



PEATWISE

New Educational Tools for Sustainable Management of Peatlands in the Humid Tropics

**H.C. Jansen
Report of Short Mission
14-25 June 2004**

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1 GENERAL OUTLINE

The curriculum framework for the Peatwise-project consists of six clusters of sub-disciplines (modules). These modules will be developed by *working groups* of staff from the various institutions. During the Inception Workshop of 30 September / 1 October 2003 at Kuching, these working groups were preliminarily appointed (Alterra-ILRI, 2003).

During the Inception Workshop, it was also decided that Wageningen UR would be the leading partner for the development of 2 modules, being:

- Water Resources and Hydrology;
- GIS and Remote Sensing.

The contents of the modules will be based on the market needs, which have been assessed in Phase 1 of the project, and on the existing curricula and study programmes at the universities. This will ensure that the new modules will meet the requirements and also fit in the existing academic structures. During the Inception Workshop the preliminary contents of the modules were discussed.

The modules "Water Resources and Hydrology" and "GIS and Remote Sensing" will be developed through *collaborative research programmes*. These programmes will partly be conducted in Wageningen, and partly in Kuching and Palangka Raya. Both UNIMAS and UNPAR will contribute to these collaborative research programmes.

Within the framework of the development of the two modules, a short mission was undertaken, aimed at:

- Final appointment of (South East Asian) members of working groups, especially for the modules "Water Resources and Hydrology" and "GIS and Remote Sensing";
- Establishment of the Terms of Reference for the collaborative research programmes;
- Planning of timing and staffing of the research;
- Preparatory activities for the collaborative research programmes (for these two modules);
- Addressing critical aspects of Distance Learning / use of ICT;
- Financial reporting of 1st project year (April 2003 / April 2004) and procedures with respect to the financiers' requirements.

Results of the mission are given in Chapters 2 – 7. A list of persons that contributed to the mission is given in Appendix I and II. A list of action points to be executed is given in Appendix X.

2 WORKING GROUPS ON COURSE MODULES

2.1 INTRODUCTION

During the Inception workshop of September/October 2003, working groups were formed, each group having a specific task within the project (Alterra-ILRI, 2003).

After the establishment of the Terms of Reference (TOR) for the collaborative research programmes, these working groups were slightly adapted, based on an assessment of the individual expertises and ambitions with reference to the TORs and to the other project activities, as well as professional commitments of the involved experts.

2.2 INPUT OF UNPAR

UNPAR will assign the following staff members to the various working groups:

- Curriculum accreditation, incorporation of Peatwise in MSc “Management of Natural Resources and Sustainable Development”: Suwido Limin (through the Vice-Rector).
- Ecology, Natural Resources and Environment: (to be confirmed) Mrs. Yulintine. See also remarks in Section 2.3.
- Hydrology and Water Resources: Adi Jaya¹, with support from Sulmin Gumiri
- Integrated Land Evaluation (Soil and Land Use): Yustinus Sulistiyanto will co-ordinate the implementation of this module (he will liase with Prof. Dr. Ir. Salampak, MS)
- Human Dimensions and Resource Economics: Tampung Nias Saman (special interest in Environmental Education) and Kumpiady Widen will give support to UNIMAS.
- GIS and Remote Sensing: Sehat Jaya Tuah², with support from Komang Gde Suastika
- Field courses and research projects: Yusurum Jagau will give support to UNIMAS.
- ICT and Distance Learning. Mr. Tampung Nias Saman will give support to UNIMAS.

¹ Will go to Wageningen UR for collaborative research (7 weeks)

² Will go to Wageningen UR for collaborative research (8 weeks)

2.3 INPUT OF UNIMAS

UNIMAS will assign the following staff members to the various working groups:

- Curriculum accreditation, incorporation of Peatwise in post-graduate diploma course: Murtedza.
- Ecology, Natural Resources and Environment: Siti Rubiah Zainudin will give feedback / support to UNPAR and UNILEI.

It was noted that this module should have three scale levels:

1. International, including the general concepts
2. Regional (focussed on South East Asia)
3. Site-specific (country-specific)

For the country-specific aspects (for example national policies, practises and legislation) parallel material should be developed, while the international and regional components can be addressed by a common course contents.

It was estimated that approximately 50 % of the module (the general concepts and part of the regional component) can be developed through the collaborative research programme in Leicester, while the remaining should be developed in the respective country.

- Hydrology and Water Resources: Lau Seng³ (together with Adi Jaya from UNPAR).
- Integrated Land Evaluation (Soil and Land Use): Wan Sulaiman Wan Harun will give support to UNPAR.
- Human Dimensions and Resource Economics: Gabriel Tongga Noweg. He will ensure that Tampung Nias Saman and Kumpiady Widen will be involved in this work. Local meetings / workshop are required.
- GIS and Remote Sensing: Harwant Singh⁴ (together with Sehat Jaya Tuah from UNPAR)
- Field courses and research projects: To be decided

It is proposed that the module “Field course and Research Projects” will be further subdivided in “Interdisciplinary Research Methodologies”, the “Field Course” and a “Research Project”. To ensure good co-ordination with UNPAR, it was decided that staff from UNIMAS will visit Palangka Raya later in 2004.

