

CAPACITY BUILDING OF THE INDONESIAN GOVERNMENT AGENCY STAFF BY THE MASTER PROGRAM ON INTEGRATED LOWLAND DEVELOPMENT AND MANAGEMENT

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ABSTRACT

There are many districts and cities related to lowland conservation and development throughout Indonesia. Large lowland areas exist along the coasts, in river floodplains and inland depressions. Most of these lowlands are in their natural state; parts have been reclaimed, primarily for agricultural uses. Urbanization and industrialisation take place, especially in the lowlands in densely populated areas.

Because of its population growth, the increase in the standard of living, the need for food self sufficiency, land use change and the on going urbanization in lowland, flood prone areas, the Indonesian government is putting a lot of effort in the future development of the lowlands based on an integrated approach. This effort will cover rural as well as urban development in lowland areas. However, there is a substantial shortage of skilled staff to take care for the development. These are including the required policies and approaches, the resulting plans and planning and the actual design, operation, maintenance and management of the required programs and projects.

Therefore since 2006, the Government of Indonesia, through its National Development Planning Agency – BAPPENAS – has requested the Sriwijaya University (UNSRI) in Palembang South Sumatra to develop jointly with UNESCO-IHE, Delft, the Netherlands a double Master Degree Program on Integrated Lowland Development and Management Planning for government staff at ministerial, provincial, district and city level, in charge of or involved in activities with respect to lowland development and management. BAPPENAS finances the 6 months of English course and the first year study on Environmental Management in Indonesia and the Netherlands Education Support Office (NESO) Indonesia gives support for the second year study on Hydraulic Engineering, Land and Water Development at the UNESCO-IHE, Delft, the Netherlands.

So far two batches of in total 21 students have obtained their MSc degree, two groups of in total 21 students are following the third and fourth programmes, and one group of 11 students is in the English Training class. The participants come from 11 districts and 14 cities in Indonesia. Most of the participants are from Ministries or Agencies related with Public Works, Forestry, Environmental Protection, and Agriculture.

Keywords:

Lowland Cities and districts, Integrated Lowland Management, Human resources development, Capacity Building

INTRODUCTION

Lowlands can be found all over the world, along the coasts, in river floodplains and as inland depressions. Generally they are by their nature sensitive areas with a high ecological value. Due to their physical conditions and environmental value they are basically unsuitable for development. However, due to the in many cases strategic location and high potential for agricultural exploitation there is often a tremendous pressure to develop these areas for various types of land use. We therefore may observe on the one hand a rapid population growth, a significant increase in agricultural exploitation, urbanisation and industrialisation in lowland areas. On the other hand there is an increased need to prevent further environmental degradation and to achieve a sustainable development.

The lowlands in Indonesia cover a total area of 33.4 million hectares (ha) (Table 1). They are mainly located at Sumatra, Kalimantan, Sulawesi and Papua (Figure 1). With respect to the physical conditions in the lowlands an important distinction can be made in tidal lowlands (Pasang surut) and in non-tidal lowlands (Lebak). The tidal lowlands cover 20 million ha and the non-tidal lowlands 14 million ha. Out of the total area 4.2 million ha has been reclaimed, primarily for agricultural exploitation. Spontaneous settlers have reclaimed 2.4 million ha and Government has reclaimed 1.8 million ha. Still some 5 million ha suitable for low-cost development can be reclaimed. The remaining (major) part of the lowlands may be considered unsuitable for reclamation, either due to the high environmental value, or due to the occurrence of (deep) peat soils (.....).

Other types of land use in the lowlands are for: animal husbandry, aquaculture, adaptation to nature - floating nurseries, eco-tourism, wood industry (Acacia) and infrastructure.

Table 1 Area of the lowlands in Indonesia (Ministry of Public Works, 1996)

Location	Total lowland area in ha and % of total					
	Tidal		Non-tidal		Total	
	million ha	%	million ha	%	million ha	%
Sumatra	6.60	19.8	2.77	8.3	9.37	28
Kalimantan	8.13	24.4	3.58	10.7	11.71	36
Papua	4.22	12.6	6.31	18.9	10.52	31
Sulawesi	1.15	3.4	0.64	1.9	1.79	5
Total	20.10	60.2	13.30	39.8	33.39	100



Figure 1. The lowlands in Indonesia

In 1996 the distribution of the lowlands on the different isles and districts (Kabupaten) was as follows (Ministry of Public Works, 1996; Direktori Kabupaten Kota, 2005):

- *Sumatra (36 districts)*: Nangroe Aceh Darussalam (Aceh Selatan, Aceh Timur, Aceh Barat, Aceh Utara); Sumut (Tap-Sel, Labuhan Ratu, Asahan, Karo, Deli Serdang, Langkat); Sumbar (Pesisir Selatan, Agam, Padang Pariaman, Lima Puluh Kota); Riau (Indra Giri Hulu, Indra Giri Hilir, Kep. Riau, Bengkalis, Kodya Pekanbaru); Jambi (Kerinci, Sarko, Batanghari, Tjg. Jabung, Bunga Tebo); Sumsel (Ogan Komering Ulu, Ogan Komering Ilir, Muara Enim, Musi Rawas, Musi Banyuasin, Bangka, Kodya Palembang); Bengkulu (Bengkulu Selatan, Bengkulu Utara); Lampung (Lampung Selatan, Lampung Tengah, Lampung Utara);
- *Kalimantan (23 districts)*: Kalbar (Sambas, Pontianak, Ketapang, Kapuas Hulu); Kalsel (Tanah Laut, Kota Baru, Banjar, Barito Kuala, Tapin, Hulu Sungai Selatan, Hulu Sungai Tengah, Hulu Sungai Utara, Tabalong); Kalteng (Kota Waringin Barat, Kota Waringin Timur, Wilayah Katingan, Kapuas, Barito Selatan, Barito Utara, Barito Timur, Wil. Kahayan Gunung Mas, Kodya Palangkaraya); Kaltim (Pasir, Kutai, Kodya Samarinda);
- *Sulawesi (29 districts)*: Sulut (Garontalo, Bolang Mongondow, Minahasa, Sangihe Talaud); Sulteng (Banggai, Poso, Donggala, Bual Toli-Toli); Sultra (Buton, Muna, Kendari, Kolaka); Sulsel (Selayar, Bulu Kumba, Bantaeng, Jeneponto, Takalar, Sinjai, Maros, Pangkajene Kepulauan, Barru, Soppeng, Wajo, Sidenreng Rappang, Pinrang, Luwu, Poliwali Mamasa, Majenu));
- *Papua (1 district)*: Merauke.

