SUBJECT REVIEW REPORT

DEPARTMENT OF SOIL AND WATER RESOURCES MANAGEMENT

FACULTY OF AGRICULTURE
RAJARATA UNIVERSITY OF SRI LANKA

22nd to 24th November 2005

Review Team :
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(1) SUMMARY OF THE PURPOSE AND AIMS OF THE SUBJECT REVIEW PROCESS

This report is based upon a review conducted on the subjects on soil and water resources management, taught by the Department of Soil and Water Resources Management in the Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura. The primary source of information for this review is the self-evaluation report submitted by the Department of Soil and Water Resources Management. This was supplemented by a 3-day visit to the Department and the university by a review team comprising of Dr. R.K.W. Punchihewa (Chairman) from Faculty of Agriculture, University of Ruhuna, Dr. A. R. Ariyaratne, and Dr. M.M.M Najim from Faculty of Agriculture, University of Peradeniya as team members. The principal aspects covered in this review are: i) curriculum, design, content and review, ii) teaching learning and assessment methods, iii) quality of students including progress and achievement, iv) student feedback, v) postgraduate studies, vi) peer observations, vii) skills development and viii) academic guidance and counseling.

Dr. J.L. Ratnasekera, who participated as the representative of the QAA Council/UGC gave a brief introduction to the review exercise.

Arriving in Anuradapura the evening prior to the day of the review, the team had a discussion and based on the information from the self evaluation report, developed a strategy to proceed with the review exercise during the next three days. The review process commenced with a meeting with the Dean, Faculty of Agriculture Mr. Y.M. Wickramasinghe. The Dean briefed the review team of the activities of the Faculty in general, new developments and current trends in teaching and research and the position of the Department of Soil and Water Resources Management vis-a vis, the other two departments in the Faculty. The Department of Soil and Water Resources Management being one of the founder departments of the Faculty is now 4 years old.

The team then visited the Department of Soil and Water Resources Management in the company of the Dean of the faculty. The team was welcomed by the Head of Department Dr. D.M. Jinadasa who introduced the other staff members (permanent, temporary and technical) currently present in the department. The review team having explained the purpose of the review exercise, the agenda for the rest of the programme was discussed and finalized over light refreshments. The Head of the Department made a 'power point' presentation on the self evaluation report, highlighting the strengths and weaknesses of the department, clarifying certain points and explaining where necessary, some information included in the report. The dean and the head requested the review team to highlight necessary recommendations in order to improve their programs and facilities. The open and frank discussion that followed was extremely helpful for the evaluation exercise. After lunch, the team visited laboratories, lecture rooms, computer room, student common room, student recreation room, and the library and observed the facilities, equipment and consumables available for teaching, research and other activities. These visits also enabled the team members to talk to the supporting staff and get an idea of their perception of the activities of the department and the use of these facilities by the students. The rest of the afternoon was spent with a group of 3rd year and 4th year students who are doing the specialization in Soil and Water Resources

Management. This discussion held over light refreshments, in the absence of permanent staff members of the department, turned out to be a very profitable exercise.

In the evening, the team met the Vice-Chancellor Professor Gamini Samaranayake in the presence of the Dean of the Faculty of Agriculture and the Head of the Department of Soil and Water Resources Management and Department academic staff. The Vice-Chancellor warmly welcomed the team and a very cordial discussion was held for over an hour. The team was quite impressed and encouraged by the attitude of the Vice-Chancellor towards the review exercise.

The second day evening, the review team together with department staff visited the faculty farm which is/will be used for farmer training of the students in the third year.

The two subject specialists Dr. Ariyaratna and Dr. Najim prepared the draft reports on course content, the coverage with respect to lectures, lab classes field and farm activities, industrial training etc, and the adequacy of resources (manpower, facilities, equipment) for the effective achievement of the aims and objectives as laid down in the self evaluation report. The entire team having peer reviewed the achievements of the students, observed teaching by teachers and having had a series of discussions with all the stakeholder groups, prepared the final report under the guidance of the Chairman, Dr. Punchihewa.

(2) BRIEF HISTORY OF THE UNIVERSITY, THE FACULTY AND THE DEPARTMENT

The Rajarata University of Sri Lanka was established on 7th November 1996. The university consists of four faculties, namely Social Sciences and Humanities, Management Studies, Applied Sciences and Agriculture. The university grants commission at its 553rd meeting on the 10th December 1999 approved the establishment of the faculty of Agriculture. The faculty consists with three departments, namely, Agricultural Systems, Soils and Water Resources Management and Plant Sciences. The first academic semester of the faculty was started on the 6th June 2001. Having commenced its academic programmes with a student population of 16, today the faculty has 219 students (Table 1). The department of Soil and Water Resources Management has 7 students under the advance program (Table 2). The advance program offered by the department is Natural Resources Management. The faculty has 21 academic staff. The total number of academic and non academic carder positions approved by the UGC are 35 (Faculty of Agriculture Annual Report for 2001/2002).

Table 1. Student numbers in different academic years

Program	Duration	Year and student numbers
B.Sc (Agric) degree (core program)	Five semesters (Soil and water mgt. courses offered in all five semesters)	2000/2001 – 16 2001/2002 – 27 2002/2003 – 56 2002/2003 (A) – 64 2003/2004 - 56

Table 2. Student numbers in the advance program of the department of Soil and Water Resources Management

Program	Duration	Year and student numbers
B.Sc (Agric) degree advance program –The name of the advance program offered by this department is Natural Resource Management	Three semesters (Advanced courses offered in 6th and7th semesters. Final year research project in 8th semester)	2000/2001 – 03 2001/2002 - 04

The faculty is located at Puliyankulama. It is a convenient location approximately 6 km away from the Anuradapura city and is situated in the vicinity of Jaffna junction on the Anuradapura Jaffna road. The faculty farm is located about a kilometer away from the faculty. The farm is 35 ac in extent.