- ICT and Distance Learning. Two scenarios are possible (depending on whether Fitri Suraya Mohamad will manage to start her PhD):

³ Will go to Wageningen UR for collaborative research (5 weeks)

⁴ Will go to Wageningen UR for collaborative research (8 weeks)

1. Fitri will start her PhD in September 2004, according to plan (in London). Then a colleague will be appointed to do the collaborative research on ICT and Distance Learning at UNILEI, while Fitri will give support and feedback from London.

Alternatively:

2. Fitri will do the collaborative research on ICT and Distance Learning (in Leicester).

A decision will be taken by July 2004.

3 COLLABORATIVE RESEARCH

3.1 TERMS OF REFERENCES

Draft Terms of Reference for the collaborative research programmes were sent prior to the mission and further discussed during the mission. Updated versions are presented in Appendix III and IV for, respectively “Hydrology and Water Resources” and “GIS and Remote Sensing”. The detailed programme will be worked out by WUR (Herco Jansen and Ron van Lammeren).

It was decided that, prior to the actual implementation of the modules, the collaborative researchers will elaborate a detailed proposal, which presents learning objectives, detailed descriptions of the subjects to be included in the module, time schedule, didactical/learning methods (e.g. theoretical lectures, self-study, individual exercises, group exercises, assignments, field work, etc.), materials and equipment (e.g. hand-outs, manuals, CDs, computers, articles, etc.), with special attention to the use of innovative educational methods and the use of ICT.

It was decided that WUR (Herco Jansen) would work out a more detailed proposal on the module contents for “Hydrology and Water Resources”. In principle the UNIMAS course descriptions should be obeyed, but there is room for adaptations on the basis of the experience of the involved staff. The UNIMAS course descriptions for “Hydrology and Water Resources” and “GIS/Remote Sensing” are given in Appendices VIII and IX.

Implementation will start after the evaluation of comments from the members of the working groups. Section 3.2 and **Error! Reference source not found.** presents details on the time schedule and appointed staff from UNPAR and UNIMAS.

3.2 WATER RESOURCES AND HYDROLOGY

Mr. Adi Jaya (UNPAR) will be responsible for “Water Resources and Hydrology”, together with Dr. Lau Seng from UNIMAS. The programme will be guided / supervised by Herco Jansen. Mr Jaya will work on the collaborative research

programme before and after the “International Course on Land Drainage”, which he will attend from 6 September to 26 November 2004. The periods of his collaborative research will then be:

- From 9 August to 3 September 2004
- From 29 November to 17 December 2004

Dr. Lau Seng will also participate in the collaborative research programme on “Hydrology and Water Resources”, from 25 October to 26 November 2004.

Hence both staff will be in Wageningen during the same period (although not simultaneously working on the programme). Herco Jansen will investigate whether Dr. Lau Seng may participate in selected topics of the scheduled short course on “Computer Models in Irrigation and Drainage” (held at Wageningen from 1 to 12 November 2004). Possible topics are the DUFLOW or SWAP model. The costs of participation will be covered by WUR. Adi Jaya will follow this course entirely.

It was also decided that an assessment would be made on feasible models to be used in the curriculum. Possible alternatives are listed in the UNIMAS course descriptions (MIKE packages, MODFLOW family, etc.), however, more models should be evaluated (see also [Jansen, 2003]).

3.3 GIS AND REMOTE SENSING

Mr. Sehat Jaya Tuah (UNPAR) and Dr. Harwant Singh (UNIMAS) will be responsible for “GIS and Remote Sensing”. The programme will be guided/supervised by Dr. Ron van Lammeren. Both staff will participate in the collaborative research programme during the same period, being:

- From 6 September to 29 October 2004

As “GIS and Remote Sensing” is a relatively new subject at UNPAR and UNIMAS, the collaborative research programme will have a significant training component for both staff. Both will, most probably, follow selected lectures of the Wageningen UR MSc programme, which starts on 6 September 2004.

It was also decided, that hand-on material need to be developed and that software packages may need to be acquired. It was remarked that new packages (ARC-GIS) and new extensions to existing packages have become available. It may be considered to purchase a limited number of extensions or new software rather than to extend the number of licences of certain packages (such as ARCVIEW, of which the Faculty presently holds 2 licences).

4 EMBEDDING IN ACADEMIC STRUCTURE

4.1 UNPAR

4.1.1 Existing MSc programmes

Presently, the University of Palangka Raya does not provide an MSc programme by itself, but they run several MSc programmes in collaboration with the University of Brawijaya, Malang (East Java). None of these MSc programmes have a distinct link with the activities within the Peatwise project. All MSc programmes are given in Indonesian.

At several Indonesian universities subjects are lectured at MSc level, which are related with the curriculum to be developed under the Peatwise-project. However, there is no formal co-operation between these universities and UNPAR. Such co-operation is also not considered to be feasible at this stage.

4.1.2 Planned MSc programme

The plans to develop a master programme on “Management of Natural Resources and Sustainable Development” at UNPAR date back to 1995. Various short courses have already been developed that should eventually fit in this programme (Adi Jaya and Tampung N. Saman, 2001, 2003 and 2004). The envisaged MSc programme will be lectured in English.

The development of the masters programme is supported by the British Council. The programme is now under (Indonesian) accreditation. The National Accreditation Board (BAN) has now assigned the “Level C” to this programme, which means that the programme is still not accredited. It is expected that the “Level B” can be achieved in the coming year. This level will allow for providing masters courses that are acknowledged within Indonesia. However, the “Level A” is required for an international programme.

It is aimed that the curriculum development project “Peatwise” fits within the development of the MSc programme “Management of Natural Resources and Sustainable Development” and that the project results will enhance the accreditation procedure.