After the autonomy New Districts and Cities with lowlands have been established. This has in general terms resulted in the following changes:

- In 1991/1992: 17 provinces, 89 districts with lowlands;
- In 2001 - 12 new cities, 2002 – 32 new districts and 4 new cities, 2003 – 24 new districts; In 2004 – 348 districts and 86 cities.

- In 2010 – 440 districts and cities with more than 150 related with lowlands

The distribution of lowland cities and districts in 2010 within 440 cities and districts can be seen in Appendix Table IV.

There have been several periods during which reclamation and development activities in the lowlands were concentrated. The following may be mentioned:

- Spontaneous development since the 1930s;
- Government reclamations during the 1970s, mostly for transmigration and for the food-estate crops program (Table 2);
- Private sector development since the 1980s;
- Since the 1980s largely uncontrolled expansion of estates, spontaneous developments and logging.
- An initiative for One Million ha development project in Central Kalimantan in 1996
- The optimalization and upgrading of lowland schemes since 2003
- New autonomous districts/ cities within the lowlands areas since 2000

Table 2 Areas reclaimed by the Government in ha and in % of total (Ministry of Public Works, 1996)

Location	Area					
	Tidal		Non-tidal		Total	
	Ha	%	ha	%	Ha	%
Sumatra	615,250	1.8	279,480	0.80	894,730	2.6
Kalimantan	219,950	0.7	192,190	0.50	412,140	1.2
Papua	0	0.0	6,000	0.02	6,000	0.0
Sulawesi	0	0.0	2,000	0.01	2,000	0.0
Total	835,200	2.5	479,670	1.3	1,314,870	3.8

Three major issues which are facing and of important in Indonesia: Food security, Energy availability, and Environmental issue.

With respect to food security in Indonesia substantial changes from agricultural land use to non - food crop uses are going on. The following changes may be mentioned:

- At Java annually on average 40,000 ha of irrigated land is converted to non-agricultural land use;
- **Out of the 3 million ha irrigated land the area with a good irrigation performance is only 800,000 ha.** In the remaining area the conditions are not optimal, because of water shortage during droughts or due to flooding;
- There are substantial losses in harvest due to droughts or floods at an area of on average 90,000 ha per year;
- Droughts in 1991, 1994 and 1997 resulted in a required import of 4,5 million ton of rice in each of these years;
- The Operation & Maintenance (OM) budget for the irrigation schemes is only 40 - 50% of the amount needed.

In addition to the mentioned reclamation activities there have been several relevant activities and involvements in the lowlands, such as:

- Activities by donors like the World Bank, Directorate General of International Cooperation (DGIS), the Netherlands, Asian Development Bank (ADB), Japanese Overseas Economic Cooperation Fund (OECF);
- Telang-Saleh / ISDP / Agriculture projects (1993 - 1996);
- Mega 1 million ha reclamation project in Central Kalimantan (1995/1996);
- Project on preparation of Technical Guidelines and the project Land and Water Management Tidal Lowlands (LWMTL) (2002 - 2004). Cooperation between the government of Indonesia - Ministries of Public Works and Agriculture - with the Sriwijaya University and the government of the Netherlands - Rijkswaterstaat - UNESCO-IHE - Arcadis Euroconsult;
- Land and Water Management Tidal Lowlands (LWMTL, 2005-2006) and Strengthening Tidal Lowlands (STLD, 2007-2008), the cooperation of Ministry of Public Works, Directorate General of Water Resources, Ministry of Agriculture, Local Governments of Indonesia, Rijkswaterstaat and Partner for Water
- Non-tidal lowlands optimisation (2003 - present) from the Ministry of Agriculture;
- Establishment of the Directorate of Swamp, Ministry of Public Works and of the Directorate of Land and Water Management, Ministry of Agriculture in 2005.
- National Lowlands Development Strategy (NLDS, 2007-2008)
- Wadclimat (2009-2012)

The results of and experiences obtained in the projects may be summarised as follows:

- Partial successful development in the lowlands;
- Constraints: unrealistic initial targets, poor site selection, top-down approach, poor conditions for the settlers, especially in the initial stage;
- Promising results with upgrading and integrated lowlands 'second stage' development projects and participatory approaches in food crop production in Telang area, South Sumatra, ; ie: paddy of 7 ton/ha in the first season, 4 ton/ha in the second season, and corn of 2 ton/ ha as the third crop.
- Recommendations on improved development;
- Lack of synergism - planning-coordination.
- Lack of knowledgeable and skill full staff at different level of government institution

The present situation of the lowlands may be characterised as follows:

- Misinterpretation of achievements and potentials;
- Unused potentials in the existing schemes;
- Uncontrolled development and destruction;
- Environmental criticism;
- Trauma of the one million ha peat reclamation project at Central Kalimantan;
- Political support lost and programs completed;
- Drainage specific know-how lost due to political changes and reforms;
- Lack of coordination and planning.