The department conducts classes to students of all four years of the Agriculture degree programme. It has 4 permanent academic staff members on its role (out of this 4, one will be appointed soon (personal communication, Head of Department)). The department also has a temporary demonstrator with a technician and a lab assistant.

Courses being reviewed

Core program

Duration of the core program is five semesters. (1 semester = 15 weeks) All the students that enter to the Faculty of Agriculture should follow this program during first five semesters. This program is designed for the students to gain basic knowledge and skills of a wide range of disciplines.

During the core program students follow seven courses related to soil and water management offered by the department of Soil and Water Resources Management. Details of the courses offered by department during core program are given in Table 3. All the courses comprise of theory, laboratory and/or field practical sessions. At the end of this program students should complete a minimum of 102 units (1 unit = 15 hr of theory or 30 hr of practical).

Table 3. Core program subjects offered by the department of Soil and Water Resources Management

Semester	**Course**	**Contact hours**	
		Theory	**Practical**
1st semester	SWBC 1102 Basic Chemistry	15	30
2nd semester	SWSP 1203 Soils and their Properties	30	30
3rd semester	SWLS 2102 Land Survey and Development/GIS	15	30
	SWAM 2102 Agro meteorology	15	30
	SWSF 2103 Soil Fertility and its Characteristics	30	30
4th semester	SWWS 2202 Watershed Management	15	30

5th semester	SWIR 3103 Principles of irrigation	30	30

Advance program

In the sixth semester, students should select an area for specialization and follow advanced program during the next three semesters. Students who are specializing in Natural Resources Management should follow advanced courses offered by the department during sixth and seventh semesters and undertake research project related to Natural Resources Management (NRM) during eighth semester. The compulsory courses have 24 credits while the project is having 20 credits. The students specializing in NRM has to take 16 credits from other departments.

Department offered eight advanced courses during this program (Table 4), which are compulsory for students who are specializing in NRM. Several courses that are taught under the NRM program are compulsory courses for some of the other specialization areas.

As NRM program is integrated with other departments, students those who are specializing in NRM have to follow several courses offered by other departments, which should be equal to 16 credits.

Table 4. Advance program subjects offered by the department of Soil and Water Resources Management

Semester	Course	Contact hours	
		Theory	Practical
6th semester	SWIM 3202 Irrigation and water management	15	30
	SWLP 3203 land Use Planning	30	30
	SWSM 3203 Soil Management	30	30
	SWSS 3203 Soils of Sri Lanka	30	30
	SWDF 3202 Dry farming Concepts	15	30
7th semester	SWCH 4103 Catchments hydrology	30	30
	SWEW 4103 Energy and Waste Management	30	30
	SWSC 4103 Soil Survey and Classification	30	30
	SWWR 4103 water Resources of Sri Lanka	30	30

Details of the courses offered by the department are in the Annex A.

(3) AIMS AND LEARNING OUTCOMES PROVIDED BY THE DEPARTMENT (REPRODUCED FROM THE SELF-EVALUATION REPORT OF THE DEPARTMENT).

(3.1) Aims

Understanding the nature and properties of soil and fundamental aspects of water management in agriculture and their implications are essential to optimize crop production and conserve natural resources. The mission of the department is to produce competent and innovative graduates with a sound theoretical and practical knowledge of soil and water resources in order to contribute confidently to optimize land use and manage natural resources management in Sri Lanka.

In this context, the department aims to provide

- A range of learning opportunities for undergraduate students to develop knowledge and skills on basic concepts of soil science and water resources management in relation to crop production and sustainable management of natural resources in line with the academic structure of the faculty.
- Well prepared laboratory practical programmes together with series of field visits enabling students to develop their skills and the interest on the subject matter.
- Encouragement to students to gather recent advances in knowledge and technology in soil and water related disciplines and direct them to apply this knowledge to develop environmentally sound technologies.
- A supportive departmental environment to conduct research to acquire new knowledge in soil and water and to disseminate such technologies to farmers and other stakeholders.
- Trainings and guidance to develop cognitive abilities and personal and transferable skills enabling to meet the needs of potential employers.
- Support for teaching staff in their career development through formal and informal feed back and peer advice.
- Supporting service for farmers and other stakeholders to solve their problems in relation to soil and water management aspects.

(3.2) Learning outcomes

On successful completion of the degree programme, student should have:

- ✓ gained knowledge and conceptual understanding of the principles of soil science and water management aspects based on core program followed by progressively increasing depth of study.
- ✓ developed the ability to apply principles of soil science and water management to design economically viable and environmentally sound land use systems.
- ✓ learnt how this knowledge and understanding can be applied to basic and applied research that can be useful in solving problems faced by farmers specially in the dry zone of Sri Lanka.
- ✓ enhanced the capacity of personal and transferable skills (e.g. Laboratory analysis, data handling and interpretation, computer literacy, oral and written communication in English, team work and self directed learning) to apply them in different situations.
- ✓

On successful completion of the following specific programs student should have:
Core program of B.Sc degree program:

Subject knowledge and understanding: A comprehensive knowledge and understanding on: weathering of rocks and minerals, soil genesis, physical, chemical and biological properties of soil, description of soil profile, maintenance of soil fertility, organic and inorganic fertilizers, soil fertility deterioration, problem soils and remedial measures, measurements of environmental parameters, land surveying and mapping, principles of remote sensing, principles and techniques of interpretation of aerial photograph, demarcation of watershed boundaries, factors influencing agricultural productivity of watershed, conservation of natural resources in a watershed , crop water requirement,

irrigation schedules, irrigation systems, measurement of irrigation water and irrigation efficiencies

In addition students should have strengthen their ability to relate principles of soil science and water management aspects to enhance crop production and conserve natural resources. Furthermore they should have developed the skills of laboratory analysis, field investigations and interpretation of reports and data on above disciplines.