Anticipating the MSc programme, UNPAR intends to continue with the short courses at post-graduate level. These short courses should eventually evolve in the MSc programme. The results of “Peatwise” should first be incorporated in these short courses (and later in the MSc programme).

UNPAR highlighted the need to test the modules, even if the MSc programme is not yet complete. Project funds are available for this purpose. The desired number of participants will be determined during the mid-term review in November 2004.

4.1.3 English Language Training Centre

The envisaged MSc programme “Management of Natural Resources and Sustainable Development” will be lectured in English. For many Indonesian students, their level of English is, however, not sufficient to follow the lectures. For this reason UNPAR is setting up an English Language Training Centre.

The training centre should prepare students to follow an MSc programme, either at UNPAR or abroad. The envisaged English course will have approximately 5 modules (5 levels) of 2 months. Hence the full English course will take approximately 1 year (5 x 2 months). It is planned that 16-20 students will follow the course annually. After completing the course, some of the students may apply for a fellowship to study abroad, while the others can continue to follow either post-graduate short courses or an MSc at UNPAR:

Year 1	Year 2	Year 3	Year 4
16-20 candidates: - English course	1-2 Fellowships: - BC - NEC - Etc. Others: - MSc UNPAR - Short courses	Continuation of Year 2	
	16-20 new candidates: - English course	1-2 Fellowships: - BC - NEC - Etc. Others: - MSc UNPAR - Short courses	Etc.

The language-training course will also be open to university staff (especially new university staff) and employees of the local government.

A building with 3 rooms has been made available by UNPAR. Each room may accommodate a maximum of 20 people. In terms of staff, 5 teaching staff are available to the centre, in addition to the Director (Mr. Tampung N. Saman).

A start has been made to acquire equipment, but the existing equipment is not sufficient to run the course.

So far the English Language Training Centre has been encouraged and/or supported by the Netherlands Education Centre (NEC), the British Council (BC) in Jakarta (a language expert worked for 3 months at UNPAR) and the Centre for English Language and Education (CELE) in Nottingham.

It was decided that UNPAR (Mr. Tampung N. Saman) will prepare a draft proposal for support to complete the training centre. The proposal should also highlight what has already been achieved and what has been UNPAR’s own contribution.

Wageningen UR (Herco Jansen) will contact NEC to inform them on the centre, the Peatwise- and other projects, and the importance of the centre for the various projects, and to explore the options of financial support for equipment.

4.2 UNIMAS

4.2.1 Post-graduate diploma course

It is aimed that the curriculum development project “Peatwise” will result in a post-graduate diploma course in “Peatland Management”.

The working paper / proposal for accreditation has already been composed (Fakulti Sains dan Teknologi Sumber, 2004) and approved by the Faculty of Resource Science and Technology. The proposal is now being approved by the “Post-graduate Committee”, while it is expected that the Senate of UNIMAS will approve the accreditation application by July 2004.

UNIMAS expects to complete the accreditation procedure (by the Ministry of Education) by the end of 2004. The course is aimed to start in March 2005.

The total duration of the course is approximately 1 year. The first year will be a try-out year, in which participants may follow only a part of the programme. However, course participation should not be without commitment. The participants should, therefore, receive a recognised certificate upon completion of any of the modules.

4.2.2 Pre-graduate course on Water Resources and Hydrology

The Faculty of Resource Science and Technology is currently involved in the preparation of a pre-graduate course on Water Resources and Hydrology. No further details were discussed. UNIMAS was informed on the contents of similar courses at Wageningen University (Jansen, 2003).

5 DISTANCE LEARNING AND ICT

In Indonesia, some initiatives are being developed to introduce Distance Learning. The Udayana University (Bali) has offered UNPAR to assist in the introduction of infrastructure for Distance Learning. The Vice-Rector of UNPAR shows a positive attitude towards Distance Learning, however, significant investments need to be made.

At present, the Faculty of Agriculture at UNPAR depends on telephone lines for email and internet access. There are two providers in Palangka Raya, who offer fast (wireless) internet connections. It is possible to purchase required hardware with project funds, however, the running costs charged by these providers are extremely high.

Monthly subscription costs were reported to be in the order of Rp 3,500,000 (approximately € 300/month) for 8 lines and Rp 5,000,000 (approximately €

425/month) for 12 lines. The only faculty at UNPAR having a fast internet connection is the Faculty of Engineering (subscription for 8 lines).

Three possible strategies were identified to improve the ICT facilities at UNPAR:

1. Co-operation/integration of the activities on ICT/Distance Learning for the Peatwise-project within the initiatives developed at central university level. If investments in ICT and Distance Learning are jointly made through Peatwise and the Faculty of Agriculture/central university level, there will be better perspectives of long-term sustainability (such as maintenance and follow-up investments), while the operation and management of the system will, most probably, also become easier.
2. Co-operation with the Faculty of Engineering. It may be an option that the Faculty of Engineering upgrade their internet connection from 8 to 12 lines, and that 4 lines become available to the Faculty of Agriculture (who pay the costs of upgrading –approximately € 125/month-).
3. Co-operation with other projects (e.g. STRAPEAT, RESTOPEAT) in order to share costs.

It was decided that Suwido Limin and Tampung N. Saman will liaise with the responsible entities of UNPAR to assess whether there is a possibility for co-operation/integration of the respective ICT/Distance Learning activities in the Peatwise-project and initiatives developed at central university level. They will also investigate the options of co-operation with the Faculty of Engineering and other projects.