If we look at the lowlands in perspective, the following items are of relevance:

- Encouraging developments in agricultural exploitation with respect to food crops, estate crops, aquaculture and wood production;
- The potential for rational food production in the lowland areas;
- National policies which show a renewed focus on lowland development;

- The importance of regional development;
- The need for integrated water management;
- The need to pay due attention to the environmental aspects;
- The need for integrated planning, implementing, organizing, controlling;
- Degraded wetland forests versus clean development mechanism (CDM);
- The existence and protection of undisturbed wetland forests - bio diversity;
- Climate Change, sea level rise, and vulnerable population in the lowland.

The above observations result in a set of issues that will play an important role in future lowland development and management, in which we really need many knowledgeable and skillful staff, like:

- Integrated agricultural development - on-farm practices, harvesting, processing, and marketing - based on a multi stake-holders participation;
- New agricultural developments, like the introduction of mechanisation, cultivation of second crops, and their impacts on production and farming systems;
- Modernization of the water management systems - and the need for sustainable operation and maintenance;
- The need for conservation of lowland areas with a high environmental value;
- Socialization and implementation of farming system technology;
- Integrated regional development, for example the development of the South Sumatra Eastern Corridor in Banyuasin District; integrated food crops and area development in Barito Kuala, South Kalimantan as well as in Kubu Raya (West Kalimantan), Indra Giri Hilir (Riau) and Tanjung Jabung Timur (Jambi) districts;
- Transfer of knowledge, science and technology, best practices from a success story area to other areas.

The conditions that are needed and will contribute to future developments and a sustainable management of the lowlands may be summarised as follows:

- Political support, at the different government levels;
- Data availability (maps) and planning mechanisms;
- The approach of lowland development as part of Integrated Water Management;
- Recognition of the uniqueness of lowlands and the requirement of adapted approaches;
- Appropriate drainage institutions and well established water user associations;
- Development and management based on a participatory approach.

Based on the observations and developments as outlined before some recommendations for the long term and the short term may be formulated. In formulating the recommendations for the short term, the long-term perspective has been taken into account. The recommendations concern:

- *Recommendations for the long term:*
 - *policy:* natural resource management;
 - *sector:* agriculture (food crops, estate crops, fisheries), forestry, tourism;
 - *spatial:* national, regional, river basin, and ecosystem unit (ie. Delta);
 - *infrastructure:* road infrastructure development to complement the water infrastructure for productive areas;
- *Recommendations for the short term:*
 - priority to agricultural development in promising existing schemes;
 - to stop uncontrolled developments and degradation;
 - to preserve and extend expertise and research;

- to upgrade the database;
- coordination and careful planning of future developments in the lowlands, for example based on an Integrated Lowland Management Plan. An example of such a plan is given in Figure 2;
- to obtain political support, for example by activities like:
 - * National Lowlands Training for university staff and staff of the Ministry of Education, Directorate General of Higher Education (DGHE), 2002 and 2003;
 - * Visit of President Megawati to Telang I area in March 2003
 - * visit of the Joint Steering Committee Indonesia & the Netherlands to the lowlands at September 25, 2003;
 - * visit of Komisi II (Finance) DPR RI to Telang I at October 7, 2003;
 - * visit of the Director General Machinery of the Ministry of Agriculture at June 7, 2003;
 - * National Workshop & Seminar on Lowlands Development & Food Security in Kandangan, South Kalimantan, October 11-12, 2004;
 - * Issue of Government law of UU 41/2009 and PP 01/2011 about the protection of productive land for food production;
- Lowlands-Wetlands Data Information Centre: regional, national, and international collaboration.

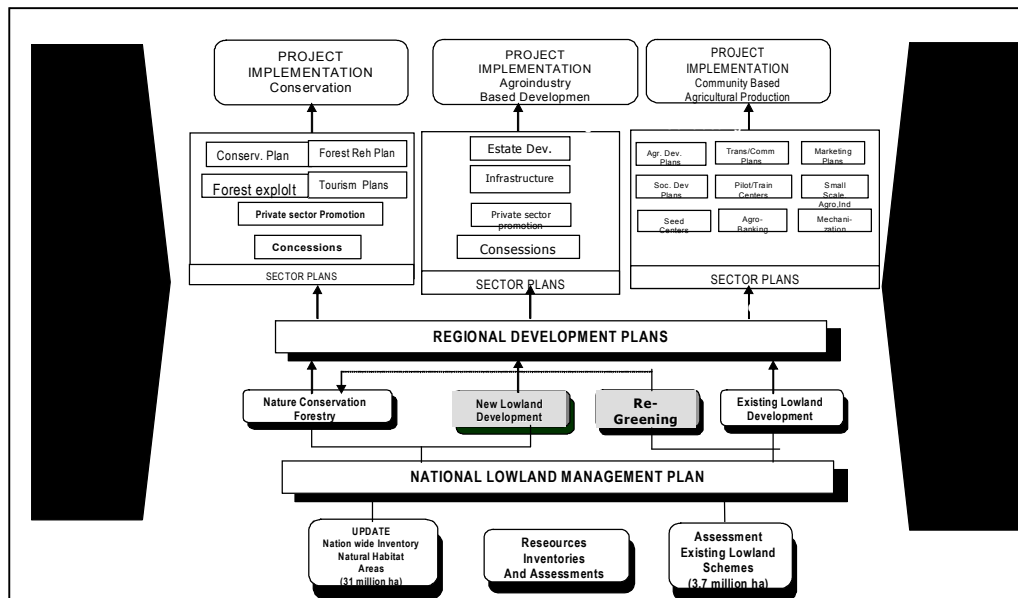


Figure 2 Example of the development of an Integrated Lowland Management Plan

The development of an Integrated Lowland Management Plan such as Figure 3, involves several inter-related steps. These steps may be summarised as follows:

- *Timeframe: long-term:* goals time-frame; *short-term:* pragmatic action plan;
- *Defining of roles and responsibilities:*
 - role of Government, Institutions, NGOs;
 - role of farmers, farmers group, and water users associations (WUA, P3A);
 - private sector, financing agencies;
 - lowland management actors;

- *Integrated planning:* infrastructure (storage, roads, bridges, jetties, canals, housing); financing aspects; communication, institutions, training centres, banks, social engineering;
- *Capacity building, training, and extension:*
 - capacity building program especially for: farmers, set-up of water user associations (P3A) and farmers groups (KT), agricultural extension services, consultants, contractors and manufacturers, government staff, especially in public works and agriculture at district, province and central government level, university, educational institutions, research institutions;
 - Double Degree on Integrated Lowland Development and Management Planning (DD-ILDM).

THE DOUBLE DEGREE MASTER PROGRAM ON INTEGRATED LOWLAND DEVELOPMENT AND MANAGEMENT PLANNING (DD-ILDM)

The on going Double Degree Master program on Integrated Lowland Development and Management Planning (DD-ILDM), since 2007, is based on the considerations as explained underneath.

Vision

To be a competent and excellent post-graduate program on Integrated Lowland Development and Management Planning with well-established university-industry-government-social linkages, and state-of-the art facilities for research and development.

Mission

- To assess and assure a program strengthened under the DD-ILDM that runs in line with the capacity building policy and paradigms of BAPPENAS and the Directorate General of Higher Education (DGHE), Ministry of National Education, as well as with the accreditation requirements for UNSRI in the Indonesian university system and for UNESCO-IHE in the Dutch university system;
- To establish an academic education program based on a teaching, exercises and research (desk, field and laboratory) approach;
- To contribute to the development of the local economy through university, local government, industry and social linkages.

Goals

The goals for the DD-ILDM program are the following:

- To become an established post-graduate program on Integrated Lowland Development and Management Planning in order to fulfil the needs of government institutions and the private sector by education of qualified MSc graduates in the field of integrated lowland management. These graduates will have to be able to fulfill the needs of the market (government, business, industry) in line with the development of the Indonesia, Malaysia, Thailand (IMT-GT) and the Singapore, Johor, Riau (SIJORI) Growth Triangles, the Asian Free Trade Area (AFTA) and the World Market;
- To prepare well-established university-business-government linkages for undertaking collaborative research;
- To improve the existing graduate study in environment management;
- To improve the capacity and performance of laboratory units;
- To implement a professional and vocational graduate program;

- To contribute to the autonomous operation of the Sriwijaya university.

Objectives

The objectives for the DD-ILDM program are the following:

- To establish and support the education of a Master program on Integrated Lowland Development and Management Planning;
- To educate qualified MSc graduates with the following characteristics:
 - duration of the study 2 years;
 - an academic index of 2.75 or higher;
 - able to compete at the global markets;
- To establish a cooperation between UNSRI, Indonesia and UNESCO-IHE, the Netherlands and to link both institutions in order to provide a platform for alumni, staff, students, and other researchers to exchange information through seminars, workshop, ICT, etc.;
- To establish a qualified institution in Integrated Lowland Development and Management Planning at the Graduate School of Sriwijaya University;
- To improve the English capability of the participants upto a professional level.

Basic competency

The DD-ILDM program builds on the recognition that in Indonesia not only lowlands cover a large area of 33.4 million ha, but that they also play an important role in the natural and human environment. As such, decisions made on lowlands by lowland environmentalists, lowland planners, as well as lowland developers might have major consequences for both society and environment. Therefore, the DD-ILDM program is expected to yield graduates of high quality in the development and management of lowland areas by applying integrated approaches to development planning, program initiating and management of lowland areas as well as in handling complicated questions, in line with the mission and goals of the study program.

The Integrated Lowland Development and Management Planning specialist is concerned with the development, adaptation and management of lowland areas. This implies:

- Ecosystems and water resources aspects of sustainable lowland management;
- Development of integrated land use development and management plans;
- Development, operation and maintenance of water management and flood protection schemes;
- Preparation and implementation of land reclamation and land consolidation programs.

Integrated lowland development and management plans and designs can be based on the management capacity and development constraints. Therefore it is of major importance that prior to the preparation of technical designs, concepts are formulated for the system management, based on which the preparation of regional development and land use plans, the selection of water management methods, flood protection, development of infrastructure, as well as organisation and financing systems can be determined.

Description of the DD-ILDM program

Aim of the course

The DD-ILDM program deals with post-graduate education in integrated lowland

development and management within a hydraulic engineering environment. Given the broad field, the program aims at conveying the knowledge that is required to fulfil the needs and requirements of users and/or users groups of lowland areas within its physical and non-physical environment. The curriculum of the program concentrates on the development as well as on the management and adaptation of land and water resources in lowland areas for the different types of land use, with a main focus on the land use for agriculture. The DD-ILDM program aims at civil, agricultural and environmental engineers, who are already specialised in water management (irrigation, drainage) and/or in integrated lowland development/management.