Natural Resource Management – (special course for majoring students)

Subject knowledge and understanding: An in depth knowledge and understanding on soil management, agro forestry systems, advance irrigation and water management, land use planning, soil classification, energy and waste management, water resources in Sri Lanka and resources planning for sustainable development.

In addition students should have developed their analytical abilities on applying fundamentals of above disciplines to promote agricultural production in the country. They should be capable to design and conduct basic and applied research to acquire new knowledge.

Furthermore they should have developed analytical, communication and computer skills.

(4) OVERALL JUDGMENT - *Suspended*

(5) SUBJECT REVIEW ASPECTS

(5.1) CURRICULUM DESIGN, CONTENT AND REVIEW

The curriculum implemented at the inception of the Faculty of Agriculture was developed by a group of consultants. A copy of the curriculum was not available in the faculty for perusal of the Subject Review panel. As the Dean stated, the weaknesses such as repetitions (overlapping) and inadequate coverage of subject matter were noticed during the initial implementation stage. The suitable revisions were made to the curriculum within the first year itself with the approval of the university authorities.

The revised curriculum has been followed for the past four years of existence of the faculty. The present fourth year first semester students are the most senior student group who has undergone training according to this curriculum. Since the remaining semester is allocated for research project, this group is following the last set of taught courses from the faculty. Hence, the faculty has gained experience in completing the curriculum for a batch of students. The Dept. of Soil and Water Resources Management has observed the shortcomings of the curriculum and, therefore, has given consideration to revision at faculty level. As a result, the faculty and the department will be engaged in curriculum revision in the near future.

The student feedback is obtained at the Faculty Board through the student representatives. The Dean has noted the views expressed by the students on matters related to the curriculum. On short-term basis, some revisions have been made at the faculty level as an ongoing process. The feedback will be taken into account in the future revisions.

The Dean and the Head have noted the comments by the external examiners in an informal manner. These comments have been on subject matters. Suitable amendments have made on case-by-case basis at the departmental or faculty level.

There was no evidence on external validation of the curriculum introduced at the inception of the faculty. The subsequent amendments were not presented to the external reviewers since the revision was a minor exercise. The faculty wishes to conduct an external validation activity when major revision of the curriculum is done in the future.

Design:
The present curriculum is designed as a four-year programme leading to a B.Sc. degree in agriculture. It provides opportunity to select an area for specialization after completion of the core programme, which spans for five semesters. Annexure-I gives the courses conducted by the department in the core and advanced programmes. During the core programme, the courses offered impart essential knowledge and practical skills to all students in the faculty. These courses prepare the students for the next step where they will follow advanced subjects covering applications and issues related to the discipline. The research project in the 8^{th} semester provides opportunity to gain experience in designing and conducting a study, analysing research data, interpreting and presenting information. The design of the curriculum is satisfactory to achieve the intended learning outcome.

Content:
The content of the curriculum in Soil and Water Resources Management is geared to achieve the subject specific learning outcomes stated in the self-evaluation report. It covers every essential and important aspect of Soil and Water Resources Management.

Review
The Faculty has identified revision of the existing curriculum is a need to make graduates more employable. It is intended to start a formal revision process soon. It is strongly recommended to include all the stakeholders' views and interests in the curriculum revision. It is also recommended to include job oriented course contents and skill developments in order to make the graduates find employments without any difficulty.

As one of the departments in a very young faculty, there is more opportunity to improve the curriculum. As at present, the judgement on this aspect is *unsatisfactory*.

(5.2) TEACHING, LEARNING AND ASSESSMENT METHODS

Teaching
The department offers 17 credits in the core program while 25 credits are offered in the advance program (according to the self evaluation report). Teaching is mainly done by the faculty staff in the core program where a 2 credit course is taught by a visiting lecturer. In the advance program, 9 credits (3 courses) are taught by visiting staff while 6 courses (16 credits) are taught by the department staff. Most of the faculty staff is probationary lecturers (2 out of three currently available at the department). Only one has gone through training in teaching methodology (a probationary lecturer). The others have applied for teaching methodology programs. Both of the probationary lecturers are reading for their M.Sc and M.Phil. Teachers are aware of the methodologies for student centered teaching/learning processes. In classrooms, teaching is done with the usage of

chalk-board or white board, overhead projector, multimedia-projector (in some cases only), and other tools such as handouts. In some cases the transparencies used were loaded with information and more time was given for the students to copy down the contents in the transparencies. The transparencies used in the classes were monotonous and the letter sizes were smaller. These needs to be rectified in achieving good teaching outcomes. Handouts given were helpful and descriptive. The pace at which lectures were conducted was good. The subject matter covered in the lectures observed was accurate and relevant. Anyway, the linking of the theory to the practical application in agriculture is lacking (i.e. effect of weather parameters on the variability of evapotranspiration, estimation of evapotranspiration using weather data etc.).

