PGIS*)
Prof. I. A. U. N. Gunatilleke (*University of Peradeniya & PGIS*)

FORTHCOMING EVENTS

- *PGIS - Young Research Forum (YRF): Seminar* Sep. 14, 2005
- *National Symposium on 'Mosquito Control'* Sep. 15 -16, 2005
- *Short Course on 'Water Resources Planning – Groundwater Hydrology'*..... Sep. 29, 30 & Oct.1, 2005
- *Workshop on 'Postharvest Handling of Fruits & Vegetables'* Oct. 20 - 21, 2005
- *Postgraduate Certificate Course in 'Advanced Biochemistry'* Oct. 23 - December, 2005
- *Workshop on 'Pre- & Postharvest Management of Vegetables & Cut Flowers'*..... Oct. 24 - 25, 2005
- *Peradeniya University Research Sessions (PURSE)* Nov. 10, 2005
- *Short Course on 'GIS and its Applications'* – Groups A & B Nov. 30 - Dec. 1, 2005
 - Group A (Laboratory) Dec. 2 - 5, 2005
 - Group B (Laboratory) Dec. 15 - 18, 2005
- *Short Course on Health and Anesthesia in Captive Elephants* Dec. 3, 2005
- *Commencement of the following New M.Sc. programmes* December 16, 2005
 - Disaster Management**
 - Medical Microbiology*
 - Water Resources Management*
- **Conducted jointly with the Faculty of Engineering, University of Peradeniya*
- *Short Course on 'Identification of Common Bees of Sri Lanka'* Dec. 19 - 20, 2005
- *Workshop on Dendrochronology* Dec. 22, 2005
- *Workshop on 'Introduction to Ecological Data Analysis using Univariate and Multivariate Techniques'* Jan. 4 - 5, 2006
- *Study Abroad Programme with San Jose State University, U.S.A.* Jan.5 - 20, 2006

- *Workshop on Graphics Programming in OpenGL* *Jan.13 - 14, 2006*
- *Seminar on 'World Year of Physics - 2005'* *Jan. 21, 2006*
- *Workshop on 'Mineral Water & Water Bottling Industry'* *Jan., 2006*
- *Short Course on 'Environmental Management: Basic Concepts and Legal Framework'* *Jan.28 - 29, 2006*
- *Workshop on 'Scientific Writing'* *March., 2006*
- *10th Asian Conference on Solid State Ionics (ACSSI - 10)* *June 12 - 16, 2006*
- *Commencement of the following New M.Sc. programmes* *2006/2007*
 - Computational Statistics*
 - Management Information Systems*
 - Science & Technology Management*
 - Molecular Biology and Bio-informatics*

NEW RESEARCH GRANTS RECEIVED DURING 2005 AND ADMINISTERED BY THE PGIS

Research Grant	Grantee(s)	Board of Study
NGS	Prof. I A U N Gunatilleke	Plant Sciences
CARP	Prof. S A Kulasooriya	Plant Sciences
NSF	Dr. H M T G A Pitawala	Earth Sciences
NSF	Prof. M A K L Dissanayake Dr. V Seneviratne	Physics
NSF	Dr. S Karunaratne	Science Education
NSF	Dr. G W A R Fernando Dr. H M T G A Pitawala	Earth Sciences
NSF	Prof. B S B Karunaratne	Physics
NSF	Prof. K Premaratne	Physics
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NSF	Prof. K Dahanayake	Earth Sciences
NSF	Prof. I A U N Gunatilleke	Plant Sciences
NSF	Dr. S Karunaratne	Science Education
NSF	Dr. Rupika Rajakaruna	Zoological Sciences
NSF	Prof. J P Edirisinghe	Zoological Sciences
US-AEP	Prof. O A Ileperuma	Chemical Sciences
PAMC	Prof. S A Kulasooriya	Plant Sciences
NSF	Prof. Namal Priyantha	Chemical Sciences
NSF	Prof. B M R Bandara	Chemical Sciences

NGS : *National Geographic Society*
 CARP : *Council for Agricultural Research Policy*
 NSF : *National Science Foundation*
 US-AEP : *United States - Asia Environmental Partnership*
 PAMC : *Priya & Araki Management Consultants (Pvt.) Ltd.*

10TH ASIAN CONFERENCE ON SOLID STATE IONICS (ACSSI - 10) Kandy, Sri Lanka; 12 – 16 June 2006

Organized by

POSTGRADUATE INSTITUTE OF SCIENCE & FACULTY OF SCIENCE
University of Peradeniya, Sri Lanka

for

ASIAN SOCIETY FOR SOLID STATE IONICS (ASSSIS)

Conference website: <http://www.acssi10.pgis.lk>

Scope

Solid State Ionics is a growing inter-disciplinary branch of science and technology. It deals with ionically conducting materials in the form of inorganic solids, ceramics, glasses, polymers and composites and nano structures with applications in numerous solid state devices such as solid state and polymer batteries, fuel cells, electrochromic displays, solar cells and sensors. This is the 10th biennial conference organized by the Asian Society for Solid State Ionics. The conference will provide an international forum for presenting research papers and in-depth discussions by scientists from Asia and other countries on recent developments in Solid State Ionic materials, devices and related topics.

Abstracts

Those who wish to participate should submit a one-page abstract not exceeding 300 words electronically in MS word format as an e-mail attachment to : acssi-10@pgis.lk before **15 January 2006**. At least one author of each abstract should register for the conference.

Papers

Manuscripts should also be submitted electronically in MS word format as an e-mail attachment to acssi-10@pgis.lk before **15 March 2006**. Guidelines for preparing full papers can be found at the conference website: www.acssi10.pgis.lk. All manuscripts will be published as conference proceedings by World Scientific Publishing Co. (Pvt.), Singapore.

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IMPORTANT DATES

Abstracts due : 15th January 2006
Notice of acceptance : 31st January 2006
Manuscripts due : 15th March 2006
Registration : 15th March 2006
Late Registration : 30th April 2006

For more information please visit:

www.acssi10.pgis.lk

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