The ICT facilities at UNPAR should at least facilitate good communication through emails and the easy exchange and downloading of documents, study materials, reports, etc. through the internet.

UNIMAS have already implemented an extensive and fast internet connection, which can be used for Distance Learning with relatively small adaptations and /or investments.

6 PREPARATORY ACTIVITIES COLLABORATIVE RESEARCH

6.1 INTRODUCTION

The market needs, being the base of the new modules, have already been assessed in Phase 1. In addition, the new modules should fit in the existing academic programmes, which means that they should constitute a logical continuation of the existing undergraduate- and BSc-study programmes at UNPAR and UNIMAS.

To ensure minimum overlap with the existing undergraduate and BSc-programmes and to avoid gaps between the new modules and existing programmes, the existing curricula have been analysed in more detail. An inventory of all subjects which are

related to "Water Resources and Hydrology" and "GIS and Remote Sensing" was made and a description of the outlines of these subjects given.

Finally a start was made with the collection of existing study material on the subjects (in any language), which has to be completed before the collaborative research in The Netherlands.

6.2 EXISTING STUDY PROGRAMME UNPAR

6.2.1 General outline

The Faculty of Agriculture offers four study programmes at undergraduate level:

- Agronomy
- Socio-economics
- Forestry
- Fishery

Each of these programmes covers 8 semesters (4 years). After completing the programme, the student has access to the MSc study programme.

The Faculty of Agriculture also offers 3-years diploma programmes. These programmes, however, concern more technical education and do not give access to MSc studies.

As the Peatwise modules will be developed for post-graduate level ("road to an MSc diploma"), only the undergraduate programmes are considered.

6.2.2 Agronomy

The following subjects are related to "Water resources and Hydrology".

Sem.	Subject	Code UNPAR	SKS	Specif. SKS	Total study load (hours)
II	Basics of Climatology	CAKU1012	2	2-0	≈ 60
IV	Water management	CACK1052	3	2-1	≈ 75
V	Conservation of soil and water	CBCK1051	3	2-1	≈ 75
VI	Peatlands and water dynamics	CAKL1003	3	2-1	≈ 75
VI	Agricultural Hydrology	CBKL1171	3	2-1	≈ 75

There are no subjects given that are related to "GIS and Remote Sensing".

6.2.3 Socio-economics

The following subjects are related to "Water resources and Hydrology".

Sem.	Subject	Code UNPAR	SKS	Specif. SKS	Total study load (hours)
II	Basics of Climatology	CTAN1071	3	2-3	≈ 110

There are no subjects given that are related to “GIS and Remote Sensing”.

6.2.4 Forestry

The following subjects are related to "Water resources and Hydrology".

Sem.	Subject	Code UNPAR	SKS	Specif. SKS	Total study load (hours)
II	Climatology	CFKL1022	3	2-3	≈ 110
VI	Forest hydrology	CFKL1152	3	2-3	≈ 110
VI	Water basin management	CFCK1102	2	2-0	≈ 60

The following subjects are related to GIS and Remote Sensing”:

Sem.	Subject	Code UNPAR	SKS	Specif. SKS	Total study load (hours)
V	Satellite images	CFCK1071	3	2-3	≈ 110
VII	Introduction to GIS (optional)	CFKL1141	2	2-0	≈ 60

6.2.5 Fishery

The study programme “Fisheries” has three specialisations:

- Management of Aquatic Resources
- Aquaculture
- Fish processing technology

The following subjects are related to "Water resources and Hydrology".

Sem.	Subject	Code UNPAR	SKS	Spec. SKS	Total study load (hours)
II	Hydroclimatology	CTAN1092 CIKL1042	2	2-0	≈ 60
VI	Management of water quality *	CICK1072	3	2-3	≈ 110

* Specialisation “Aquaculture” only

There are no subjects given that are related to “GIS and Remote Sensing”.

Many subjects are related to “Aquatic Ecology”. The entire curriculum of the study programme “Management of Fishery Resources” is presented in Appendix VII.

6.2.6 Staff

The university staff is organised per department (programme). This means that there is limited or no pooling or sharing of expertise. Each lecturer develops his/her own subject and study material. This implies that a certain subject, which is taught in various programmes, can be lectured by different lecturers, for example "Climatology"; see Section 6.2.2 to 6.2.5.

At the Department of Fishery, the responsible staff for subjects related to "Water Resources and Hydrology" are:

- Ir. Inga Torang, M.Si (post-graduate)
- Ir. Kembarawati, M.Si (post-graduate)
- Ir. Petrus

6.2.7 Study material

In general, undergraduate students have very limited access to study material, such as lecture notes, handouts, manuals and books. The library contains some reference books, either written by Indonesian authors (e.g. Wisnubroto et al.), or translated from English reference books. The access to journals is also very limited.

MSc students may find more study material. The majority of the lecturers are from Java, they often have developed study material.

Internet access is very restricted. With the exception of the Engineering Faculty (who have a wireless internet connection), all faculties depend on telephone lines for internet use. The downloading of information is, therefore, difficult, often interrupted, and relatively expensive.