The information provided by formal lectures is supplemented by laboratory classes. All the courses offered by the department have practical components. Some of the practical components are covered through field demonstrations (i.e. micro-irrigation) and field visits (i.e. meteorological stations). Opportunities to gain hands on experience and developing skills to practice theoretical knowledge is not provided in many cases through farm practice field classes, which was identified by the students as one of the biggest weaknesses in the teaching at the department.

The physical resources for teaching included spacious class rooms (shared by all the departments) and a reasonably equipped laboratory (shared by other departments too). Anyway, there are some urgent need of equipment such as Kjeldhal distillation unit, fume hood, pressure plate apparatus, wet sieving systems, soil sampling kits etc.. Further, there is a difficulty in purchasing required consumables for the laboratory classes due to financial and administrative constraints. The laboratory can accommodate about 30 students at a time with difficulty. The laboratory is used for chemistry, soil science and other practical classes. Therefore, the laboratory space available at the department is not satisfactory. The students have very limited opportunities for practicing what they have learn in class rooms, due to inadequate equipment, consumables and space in laboratory. Therefore, most of the lab classes or experiments are done in group basis.

The learning processes still depends largely on teacher centered instructions, particularly during the 1st four semesters of the programme. In a way this is inevitable due to the large number of students (approximately 50 in each batch) and the relatively small number of academic staff (currently three permanent members). The laboratory classes to some extent enable students to learn things on their own, but the limited number of facilities and equipment are constraints for individual skills development. Student centered learning is mainly practiced during the 4th year of specialization especially when they are undertaking their final year project. Anyway, there are few cases of student centered learning processes practiced for very few courses during other years (i.e. Course on Watershed Management). The research project done during the 2nd semester of the 4th year is perhaps the best opportunity for the students for independent study. Discussions with the specialization students revealed that the teaching is mainly theory oriented with less field and practical oriented aspects. Anyway, the review team could not come to any final conclusions as the first batch entered the university is still in the second semester of their final year. There is no one in the faculty who has completed the final year project.

On the whole the members of the staff are making an intensive effort to improve teaching and knowledge delivery systems with the limited resources. Anyway, there is room for lots of improvements. As stated earlier, the gaps between theory lectures and the

corresponding practical classes should be minimized specially more hands on in field skills. The skill development on agriculture related activities, equipment usage, troubleshooting, operational aspects needs to be included as field visits or field demonstrations will not allow the students to gain such skills. All the batches of students with whom discussions were held, indicated this as a weakness in the system.

There is a need for trainings on the effective use of the teaching methodology concepts and tools in classroom or laboratory environments. Lack of opportunities on field sessions during the program is a disadvantage to the students.

Students are generally satisfied with the teaching by staff including the visiting staff. They have a confidence with the theoretical knowledge they gained through the lecture sessions. Anyway, they had some serious reservations on the teaching program such as:

- Repetition of subject matters in many levels and courses (i.e. nutrient deficiencies, composting, biogas production, soil erosion etc),
- Uneven distribution of course workload due to visiting lectures: This is a serious problem faced by students as most visiting lectures are either in weekends or at the end of the semester. Because of this, they have to sacrifice their weekends which prevent them from other activities such as visiting families etc.
- Teaching advance stuff before basic concepts is taught (i.e. statistics). They said that this problem is mainly rectified now.
- Less field visits on soil and water resources management subjects and less field exposure though there are laboratory classes (i.e. chain surveying was the only practical done in Land Surveying and Development course)
- Less innovative approaches in the course or only limiting the innovative technologies to theoretical classes or demonstrations (i.e. field visits to micro-irrigation systems and meteorological stations without hands on)
- Dragging the semester always beyond the scheduled time. This is partly due to the administrative problems with the reliance on visiting staff and partly due to students' requests for more time during examination period. The shifting of lectures and field visits to the study leave period has also contributed for students' requests for more time during examinations. Anyway, the third year students (first semester students) have spend 11 months more than the scheduled time and the second year students (first semester) have spend 3 months more than the scheduled time.
- Subject matter taught by temporary staff or visiting staff varies person to person on the same subject. Therefore, a stronger supervision of the work of temporary and visiting staff by the senior staff could certainly bring about an improvement.

Learning

All academic programmes are conducted in the English medium. To move from learning through the mother tongue to a foreign language must be an arduous task particularly during the 1st year. All students are given intensive courses in English (six weeks) on admission to the university. Further, English is taught as a subject in first 4 semesters. A pass in the English course is compulsory for the completion of the degree program. The review team was impressed by the competency in English among the students. Perhaps they have realized the importance of this international language to meet future challenges and career development.

The attendance of the students to the lectures was not satisfactory. Only 67% were present in the classes observed. The lecturer states that it is usual when the course is begun as students take time to come from there hometowns and settle in hostels or boarding places.

During lectures most of the students were more interested in writing down notes than listening and understanding. They seem to write down anything and everything mentioned by the lecturer or displayed on the screen. The lecturers also tend to show all the details even minor things in the transparencies (lecture class observations). The interaction between the lecturer and students were very poor. The students were not encouraged to ask questions or the staff member didn't encourage student participation in discussing facts.

The aims and objectives of the courses and intended learning outcomes of the courses or the lecture were not presented to the students and the students were not clear with the learning outcomes. The lecturers too were not clear about the intended learning outcomes and the skills developed through the subject. The practical session identified the learning outcomes. Anyway, the learning was linked to the previous courses and knowledge gained with good examples in many cases.