Approach to the program

Given the importance of both technical and non-technical aspects in integrated lowland development and management, the DD-ILDM program aims at presenting the knowledge and skills following an integrated approach through integration of:

- Technology and environment, including social, economic, legal and other aspects;
- Technology and management capability, stressing the importance of management in system performance and development;
- Agricultural, civil engineering and environmental aspects of integrated lowland development and management.

This approach will be introduced gradually, culminating in the group work, in which all aspects of integrated lowland development and management, as presented in the technical and non-technical subjects, will be considered in drafting a concept with alternatives for a specific integrated lowland development and management plan. The group work is followed by individual MSc research in the field of integrated lowland management, which will have to result in a thesis that has to be presented and defended.

Structure of the program

The DD-ILDM program offers a 24-month double degree of Master of Science (Magister Sains, M.Si) and Master of Science (MSc) to be completed at Pascasarjana UNSRI in predominantly the first year and at UNESCO-IHE predominantly in the second year. The Master program can start in February and be completed in January of the next two years. This program can be repeated on an annual basis. Preceding to the programs a selection procedure has been developed by BAPPENAS, including administrative and academic screening, a Academic Potential Test (TPA), a TOEFL test and additional training in English, if required (TOEFL score below 550). In addition STUNED scholarship provided by NESO provided selection procedure before granting permission for departure to the Netherlands. The academic screening will be jointly done by UNSRI and UNESCO-IHE and be based on their standard admission criteria.

Graduates will obtain an MSc-degree on Integrated Lowland Development and Management Planning of UNSRI and in Water Science and Engineering, Specialisation Hydraulic Engineering - Land and Water Development of UNESCO-IHE. These degrees are awarded to participants who have successfully completed both course works and the research-based MSc thesis.

Courses will be offered under various topics concerning the related issues of integrated lowland development and management. Users' inputs as suggested during the preparations, courses availability in UNSRI and at UNESCO-IHE have been taken into account. In line with the latest developments in the field integrated lowland

development and management the DD-ILDM program is designed to meet the specific issues, where an interaction between design and management is the prerequisite for sustainable development of lowland areas.

The lectures, exercises, field and laboratory work at UNSRI are organised in semesters. At UNESCO-IHE there will be time blocks of two times three weeks ('Modules') followed by one week examination period (altogether 7 weeks), while a development from generalist to specialist subjects goes together with increased emphasis on individual activities, culminating in the MSc Research thesis at the end of the program. The semesters, modules and contents of the program are described in Annex IV.

Appendix Table I presents the overview of the scheduling of the semesters and modules in time for the academic year 2010-2013. The corresponding topics (subjects) and their study load hours (SLH) within the semesters and modules are presented in the detailed descriptions. All semesters and modules will be evaluated. Evaluation can take place in the form of exercises, tests and/or examinations (written or oral), and are all compulsory. In the semester system at UNSRI, evaluation takes place during the whole period of each semester, in line with the lecture, in the form of the following components: attendances, assignments, quizzes, laboratory and/or fieldwork reports, papers, midterm exams, and final exams. The final mark of each course will be weighted according to such components and to the number of credit hours of the course. At UNESCO-IHE tests and examinations are scheduled at the end of each 'two module time blocks' (6 weeks) on the 7th, examination week. Every module will finally result in one weighted so called 'module mark'. How a subject is evaluated and the weight that the subject has in the 'module mark' is described in the detailed descriptions that will be explained to the participants in the handbook. During the program a number of fieldtrips will be organised. In addition there will be an extended fieldtrip through a lowland area that will be example area for the group work as well. Other fieldtrips are scheduled during the program and are organised in the frame of different subjects. For all fieldtrips the participants obtain credit points.

Learning objectives

The DD-ILDM program takes full account of the multi-disciplinary character of human activities dealing with lowlands and water. It also recognises the modern role of professionals involved in the manifold tasks from assessment to implementation and to operation and maintenance in lowland areas. In order to operate within an increasing complex kaleidoscope of existing specialities, these professionals are expected to take up the added duty of developing a broader understanding of the social, economic and environmental implications of water and environment related activities.

The general objectives of the DD-ILDM program concern the presentation of different scenarios (alternatives) for integrated lowland development and management including irrigation and drainage infrastructure and flood protection for clearly defined service levels. The objectives also concern the evaluation of the various alternatives on technical, social, financial and economic, managerial and environmental aspects and the skills to develop and conduct research in the field of the specialisation.

Upon completion of the DD-ILDM program, the graduates should (Table 3):

Table 3 Relationship between the DD-ILDM program components and learning objectives

	a	b	c	d	e	f	g	h	i	j
<i>Indonesia</i>										
10. Groupwork										
11. MSc research inception phase										
<i>Netherlands</i>										
12. MSc research, thesis writing										

Key: ■■■■■-objectives of primary focus; ■■■■■-objectives of secondary focus.