6.3 EXISTING STUDY PROGRAMME UNIMAS

6.3.1 General outline

The Faculty of Resource Sciences and Technology offers five study programmes at undergraduate level:

Resources Science and Management

- Aquatic Resources Science and Management
- Plant Resources Science and Management
- Animal Resource Science and Management

Resources Technology

- Resources Chemistry
- Resources Biotechnology

Each of these programmes covers 6 semesters (3 years). The total study load is 82 or 83 credits. The study load per semester varies from 10 to 16 credits.

After completing the programme, the student has access to the MSc study programme.

6.3.2 Resources Science and Management

There are no subjects given that are related to (quantitative) "Water resources and Hydrology". However, there are several subjects taught which are related to (aquatic) chemistry.

The following subjects are related to GIS and Remote Sensing”:

Aquatic Resources Science and Management / Plant Resources Science and Management

Sem.	Subject	Code UNIMAS	Credits	Total study load (hours)
3	Remote Sensing & GIS	STF3022	2	80

Animal Resources Science and Management

Sem.	Subject	Code UNIMAS	Credits	Total study load (hours)
5	Remote Sensing & GIS	STF3022	2	80

7 MISCELLANEOUS PROJECT MATTERS

- A request for a small amendment of the budget will be sent to the EU, in terms that UNIMAS will have the option of one additional flight to Europe. More staff is being involved in the collaborative research programmes, while UNIMAS also want to have the flexibility to visit the EU at Brussels when required. The number of days abroad will be reduced accordingly.
- Original invoices of the first years' activities were submitted by UNPAR, while certified copies were submitted by UNIMAS. WUR will finalise and sent the financial reports with all required documents to the EU.
- Mr. Harwant Singh will try to combine his collaborative research programme with an intended visit to Italy.
- All collaborative researchers at WUR will be housed in small apartments in Wageningen, with basic furniture and self-catering. WUR will take care of the rental and other logistics. The daily subsistence allowance will be reduced accordingly. The exact values are still to be confirmed, but will be between €

65 and € 80 per day (with housing paid). Mr. Lau Seng may need to be housed in a hotel from 25 to 29 October 2004 (to be organised by WUR).

- Mr. Lau Seng and Mr. Adi Jaya will also participate in the midterm review at Leicester (November 2004).

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III. TERMS OF REFERENCE COLLABORATIVE RESEARCH HYDROLOGY AND WATER RESOURCES

INTRODUCTION

The curriculum framework for the Peatwise-project consists of six clusters of sub-disciplines, which include the module "Water Resources and Hydrology". At the October 2003 inception workshop in Kuching, a number of working groups was appointed to implement the various sub-disciplines during Phase 2 of the project. The working group for the module "Water resources and Hydrology" consists of Herco Jansen (WUR; leading), Mr. Lau Seng (UNIMAS), Mr Adi Jaya and Sulmin Gumiri (UNPAR), and Mr. David Harper (UNILEI).

The module "Water Resources and Hydrology" will be developed through a collaborative research programme. Both UNIMAS and UNPAR staff members will be involved in the research programme. The proposed Terms of Reference for the collaborative research programme are described below.

SET-UP OF THE COLLABORATIVE RESEARCH

To allow for a correct scientific development of the collaborative research within the time and budget framework, and to guarantee sufficient feedback from all working group members, a phased approach is proposed. The activities will be executed in Kuching / Palangka Raya and Wageningen. The following phasing proposed:

Table 1: Set-up of collaborative research

Phase:	Location:	Main activities:
1	UNIMAS/ UNPAR/WUR	Collection of basic information, Further detailing of course contents
2	WUR	Acquisition of additional skills, materials & knowledge. Development of (draft) module
3	UNIMAS/ UNPAR	Finalization of module
4	UNIMAS/ UNPAR	Implementation of the module & Testing

FRAMEWORK AND MODULE CONTENTS

The contents of the collaborative research will be based on the market needs, which have been assessed in Phase 1 of the Peatwise-project, and the existing curricula at the universities (first activity in the collaborative research). This will ensure that the new module will meet the requirements and also fit in the existing academic programmes.

During the inception workshop the preliminary contents of the module was discussed and agreed upon. The final contents will be worked out, based on the already developed course contents sheets, and the expertise and experience of the involved staff.

EDUCATIONAL METHODS

The educational methods will be selected and implemented in close co-ordination with the other working groups, in order to obtain consistency in the didactical methods and to achieve innovation in the educational tools. Activities with respect to distance and blended learning will be executed in close co-ordination with UNILEI.

Much attention will be paid to the interdisciplinarity of module subjects. Also the envisaged incorporation of research results requires adequate communication with other working groups.

OUTLINE OF ACTIVITIES

1. Preparatory activities (Malaysia / Indonesia/Wageningen):

- Collect existing study material on the subject (in any language);
- Detailed proposal of course contents and didactical methods
- In collaboration with the (Asian) partner university, complete the standard form for modules to describe the module of "Water Resources and Hydrology";

2. Acquisition of additional skills, materials & knowledge (Wageningen):

- Collect, assess and review existing study material on the subject;
- Review and finalise the standard form for the module;
- Implement selected didactical methods (e.g. lecture notes, working books, assignments, e-learning, PowerPoint presentations, practicals, case-studies, etc.);
- Identify knowledge and material deficiencies;
- Elaborate specific research topics and develop new study material (e.g. "peat hydrology", numerical modelling of peat swamps, etc.);
- Participate in selected lectures at Wageningen UR and/or Alterra-ILRI;
- Liaise with partners of the working group to ensure support to the resulting module contents and reference materials.