It is not easy to move away from this type of learning particularly during the teaching of theoretical aspects. Experienced teachers may be able to draw students into active participation during lectures and impart knowledge through effective discussion and dialogue. To some extent, this also depends on the course content. It may be desirable to include only the principal salient points in overhead transparencies and other illustrative accessories and built up the lecture around them. When detailed information is included in such material, the students naturally attempt to copy all of them without paying any attention to the explanations and comments made by the teacher. Preparation of teaching material is crucial in effective delivery of knowledge. A set of transparencies submitted to the review team by a lecturer was informative and of an acceptable standard. Besides providing training in teaching methodologies, there is a need for supervision in the preparation of teaching material and presentation through peer observation. As most of the senior staff members are lacking teaching experience, it is important to get the subjects taught (theory and practical classes) observed by experienced peers.
Majority of students appear to comprehend instructions given during laboratory and farm practice classes. One advantage in these classes is the ability of the students to move around and obtain advice on an individual basis. Anyway, safety requirements were not provided in the laboratory (i.e. eye wash, a shower, lab coats etc.).

Handouts distributed in the class or made available in the library help the students to comprehend lecture material especially for those who have difficulty in following classes in the English medium. The negative impact of providing too many handouts is, that certain students tend to keep away from lectures on the presumption that the material in the hand outs are sufficient for them to pass examinations.

The students feel that the teaching and learning encourages them to learn more. Some assignments (field based and theory based) were good tools used to encourage the students learning through interaction with outside resources, personnel and browse through internet. Though students complained about the time taken on some assignments were high, those have enhanced their analytical, information technology and other

personal skills such as interaction with people, extract information and data needed for their need etc.

Assessment methods

The department utilizes a combination of different assessment methods for the overall evaluation of student progress throughout the course. This is certainly an improvement on the conventional dependency on end term examinations. However, even with the novel changes a higher weightage is given to end semester theory and practical assessments (i.e. 60% - 70% for final theory exams, in one course 30% for final practical exam). Continuous assessments are given only 10 - 20% of the total marks. Implementation of an unambiguous, proper continuous assessment without adequate permanent staff is a difficult task. The department should therefore be given sufficient time to move from the present status of assessment to a fully fledged course unit system with less weightage being accorded to end semester examinations.

All question papers are scrutinized by a panel consisting Head of the Department and the lecturer in charge of the course. An expert is nominated by the Senate based on the recommendation of the Faculty Board for moderating and second marking of question papers. Names of the setters and the moderators for last end semester examination are provided in the self evaluation report. Based on the comments from the moderator/second marker, the assessments done by the first markers were reasonable.

The proportion of marks allocated to different component of the examination is weighted according to the number of units of theory and practical in the course, such that two practical units are equivalent to one unit of theory. The course evaluation is mainly done by an end semester examination (Prospectus 2003-2007). The end examination will be a three hour paper which is not variable with the number of credits given for the course (Prospectus 2003-2007). Practical components are either assessed by an end semester examination or by continuous evaluation. A maximum of 10 marks are allocated for continuous assessments (Self evaluation report). A letter grade is awarded based on total marks obtained by students for each and every course. The cut off marks for each grade and corresponding grade points are given in the Prospectus and self evaluation report. Anyway, in order to pass a course, a student has to score at least 35% in both theory and practical components separately. Classes are awarded based on the Grade Point Average (GPA). The GPA will be calculated as a weighted average on the grade points obtained for the different courses and the number of course credit hours (Prospectus 2003-2007).

The project work is assessed continuously at four levels, proposal preparation, field experimentation, data collection, processing of data and write-up. The four levels carry equal weight. As there were no final exams conducted yet, there could be many additions in the assessment process.

The teaching aspect and learning aspects are *satisfactory*. Anyway, there are much more to improve in teaching aspects. The assessment methods also have room for improvements.

The following are the recommendations to improve the above:

- Give more opportunities for teacher trainings specially on teaching methodology

- Give more opportunity to the staff to take part in other trainings or short courses related to the subjects offered by other organizations such as PGIA, PGIS, CapNet Lanka, etc.
- Include more hands on exercises to impart skills
- Fulfill the urgent equipment needs specially for laboratory and field sessions
- Increase the financial allocations for laboratory consumables
- Increase the laboratory facilities and the laboratory space
- Recruit more qualified staff in order to avoid much dependence on visiting lecturers. Collaborations with established universities also can help in getting qualified staff.

(5.3) QUALITY OF STUDENTS, STUDENT PROGRESS AND ACHIEVEMENT

Several groups of students were interviewed and all of them were rather enthusiastic and there were no indication of any "backwardness". Further they were quite aware of modern day realities and often compared themselves with other well established faculties like that of Peradeniya.

Three selected students in the 3rd year were interviewed with regard to their future employment plans and they had GPAs 2.1, 2.0 and 2.69. They were contend and were of the opinion that what is learned here will help them to find employment in the future, where one want to be a teacher, the other wants to be engaged in agricultural research and the third wish to seek an employment in agricultural marketing. However, they were of the opinion that classes should be more practically oriented and they should have a greater chance of interacting with agricultural related institutes in the area such as IPHT, MI Agric Research Institute, Mahaweli Authority, Irrigation Dept. Institutes, etc which can help immensely to mitigate many of the present problems in teaching.

Reviewers were not able to meet any students with exceptional academic or any other achievements. Up to this time no batch of students have passed out from this faculty.

The quality of students, student progress and the achievements are *satisfactory*.