Implementation of the DD-ILDM program

The DD-ILDM program will be jointly implemented by Sriwijaya University (UNSRI) Graduate School on Environment Management, Integrated Lowland Development and Management Planning and UNESCO-IHE, Department of Water Engineering, Core Hydraulic Engineering - Land and Water Development. Support to the implementation have been obtained from:

- *Institutional support.* Support of this DD-ILDM program is given firstly by the cooperating institution of UNSRI and UNESCO-IHE;
- *Professional support.* Professional supports are awaited from several professional institutions, e.g. ICID, KNI-ICID, World Water Forum, HATHI (Association of Indonesian Hydrological Engineering), etc.;
- *International cooperation in research.* Latest international cooperation in research conducted by Sriwijaya University with international agents concerns:
 - Land and Water Management Tidal Lowlands (LWMTL), Rijkswaterstaat, UNESCO-IHE, Arcadis Euroconsult, Ministry of Public Works, Ministry of Agriculture, Local Government of Banyuasin, South Sumatra Province, and the Lowlands-Wetland and Coastal Area Data and Information Centre;
 - Development of Replanting Technology and A CDM Model of Mangrove Forrest for Supporting Mangrove Forrest Rehabilitation Program in Tsunami Devastated Areas, JSPS – DGHE Joint Research Project 2006 – 2008, Saga University, Japan;
 - The Study on Comprehensive Water Management of Musi River Basin in the Republic of Indonesia, JICA and Directorate General of Water Resources, Ministry of Settlement and Regional Infrastructure the Republic of Indonesia;

Latest collaboration in capacity building and research projects of the Core Hydraulic Engineering - Land and Water Development concerns:

- Land and Water Management Tidal Lowlands (LWMTL); and Strengthening Tidal Lowland Development (STLD);
- Water Saving Yellow River (EU-funded project with several EU and Chinese partners);
- Capacity building on the implementation of the European Water Framework Directive for government staff of Hungary;
- Polders of the World (long term research);
- Integrated aspects of lowland development, water management and flood protection. Several MSC and PhD studies.

Quality control

The quality control systems as prevailing for the programs in both institutes will be applicable to this program as well.

Program committees

Responsibility for the up to standard implementation of the DD-ILDM program rests within UNSRI with the Head of the Study Program, the Vice Director for Academic Affairs of the Graduate School and the Vice Rector for Academic Affairs of UNSRI.

Within UNESCO-IHE the responsibility for the up to standard implementation of the DD-ILDM program rests with the program committee of the Water Science and Engineering Program. The final responsibility rests with the Academic Board of UNESCO-IHE.

Lecturers

One of the concerns of this DD-ILDM program as mentioned in the objectives is to improve the English capability of the participants upon completion of this program to deal with the global market. In order to achieve such objective, during this program, not only the students will be taught by qualified lecturers but also such lectures be conveyed in English. Therefore, the lecturers of this program, especially those who serve at UNSRI must meet with the following criteria:

- Hold relevant S3 degree or at least relevant S2 degree with prominent experience in lowland areas;
- Have sufficient level in both spoken and written English;
- Able to provide course materials in standard-academic written English;
- Able to provide examination materials in English and to do evaluations accordingly;
- Upon request, able to serve as advisory committee members for MSc thesis work.

Academic facilities

Facilities provided by the Graduate Program of Sriwijaya University for the DD-ILDM program to support international classes, will include: New libraries with international corners; Laboratories; Experimental stations (at lowland areas); Classes equipped with audio-visual aids; Books, software and other references; ICT facilities (to be completed to support tele-conferences); Hotspots internet connections; E-learning facilities; Language labs, etc.

Within UNESCO-IHE participants will have free access to: The library and the library of Delft University of Technology; Hydraulic laboratory facilities; Fieldwork facilities; Classes equipped with audio-visual aids; Books, software and other references; ICT facilities (including distant learning and tele-conference facilities); Internet connections; I-learning facilities.

Profile of participants and admission criteria

Participants for this proposed DD-ILDM program, according to the regulations set forth by Pusbindiklatren BAPPENAS, are:

- Officials of ministries, provincial, district or city governments working favourably at planning units;
- Hold an S1 degree of relevant fields that may contribute to integrated lowland development and management, e.g. civil, agricultural, or environmental engineering,

- or an equivalent degree;
- Aged 38 years or younger;
- Have an academic index of 2.75 at S1 degree or higher;
- Have been working as government official for at least 3 years;
- Proposed officially by his/her superior;
- Have an academic potential test (TPA) of 565 or higher;
- Have a TOEFL score of at least 450 to join an English for Academic Purpose (EAP) training;
- Have a TOEFL score of at least 550 during or after the EAP training;
- Willing to work at fields relevant to his/her degree upon completion of the program;
- Fulfil other requirements stated in the ‘Guidelines of the Education and Training Program for the Planners’.

DISCUSSION ON THE ON GOING DD-ILDM PROGRAM : THE ALUMNI, STUDENTS, PROSPECTIVE CANDIDATE, AND THE FUTURE OF LOWLAND DEVELOPMENT IN INDONESIA

If we look at the Table Appendix ... as the origin of candidates for the double degree program on Integrated Lowland Development and Management Planning, there are numerous cities and districts all over Indonesia related with lowland management. This can be as the urban lowland as well as the rural areas both at the provincial level and cities or districts governments responsibility.

If we consider the Directorate General of Water Resources, Ministry of Public Works, as a case study in calculating the needed staf on lowland management. The following Table .. and Table ... can give an idea about the man power needed. The target area of reclaimed lowlands taking into account on this estimate is 2.200.000 ha both at the central and local government responsibility.

Table ... below shows an estimate number of skillful staff at the national, provincial, city/district level to manage the reclaimed lowlands environments in Indonesia (Simanjuntak, 2011). From Table ..., there are 23 mid managers for operational responsibility needed which need a Master Degree education level.

Table 4. An estimate number of operational staff needed to manage the lowlands in Indonesia for a given area and responsibility (water resources)

Institution	Work Volume (Ha)	Mid Manager (person)	Observer (person)	Gate Operator (person)
Riverbasin Authority, Ministry of Public Works	1.200.000	11	60	180
Local government level (Provincial + Districts/ Cities)	1.000.000	12	162	486
Total	2.200.00	23	222	666

Overall skillfull staff	905	
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Table ... give more information on functional skillfull staff at central government, watershed authority, provincial government, district/ city government needed in relation with urban drainage and rural drainage responsibility. From this table there are 40 person at prime/ mid level which might need the Master Degree education level.