3. Finalisation of (draft) module (Malaysia / Indonesia):

- Compilation of knowledge and material into draft module;
- Liaise with partners of the workings group to ensure support to the module contents and materials;
- Liaise with partners to ensure consistency and acceptance of educational methods.

4. Implementation and testing of the module (Malaysia / Indonesia):

- Test lecturing
- Evaluation

TIMING

The collaborative research will be organised in the following periods:

UNPAR staff (7 weeks)

- From 9 August to 3 September 2004
- From 29 November to 17 December 2004

UNIMAS staff (5 weeks)

- From 25 October to 26 November 2004.

IV. TERMS OF REFERENCE COLLABORATIVE RESEARCH GIS AND REMOTE SENSING

V. SPECIFICATION OF PRE-GRADUATE SUBJECTS ON HYDROLOGY AND WATER RESOURCES UNPAR

Climatology

- Description of concepts (terminology) and the relation with agriculture
- Climatic and weather factors/parameters and measuring devices.
- Units and measuring practices for climatic data
- Interpretation of climatic data for agricultural purposes

Water management

- General description of land and water resources in Indonesia. Prospects and constraints
- Hydrological concepts and application in the field of water management
- Water resources development
- Management of irrigated agricultural lands and drylands (from the hydrological perspective)
- Socio-economic aspects in land and water management

Peatlands and tidal lands

- Definition of tidal lands. Basic physical and chemical characteristics.
- Types of tidal lands, land suitability
- Definition of peatlands. Formation process. Classification. Type. Distribution. Basic physical and chemical characteristics. Fertility and productivity
- Utilisation of peatlands for agricultural and non-agricultural purposes
- Peatland management in Indonesia (coastal and inland) considering depth, underground material and topography

Soil and water conservation

- General concepts on soil systems, texture, structure, volume, porosity, aggregates, infiltration, drainage and temperature
- Soil water potential and water movement in soils
- Water balance and water availability
- Soil degradation
- Erosion factors
- Soil and water conservation methods
- Erosion prediction models
- Land capability classification
- Capability of land related to soil and water conservation methods

Forest hydrology

- Relations between hydrology and forestry
- Impact of forest vegetation on hydrological cycle
- Interaction between hydrological and nutrient cycle
- Impact of forest on the environment
- Management of forest protection
- Measuring methods for forest hydrology

Water basin management

- Terminology. Definition of watershed ecosystem
- Types of land use and their impact to water quality and quantity
- Floods and erosion
- Rehabilitation of degraded lands through integrated water management

Aerial photograph interpretation

- Basic definitions
- Details of acquiring aerial photographs (colours, wavelengths, etc.)
- Interpretation of aerial photographs (quantitatively and qualitatively)
- Critical evaluation of benefits and weakness
- Case study for soil and water

Water quality management

- Parameters of water quality
- Impacts on ecology and productivity of aquatic ecosystems
- Principles of water quality management to improve the productivity of the aquatic resource (especially for fishery and related aspects)

VI. SPECIFICATION OF PRE-GRADUATE SUBJECTS ON GIS AND REMOTE SENSING UNPAR

Interpretation of aerial photographs

- Basic definitions
- Details of acquiring aerial photographs (colours, wavelengths, etc.)
- Interpretation of aerial photographs (quantitatively and qualitatively)
- Critical evaluation of benefits and weakness
- Case study for soil and water

VII. CURRICULUM PROGRAMME MANAGEMENT OF FISHERY RESOURCES UNPAR

Sem.	Subject	SKS	Specif. SKS	Total study load (hours)
I	Religion Education	2	2-0	≈ 60
	Indonesian norms and values (Pancasila)	2	2-0	≈ 60
	Indonesian language	2	2-0	≈ 60
	Mathematics	4	4-0	≈ 120
	Biology	4	3-3	≈ 140
	Basic Chemistry I	3	3-3	≈ 140
	Introduction to Economy	2	2-0	≈ 60
	History	2	2-0	≈ 60
Total of Semester I		21		≈ 700
II	Military Education	2	2-0	≈ 60
	Basics of Social behaviour (Ilmu Social Dasar)	2	2-0	≈ 60
	Basic Physics	4	3-3	≈ 140
	English	2	2-0	≈ 60
	Basic Chemistry II	3	2-3	≈ 110
	Basics of Management	2	2-0	≈ 60
	Indonesian Culture	2	2-0	≈ 60
	Introduction to Fisheries Science	2	2-0	≈ 60
	Hydroclimatology	2	2-0	≈ 60
Total of Semester II		21		≈ 670
III	Aquatic ecology	3	2-3	≈ 110
	Academic writing	2	2-0	≈ 60
	Soil science	3	2-3	≈ 110
	Rural sociology	2	2-0	≈ 60
	Ichthyology	4	3-3	≈ 140
	Aquatic invertebrates	3	2-3	≈ 110
Total of Semester III		17		≈ 590
IV	Fish biology	3	2-3	≈ 110
	Marine biology	3	2-3	≈ 110
	Fishery data processing	2	2-0	≈ 60
	Aquaculture	3	2-3	≈ 110
	Aquatic Fauna Physiology	3	2-3	≈ 110
	Limnology	3	2-3	≈ 110
	Statistics I	3	2-3	≈ 110
Total of Semester IV		20		≈ 720