(5.4) EXTENT OF STUDENT FEED BACK, QUALITATIVE AND QUANTITATIVE

The self-evaluation report indicates the absence of a formal mechanism for student feedback. Some academic staff members at the end of their lecture series seek an informal student feedback. In addition, the teachers take student views in verbal form. The teachers who have practiced it on their own wanted to improve themselves as teachers. These initiatives taken by some members of the academic staff are commendable. All these practices are informal but have produced some benefit to teachers as well as student community. Evidence on improvement in teaching-learning environments can be observed.

Perhaps, the student representation at the Faculty Board is one of the formal mechanisms in operation. Students agreed that they were able to bring matters to the notice of the members of the board and to obtain positive results. It was not possible to verify whether these matters were highly related to the subject being reviewed.

The review team commends the initiatives taken by certain staff to establish student feed back as a positive step in correct path, but the faculty has to establish a formal system. The initiative taken by few staff has developed to a level with a prescribed for the teacher / lecture / course evaluation. Though there are many aspects needs improvements, the review team judged this aspect as *satisfactory* having day by day improvements. The review team wishes to recommend incorporating a formal independent system of teaching evaluations. This should include class room teachings, lab classes, field classes, field trips and the course evaluations separately.

(5.5) POSTGRADUATE STUDIES

The department or the faculty does not offer any postgraduate courses or programs at the moment.

Appropriate support and resources for postgraduate studies

The department staff is not engaged in any research activities other than the final year projects and the probationary staff members postgraduate study related research works. There are few resources available at the department which could be used in research activities. Anyway, there is a big shortage of analytical equipment and consumables which hinders research. The atomic absorption spectrophotometer is not functioning which needs minor repairs and maintenance. The probationers complain that the shortage of staff hinders them doing research and postgraduate studies due to the work load they have to complete. Due to this, they have to do part time postgraduate studies.

Critical mass of permanent research active academic staff

At present the department does not have a critical mass of research active permanent staff. An improvement of this situation is essential for the betterment of the teaching and leaning in the faculty and the department.

Availability of trainings, research methods and other areas

Only one staff member has done the teaching methodology training program. The participation of the department staff as resource personnel in external training programs is in a minimum level. The opportunity for the participation in trainings, short courses and staff development activities/programs are also at a minimum level. This is due to delays in receiving information on such activities or programs. The staff complains that always such information reaches the department or the faculty after the deadline. Therefore, it is really difficult to apply and get selected for such activities. Further, the staff has to go through another barrier in applying such programs or activities. The applications should go through a committee at the university level. The approval of this committee is essential in getting financial support for such activities. Unfortunately, there is a delay in the approvals so that most of the deadlines are past by the time approval is granted.

As there are no research students and staff research programs, there is least opportunity to develop research methodologies and related skills among the staff and students. Therefore, initiation of research by the academic staff is highly encouraged. The university location is very good to commence with applied research in agriculture related aspects. Further, the availability of other institutes around the university (i.e. FMTC,

FMRC, Mahailluppallama Research Station, IPHT etc.) is a grate opportunity for collaborative research. Therefore the review team strongly recommends to have collaborative research activities with other local organizations, NGOs and private sector organizations. Collaborative research activities with established faculties are also encouraged.

As a conclusion, the postgraduate related activities are *poor and unsatisfactory* with the department. There are lots of aspects need to be improved.

(5.6) PEER OBSERVATION

It is evident from the self evaluation report that formal peer observation does not happen. Teacher evaluation, course evaluation by the student is practiced in an informal manner. In most cases there were no prescribed format used. In some cases a prescribed form is used. This form has not got the approval from the faculty board. Anyway, the evaluation is not compulsory for any teacher at the department or the faculty and it is up to the teacher to conduct it.

The student evaluation results were used by the staff members to improve some aspects in their teachings (i.e. the pace, material in transparencies, clarity of transparencies etc.). They have noticed that the evaluation by students have helped them improve their teaching.

It is recommended that a peer observation and evaluation system be formalized and implemented as a regular feature in the administration of the department. As a beginning, peer observation could be included as an agenda item in the regular meetings of the departmental committee.

Currently the status of peer observation is *satisfactory because of the initiatives taken by introducing a prescribed format and a form for the observations in the class. Further, the peer observation is available through the external examiners in evaluating the examination papers and answer scrips*. Anyway, the entire Faculty can implement a scheme of peer observation, until each department secures a critical mass of postgraduate qualified, experienced teachers.

(5.7) SKILLS DEVELOPMENT

Skills development as opposed to acquiring knowledge is only possible through engagement in regular and constant practice of required techniques. These techniques as far as a graduate in agriculture is concerned not necessary be laboratory but could easily be out in the field, and perhaps sometimes even with farmers.

In this respect it is evident that neither the students nor the staff was satisfied with the way the present practicals are conducted. This is an important area where more attention is required. Conventionally many of us tend to orient our thinking on a program of "laboratory centered practical" which is not necessarily be the case, especially in a new faculty with many resource limitations. The reviewers attended a class on Soil Fertility and then a practical class in Soil organic matter determination which was done with "Chromic Acid Method", but teachers had no idea that it also could be done cheaply by incinerating the soil. A muffle furnace was available. A short visit across the road to

natural areas could be done where a soil sod could be demonstrated with several important aspects of soil fertility with simple approaches. For future employability of agricultural graduates these aspects needed to be reconsidered.

Limitations in practical training whereby skill development can be impeded; has been directly addressed in several places in this report and therefore what is presented are some suggestions for improvement. In this regard one effective way is for the young staff to interact with senior professionals in their fields of specialty elsewhere, where the staff member will have the benefit of learning "how to handle a real situation through hands on the job experience". The agriculturally related institutes in the area can serve as useful resource centers for this purpose.