So, if we combine Table ... and Table to see the required staff for operational and functional purposes in the Water Resources Department of the Ministry of Public Works for a given area, there are at least 63 staff with Master degree education level needed.

Table 5. Summary of functional skillfull staff on lowlands related water resources in
Table 5. Man power need at different level of organization in Indonesia

Organisation	Total Need				
	Specification	Senior (Utama)	Madya	Young (Muda)	Pratama
Central Government	Planner	2	2	5	6
	Implementing	2	2	3	6
	OM & Extention	1	2	6	8
Water Resources Authority (BBWS & BWS)	Planner		5	11	20
	Implementing			8	19
	OM & Extention			15	35
Province	Planner		8	33	66
	Implementing		8	33	66
	OM & Extention		8	33	66
District/ City	Planner				150
	Implementing				
	OM & Extention				150
Sub Total		5	35	147	587
Total					804 person

Note: from Simanjuntak 2011

Statistic of the participants following this DD-ILDM program since the academic year 2007 up to now such as the following. They are working mostly with the government (96%, 50 people), mostly at: Environmental Protection Agency (11, 21%), Ministry of Public Works - Water Resources (10, 19%), Planning Agency (8, 15%), Agriculture Department (6, 11%), Forestry (6, 11%), National Parks (4, 8%), Watershed authority (2), Marine and Fisheries (2), Police Department, University and NGO (each of 1). If we consider, the Ministries or other Institutions than the Water Resources, Ministry of Public Works, we will have more lowland related people needed in the years to come.

The thesis titles of the DD-ILDM participants for example can be seen in Table, which covered a wide range of topics from the engineering aspects to the financial aspects of water management in the lowlands. There are still numerous subject can be studied as the problems may arise else where in Indonesia. Urban drainage and rural drainage is affecting each other, a succes at the rural development areas will reduce the movement of rural people to the urban (city) areas. Water management issues at rural and urban areas need to be solved simultaneously.

Since the total participants of this DD-ILDM program is only 51 people so far, we might conclude that this program still need to be continued for years to come. Treasure study for the alumni showed that most of the alumni are promoted to do a more challenging jobs (Table). English language capability of the DD-ILDM alumni is really another positive point such that at any events using the english language, i.e. International Seminar/Workshop, Foreign delegate meetings, they will be invited

Tabel 6. Participants of double degree program on Integrated Lowland Development and Management, Universitas Sriwijaya, Unesco-IHE – Netherlands, Bappenas of Indonesia, STUNED

Year	Number (person)	Origin of Participants	Remarks
2007/2009	10	West Sumatera (1), South Sumatra (7), Banten (1), Lampung (1)	10 graduated from Unesco-IHE and Unsri in 2010
2008/2010	10	Jakarta (2), East Java (1), West Java (2), Central Java (1), Lampung (1), South Sumatera (2)	10 graduated from Unesco-IHE and Unsri in 2011
2009/2011	11	Jakarta (4), Central Java (1), East Java (1), Lampung (1), Riau Island (1), South Sumatera (3)	8 are doing thesis at Unesco-IHE, 2 graduate single degree from Unsri, 1 postpone to Unesco-IHE in 2011
2010/2012	11	East Java (2), Central Java (1), Lampung (2), West Kalimantan (1), North Sumatera (1), Jambi (1), South Sumatera (3)	12 are going for their 2nd year to the Unesco-IHE in mid of October 2011
2011/2013	11	Jakarta (1), South Sumatra (2), Jambi (2), East Kalimantan (1), Central Java (1), North Sumatra (1), Riau (2), Central Kalimantan (1).	11 are on the English for academic purposes (EAP) training at Unsri

CONCLUSION AND REMARKS

There have been substantial role of the alumni of this program upon their study completion at their office (see Table). The responsibility to involve on lowland development and management at the urban and rural areas is increased. Most of the alumni are working and applying the knowledge which they gained during their study and research works.

Since the target of local government in all over of Indonesia (Table) and the available alumni (Table...) are still lacking, it is adviseable that this DD-ILDM program need to be continued and supported.

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Appendix Table 1. Bar charts of Program for Group IV of DD-ILDM, 2010 – 2012: On going Program (2010 – 2011/3)

[illegible]

[illegible]

[illegible]

[illegible]

Appendix Table II. Graduates of the first and second Double Degree MSc Programme on Integrated Lowland Development and Management Planning