Sem.	Subject	SKS	Specif. SKS	Total study load (hours)
V	Knowledge dissemination	3	2-3	≈ 110
	Technology of fish catching	3	2-3	≈ 110
	Basics of fish processing techniques	3	2-3	≈ 110
	Basics of fish agribusiness	2	2-0	≈ 60
	Experimental design	3	2-3	≈ 110
	Planktonology	3	2-3	≈ 110
Total of Semester V		17		≈ 610
VI	Management of fishery resources I	3	2-3	≈ 110
	Aquatic productivity	3	2-3	≈ 110
	Management of natural Resources and Environment	3	2-3	≈ 110
	Tropical Sea Ecology	3	2-3	≈ 110
	Statistics II	3	2-3	≈ 110
	Aquatic plant	3	2-3	≈ 110
Total of Semester VI		18		≈ 660
VII	Conservation of fishery resources	3	2-3	≈ 110
	Management of aquatic resources	3	2-3	≈ 110
	Quantitative ecology	2	2-0	≈ 60
	Management of fishery resources II	3	2-3	≈ 110
	River and swamp ecology	3	2-3	≈ 110
	Fishery laws and regulations	2	2-0	≈ 60
Total of Semester VII		16		≈ 560
VIII	Student community services	4		
	General field work	4		
	Thesis	4		
	Seminar	1		
	Examinations	1		
Total of Semester VIII				

VIII. COURSE CONTENT SHEET UNIMAS FOR WATER RESOURCES AND HYDROLOGY

Taken from [Fakulti Sains dan Teknologi Sumber, 2004. Diploma Pasca Siswazah dalam Pengurusan Tanah Gambut]

COURSE 2: WATER RESOURCES AND HYDROLOGY

Course code		Semester	
Course title	Water Resources and Hydrology	Credit (Hours)	4 (56)
Course facilitator(s)	Lau Seng	Email	lauseng@ibec.unimas.my
Resource person(s)		Email	
<p>Course objectives</p> <p>The course is aimed at providing (a) an overview on hydrological aspects of water resource science, (b) an understanding of basic hydrological concept within peatland catchments, and (c) the fundamental water resource management concept particularly for peatlands and coastal areas.</p> <p>Students completing this course would be able to:</p> <ol style="list-style-type: none"> describe the hydrological features of a catchment area conduct fundamental hydrological measurements identify and apply appropriate hydrological analysis for sustainable development of catchment and water resource practise water resource management within peatland catchments 		<p>Learning Units</p> <ol style="list-style-type: none"> General introduction to hydrology and water resources; Hydrological processes – precipitation, river flow, evapotranspiration, infiltration, geohydrology and hydrographs; Hydrological aspects relating to peatland catchment management and development sustainability. Water quality classification, standards, guidelines and monitoring. Treatment of peatland water and pollution control measures Introduction to hydrological and water quality modelling Applications of hydrological and water quality models Case Studies 	
<p>Course synopsis</p> <p>Overview of hydrology in the context of water resource management; detailed treatment of the main hydrological processes and their importance in the management of the water resources in peatland catchments; discussions on water chemistry, water quality standards, monitoring and treatments and pollution control measures for peatland areas; and finally, introduction to water resource applications software for management of groundwater, surface water and water quality assessments.</p>			
Course contents			
LU 1 4 h	<p>The hydrological cycle.</p> <p>Hydrology from different perspectives - engineers, environmentalists, agriculturists, water managers. The hydrologic water balance – global, regional, national. Relationship between weather and hydrology – heat balance, radiation, thermal circulation, earth's rotation, weather fronts, humidity. Definition of river basin and catchment area. The hydrological station. How hydrology fits in the general scheme of Integrated Water Resource Management (IWRM).</p>		
LU 2 8 h	<p>Quantitative surface water hydrology .</p> <p>Precipitation – types (cyclonic, convective, orographic), measurements, precipitation data analysis, intensity duration frequency (IDF) curves. Streamflow – river stage and gauging, discharge measurements, Stage-Discharge relationship, rating curves, streamflow data interpretation, hydrographs, streamflow variations(annual, seasonal, daily). Evaporation and Transpiration – Controlling factors, measurements, Penman-Monteith Equation. Infiltration – fundamental process and infiltration methods. Geohydrology – definitions and terminologies, Darcy's Law. Hydrograph analysis.</p>		