The formation of critical mass or group of academics (see also section 5.5) need to be encouraged and such a process is hastened by an approach which considers an academic department as "a unity of teaching and research" in the particular subject area.

There are many efforts taken by the department and the faculty to impart skills among the graduates with the available minimum facilities. The skills development is also discussed under section 5.2 with some recommendations to improve those. The review team judged this aspect as *satisfactory* and needs more considerations in improving those.

(5.8) ACADEMIC GUIDANCE AND COUNSELING

Students were satisfied with the help they receive from staff with respect to various difficulties they encounter in the faculty. At least none of them highlighted any problem pertinent to this area.

However, the general difficulties discussed elsewhere with respect to academic programs in the report (ex. section 5.2) remains to be resolved and will not be discussed here.

The review team judged this aspect as *satisfactory.*

(6) CONCLUDING REMARKS

Based on the observations made during the visit by the review team, the eight aspects were judged as follows:

Aspect Reviewed	**Judgment Given**
Curriculum design, content and review	unsatisfactory
Teaching learning and assessment methods	satisfactory
Quality of students including student progress and achievements	satisfactory
Extent and use of student feedback, qualitative and quantitative	satisfactory
Postgraduate studies	unsatisfactory
Peer observations	satisfactory
Skills development	satisfactory
Academic guidance and counseling	satisfactory

Annex A

Core Program Subjects Offered by the Department of Soil and Water Resources Management

Year 01 Semester 01

SWBC 1102- Basic Chemistry

- Introduction to Analytical Chemistry and its Relevance to Agricultural Science
- Terminology and Basic Concepts; Chemical Formulae and Chemical Equations, Stoichiometry
- Qualitative and Quantitative Analysis; Gravimetric Analysis, Volumetric Analysis
- Principles of Colorimetry and Potentiometry
- Principles of Analytical Instruments; Flame Photometry, Spectrophotometry

Year 01 Semester 02

SWSP 1203- Soils and their Properties

- Introduction to soil science
- Rocks and minerals
- Classification of rocks minerals and their physical and chemical properties
- Weathering of rocks and minerals
- Soil genesis
- Factors and processes of soil formation
- Description of soil profile
- Physical chemical and biological properties of soil
- Major soil groups of Sri Lanka and their characteristics.

Year 02 Semester 01

SWLS 2102- Land Survey and Development/ Geographical Information Systems (GIS)

- Introduction to surveying methods employed for mapping
- Leveling and techniques used for contouring
- Cut and fill calculations
- Surveying and leveling applications in agriculture
- Land development machinery and application
- Principles of remote sensing
- Concept of multispectoral remote sensing sensors and data acquisition
- Collection of *in situ data*
- Principles and techniques of interpretation of aerial photography

SWSF 2103- Soil Fertility and its Characteristics

- Factors governing soil fertility and their relative importance
- Assessment of soil fertility
- Maintenance of soil fertility

- Organic and Inorganic fertilizers
- Fertilizer application techniques
- Role of organic material in maintaining soil fertility
- Agricultural practices leadining to soil fertility deterioration
- Problems of soil fertility
- Problem soils and ameliorative /remedial measures

SWAM 2102 -Agro Meteorology

- Introduction to Meteorology; Meteorology, Agro Meteorology, Role of Agro Meteorology to Agriculture
- The nature and Composition of Atmosphere; Composition of Atmosphere, Thermal Structure of Atmosphere;
- Energy Exchange in Earth Atmospheric System; Introduction to Electromagnetic Radiation, Solar Radiation, Terrestrial Radiation, Planetary Balance of Radiation, Greenhouse Effect and Global Warming
- Meteorological Stations and Installation Requirements
- Measurement of Environment Parameters; Atmospheric Pressure, Wind Velocity and Direction, Temperature, Radiation, Humidity, Precipitation, Cloud Development and Major Types of Clouds, Evaporation and Evapotranspiration
- Tropical Meteorology and Climate of Sri Lanka
- Microclimatology with special reference to Crops, Domestic Animals and Man
- Influence of Man on Climate; Industrial Development and Agriculture on Climate Change

Year 02 Semester 02

SWWS 2202- Watershed Management

- Definition of watershed
- Demarcation of watershed boundaries including aerial photography
- Factors influencing agricultural productivity of a watershed (hydrologic, soil, plant and human factors)
- Stratergies for soil and water conservation
- Optimization of conditions for better watershed management

Year 03 Semester 01

SWIR 3103-Principles of Irrigation

- Soil moisture potential
- Field capacity
- Available moisture
- Evapotranspiration
- Crop water requirement
- Irrigation schedules
- Irrigation systems (furrow. Bed, basin, sprinkler, drip)
- Flow control and management using weirs, flumes, current meter,
- Irrigation efficiencies

Advanced Program Subjects Offered by the Department of Soil and Water Resources Management

Year 03 Semester 02

SWIM 3202-Irrigation and Water Management

- Historical background of irrigation system development in Sri Lanka
- Components of an irrigation system
- Its performance in relation to their objectives
- Irrigation efficiencies
- Water losses and its control
- Crop response to irrigation
- Cost benefit analysis of irrigation systems
- Irrigation project planning and management

SWLP 3203- Land Use Planning

- The spatial aspects of man's activities on land.
- The history and process of planning
- Land use statistics and classification
- Land conservation
- The nature of planning countryside agriculture
- Forestry and other land competitors
- National policies agencies and interaction