LU 3 6 h	Peatland Catchment Management. The hydrological aspects relating to catchment management and development sustainability includes – surface run-off management(quantity and quality), effects of land clearing and development in catchment areas, river and groundwater extraction, reservoir sedimentation, saline intrusion, changes in land use. Impacts of hydraulic processes due to developments on peatlands. River works and dams, intakes and outfalls, flood control structures, dredging and sand mining, reclamation. Assessments of impacts from case studies.
LU 4 4 h	Water Quality, Classification and Monitoring. Parameters of water quality and WHO standards for drinking water. River classification and water quality indices. Planning principles for water demand and for water conveyance. Protection of water resources from pollution and eutrophication. Ecology and management of natural and receiving waters.
LU 5 6 h	Water Treatment and Pollution Control. Water treatment processes for removing particles in water and wastewater, particle characterization, coagulation / flocculation, sedimentation, filtration and disinfection. Formation of trihalomethanes (THMs) in the treatment of peat water. Removing dissolved organic contaminants from water & wastewater; activated carbon, stripping, membrane separation, removed of ammonia. Biological treatment systems - activated sludge and wetland systems. Wastewater and sludge disposal, and re-use. Wastewater in urban and rural areas and in different climate zones. Basic types of sewage treatment plants.
LU 6 10 h	Introduction to Hydrological and Water Quality Modelling <i>Types of models used in IWRM tools:</i> Conceptual, mathematical and numerical models, "black box" and physically based models, lumped and distributed models, empirical, deterministic and stochastic models. <i>Process of building a model:</i> Schematisation, data, discretisation, calibration, verification and simulation. Numerical methods: numerical integration, solution of equations, method of finite difference and method of finite elements. <i>Optimisation techniques:</i> Introduction to linear programming, dynamic programming, generic algorithms.
LU 7 8 h	Applications of hydrological and Water Quality Models Hydrological and Water Quality Models: <i>Introduction to modelling softwares (Mike 21, QUEL 2E, WASP etc.)</i> <i>Model set-up:</i> Setting the boundary conditions, determining the model domain area, grid sizes, time-step etc. <i>Data Collection:</i> Methods of data capture. Field data (sampling points, duration, frequency etc.) and office data (existing maps, discharge records, rain, wind, tidal and wave records etc) collection. Role of data in modelling and decision making. <i>Calibration:</i> Short-term calibration dataset (parameters), Long-term dataset for inference. Location of calibration points, quality of calibration and verification data. Parameters include water levels, velocity, river discharge etc. <i>Verification:</i> Accuracy (parameter calibration/ model structure). Reliability <i>Sensitivity analysis:</i> Parameter optimisation. State variable sub-spaces. Parameter uncertainty. Sensitivity gradients <i>Interpretation of model outputs.</i> Physical meaning of the model outputs. Model output accuracy. Hypothesis testing and regression modelling.
LU 8 10 hr	Case studies (Practical) Surface Water Modelling: Case study and practical. XP-SWMM (Storm Water Management Model), MIKE 21, MIKE SHE (A Watershed Scale Model for Soil and Water Resources Management), SHESED (Basin Scale Water Flow and Sediment Transport Modelling System) Groundwater Modelling: Case study and practical. ASMWIN, MODFLOW River Basin Modelling: Applications of the ISIS-FLOW software. Case study.

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Course highlights

Practicals consisting of case studies on surface water, ground water and river basin modelling

Assessment

Written examination	(50%)
Assignment	(30%)
Group work/project	(20%)

IX. COURSE CONTENT SHEET UNIMAS FOR GIS/REMOTE SENSING

Taken from [Fakulti Sains dan Teknologi Sumber, 2004. Diploma Pasca Siswazah dalam Pengurusan Tanah Gambut]

COURSE 5: GIS AND REMOTE SENSING FOR PEATLAND MANAGEMENT

Course code		Semester	
Course title	GIS and Remote Sensing for Peatland Management	Credit/ Hours	4 (56 hrs)
Course facilitator	To be named	E-mail	
Resource person(s)		E-mail	
Course objectives After completing the module students would be able to: 1. Describe the various tools in Remote Sensing and make an appropriate choice of RS techniques for monitoring of land use and land use change 2. Monitor and interpret changes in peatland ecosystem using GIS and RS technology 3. Demonstrate basic skills in GIS operations such as digitizing, preparing maps and overlays, elevation and spatial modelling and manipulation; and geo-visualization or image display		Learning Units	
Course synopsis < BEING DEVELOPED >			
Course contents			
LU 1	Introduction to mapping and surveying. Environmental and landuse parameters for mapping.		
LU 2	Eo technology and system. Satellite image understanding and interpretation.		
LU 3	Principles of GIS and basic GIS operations. Elevation and spatial modelling and manipulation. GPS for Eo and GIS.		
LU4	Practical/case study.		
Key references To be completed.			
Course highlights Students will be exposed to Arc/Info, Arc View, Mike-11 GIS, ERDAS software during Lab practicals and given opportunity to display their data in digital images			
Assessment Written examination: 50% Assignments: 50%			

X. ACTION LIST

Activity:	Section:	Responsible:
Monitoring of the ongoing procedure of Curriculum accreditation and the incorporation in post-graduate diploma courses (/MSc)	2.2, 2.3	Suwido, Ted
Appoint staff and organise collaborative research on “Ecology, Natural Resources and Environment”	2.2	Suwido, Susan
Organise implementation of module “Integrated Land Evaluation (Soil and Land Use)”	2.2	Yustinus Sulistiyanto
Collaborative research Water Resources and Hydrology (detailed programme by Herco Jansen)	2.2, 2.3	Adi Jaya, Lau Seng, Herco Jansen
Collaborative research GIS and Remote Sensing (detailed programme by Ron van Lammeren)	2.2, 2.3	Harwant Singh, Sehat Jaya, Ron van Lammeren.
Collaborative research “Distance Learning / ICT”	2.3	Fitri, Ted, Susan
Human Dimensions and Resource Economics	2.3	Gabriel Tongga
Field course and organisation /co-ordination of visit to UNPAR	2.3	Ted
Logistics collaborative research in The Netherlands (housing, etc.)	7	WUR (Herco Jansen)
Work out a more detailed proposal on the module contents for “Hydrology and Water Resources”.	3.1	Herco Jansen
Contact NEC to explore possible financial support to the language centre at UNPAR.	4.1.3	Herco Jansen
Explore options for improvement ICT / fast internet at UNPAR	5	Suwido, Tampung Saman
Finalise and sent the financial reports with all required documents to the EU.	7	Henk
Request possible budget amendment 3 rd year UNIMAS	7	Henk