SWSM 3203 - Soil Survey and Classification

- Introduction to soil survey and classification
- Factors affecting to soil formation
- Historical development of soil classification
    - (in other counties of the world and in Sri Lanka)
- Modern soil classifications
- FAO/UNESCO classification
- USDA classification
- USDA soil taxonomy
- Epipedons
- Subsurface horizons
- Characteristics of diagnostics
    4. Identification of taxonomic classes
- Orders of soils
    - Alfisols Oxisols
    - Aridisols Spodosols
    - Entisols Ultisols
    - Histosols Vertsols
    - Inceptisols Andisols
    - Molllisols Gelisols
- Preparation for a soil survey
- Examination and description of soils in the field
- Soil mapping and survey report

SWDF 3202- Dry Farming Concepts

- Introduction to dry farming concepts
- Climate in the dry zone of Sri Lanka
  Rainfall, Temperature, Evapo-transpiration, Sunshine hours
  * Agro ecological zones
- Soils of dry zone of Sri Lanka
- Soil water
  Soil water energy concept. Soil moisture retention curves.
  Available water, Soil water movement
- Crop adaptation to moisture stress
- Antitranspirants
- Conservation farming
  Zero tillage, Mulching. Mix cropping, Crop rotations.
  Alley cropping. Chena cultivation
- Rain water harvesting
- Soil erosion and erosion control measures
- Role of organic matter in dry farming
  Importance of organic matter, Sources of organic matter,
  Importance of compost and compost preparation

SWSM 3202- Soil Management

- Principles of Soil Management
- Characteristics of Problems in Soil
- Soil Reaction; Acidity, Alkalinity and Acid Sulphate Soils
- Submerged Soils
- Salt Affected Soils
- Bog and half bog soils
- Eroded Soils
- Soil Organic Matter Management
- Soil Amendments
- Contaminants / Pollutants
- Nutrient Enrichment and Impoverishment and Water Pollution
- Fertilizers in Soil Degradation and Management of Fertilizers
- Soil Conservation

Year 04 Semester 01

SWCH 4103- Catchment Hydrology

- Definition of a catchment for water bodies
- Water conservation concepts
- Agricultural impacts
- Ecosystem management
- Major and minor tanks in Sri Lanka
- Calculation and computation of input and output of flow systems
- Determination of command area of a tank
- Forestation and deforestation in a catchment

SWSS 4203- Soils of Sri Lanka

- Introduction and history of soil surveys in Sri Lanka

- Soil formation and Morphological characteristics
- Classification of soils
- Soils of the wet-zone of Sri Lanka
  - Climate
  - Physiography
  - Soils on depositional surfaces (Series level)
  - Soils on erosional/residual surfaces (Series level)
- Soils of the intermediate zone of Sri Lanka
  - Climate
  - Physiography
  - Soils on depositional surfaces (Series level)
  - Soils on erosional /residual surfaces (Series level)
- Soils of the dry zone of Sri Lanka
- Risks and limitations of wet, intermediate and dry zone soils
- Management of wet, intermediate and dry zone soils

SWEF 4102- Energy and Waste Management

1. Energy Management

Solar Energy

- Introduction to Solar Energy
- Solar Radiation, It's measurement and Solar Energy Resource in Sri Lanka
- Solar Energy Technology
  - Photo - thermal Conversion
  - Photo – voltaic Conversion
  - Storage of Solar Energy
  - Auxiliary Energy Supply
  - Concentrating Devices
- Applications of Solar Energy
  - Water Heating
  - Grain and Crop Drying
  - Solar Heating for Tea Industry
  - Domestic photo – voltaic lighting systems
  - Photo – voltaic water pumping

Wind Energy

- Introduction to Wind Energy
- Energy in the Wind
- Wind Characteristics
- Principles of Wind Energy Conversion
- Wind Power for Water Pumping

- Bio gas
- Role of Bio gas in Energy Systems
- Bio gas as an Energy and Environmental management tool
- Properties of Bio gas
- Uses of Bio gases
- Bio gas Generation

- Hydro Power
- Introduction
- Small Hydro Power Generation

2. Waste Management
    - Introduction to Waste Management, Impact of Agricultural Activity on Environment, Waste Generation Streams
    - Waste Characteristics
    - Basic Biological Processes; Aerobic, Anaerobic, Facultative, Photosynthetic, Suspended Growth, Adherent Growth
    - Micro organisms; Bacteria, Fungi, Algae, Protozoa, Rotifer, Crustacea, Biochemical Transformations; Carbon, Nitrogen, Phosphorus, Sulphur, Oxygen and pH
    - Biological Treatment and Chemical Parameters for Designing and Monitoring; Total Solids, Volatile Solids, Volatile Suspended Solids, Dissolved Oxygen, Biochemical Oxygen Demand, Chemical Oxygen Demand, Chemical Oxygen Demand, Total Oxygen Demand
    - Effluent Treatment; Oxidation ponds, Aerobic Ponds, Anaerobic Ponds, Aerated lagoons, Aeration Units
    - Physical and Chemical Treatment; Disinfection, Chlorination, Chemical Precipitation, Sedimentation and Floatation
    - Waste Water Treatment Systems for Industry for a Cleaner Environment
    - Solid Waste Management; Generation Streams, Agricultural and Urban Waste Management Techniques, Land Disposal, Sanitary Landfills, Incineration, Recycling and Reuse, Pyrolysis, Gasification
    - Household Waste Management
    - Plastic Waste Management
    - Waste Management Practices in Sri Lanka – An Overview