GROUP	NAME	TITLE OF MSC THESIS	PRESENT POSITION
I	Mrs. Dewi Sartika	Water management service fee for optimal operation and maintenance of canal systems in tidal lowlands. Case study Telang I. South Sumatra (<i>distinction</i>)	SubBid Pembangunan dan Peningkatan, Dinas PU Cipta Karya dan Pengairan, Kab. Musi Banyu asin
	Rahmadi	The Effect of Climate Change and Land Subsidence on Water Management Zoning In Tidal Lowlands. Case Study Telang I, South Sumatra (<i>distinction</i>)	GIS expert for WACLIMAD project under World Bank-BAPPENAS
	Mrs. Wiwin Estiningrum	Impact of City Development on Urban Drainage and Flood Protection in Metro City	Kasubbid Bidang Litbang Pemerintahan dan Sosial Budaya, BAPPEDA Kota Metro
	Mrs. R.A. Marlina Sylvia	Options for water management and flood protection of agropolitan Gandus for agricultural development	Staf PU Bina Marga dan PSDA kota Palembang, Bidang pengendalian banjir dan drainasi
	Mrs. Eka Gustini	Palembang urban drainage and flood protection development. Case study Jakabaring	Staf PU Bina Marga dan PSDA kota Palembang, Bidang pengendalian banjir dan drainasi
	Mrs. Resza Dwi Artha	Water management for acid sulphate soils in lowland areas. Case study in Patra Tani Muara Enim	Kasi Migas, Dinas Pertambangan dan Energi, Kab. Muara Enim
	Mrs. Flora Prima Syntha	Optimizing operation and maintenance for urban drainage system. Case Study: Sub Catchment Bendung Palembang City, South Sumatera.	KaSubBid Perekonomian BAPPEDA, Kab. Limapuluh Kota Sumatra Barat
	Akbar Saefudin	Land and water evaluation of lowland areas. Case study: lowlands in North Eastern Muara Enim Region, Indonesia	KaSubBid Renstra BAPPEDA, Kab. Muara Enim
	Taufik Syahzaeni	Urban drainage and flood protection in Tangerang City	Staf Badan Lingkungan Hidup Kota Tangerang
	Ahmad Fadilan	Regeneration options for peat forest. Case study Marang Kepayang, South Sumatera, Indonesia	Perwira POLRI, Staf Pribadi KAPOLRI Bidang Hubungan Luar Negeri
II	Albert Reinaldo	Evaluation of urban drainage and flood protection system in North Jakarta. Case study Papanggo Areas	Pembinaan Teknik, Monev, Bantuan teknis bidang drainasi , Subdit Drainasi, Direktorat Pengembangan Penyehatan Lingkungan Pemukiman, Dit Jen Cipta Karya, Kemen. PU
	Muhd. Thursina Cahya	Evaluation of drainage system performance in Bandar Lampung City. Case study in Sub District Tanjung Karang Pusat	Ka.SubBag Penyusunan Rencana Kegiatan pada BAPPEDA kab Lampung Selatan
	Eldowan Arief	Developing Lubuklinggau Drainage Masterplan	
	Mrs. Esty Nayadiah	Analysis and evaluation of urban drainage and flood protection problems in Surabaya. Case study: East Surabaya	Menyusun program lingkungan hidup dan tata ruang wilayah, Staf BAPPEDA Kota Surabaya
	Muhd. Riza Fahlefi	Integration of the floodway and urban drainage system in the eastern part of Semarang Lowland Area	Staf Perencanaan Dinas PU Pemalang Bidang Sumberdaya Air

	Mrs. Febrinasti Alia Nasrul	Impacts of future changes on flood protection systems. Case study of Indonesia and the Netherlands in comparative perspective	Staf PU Bina Marga dan PSDA kota Palembang, Bidang pengendalian banjir dan drainasi
	Mrs. Fetri Aswanti	Optimizing water management systems in lowland areas to maximise agricultural production. Case study: Telang II, South Sumatra	Staf Bagian Perencanaan Dinas Pendapatan Daerah, Provinsi Sumatra Selatan
	Lufiandi	Impact of land use change on water management in Metropolitan Bandung	Staf BAPEDALDA/ BLH Jawa Barat
	Mrs. Titih Titisari Danielaini	Optimizing reservoir operation, water distribution and cost-sharing system of a multipurpose reservoir. Case of Jatigede Reservoir Scheme, Indonesia	Staf Dinas Tata Ruang dan Permukiman Pemerintah Kabupaten Cianjur
	Hotman Fr. Pandiangan	Urban drainage and flood protection in Jakarta City, Indonesia. Case study: Ciliwung River – West Banjir Canal	Pembinaan Teknik, Mobev, Bantuan teknis bidang drainasi kepada pemerintah daerah, Subdit Drainasi, Direktorat Pengembangan Penyehatan Lingkungan Pemukiman, Dit Jen Cipta Karya, Kemen. PU

Appendix Table III. Students of the third and fourth Double Degree MSc Programme on Integrated Lowland Development and Management Planning

GROUP	NAME	WORKING TITLE OF MSC THESIS	PREVIOUS POSITION
III	Aditya Sidik Waskito	Hydraulic and performance analysis of water management in tidal lowlands. Case study: Telang I, South Sumatra (after STLD Programme)	Staf Sekretariat Direktorat Jendral Sumber Daya Air Kementerian
	Andi Irawan	Analysis and development of urban drainage and flood protection in Tanjung Pinang City, Riau Islands Province	Plt. Kepala Sub Bidang Penegakan Hukum Badan Lingkungan Hidup Prov. Kepulauan Riau
	Aris Fajar Suryono	Water management zoning in tidal lowlands based on hydraulic performance and land subsidence. Case study: Delta Saleh, South Sumatera	Staf Direktorat Rawa dan Pantai, Direktorat Jenderal Sumber Daya Air, Kementerian Pekerjaan Umum
	Mrs. Esty Siske Setioriny	Optimisation of water management for pulpwood production	Staf Balai Perbenihan Tanaman Hutan Sumatera, Kementeerian Kehutanan
	Yosiandi Wicaksono	Hydraulic modelling for improvement of tertiary canals and its effect on the implementation of water management systems in the Telang II Scheme	Staf Direktorat Bina Pengelolaan Air, Direktorat Jenderal Sumber Daya Air, Kemeterian Pekerjaan Umum
	Mrs. Yulia Mariska	Urban drainage and flood protection development in Prabumulih City, South Sumatera. Case study in Kelekar River	Staf Badan Perencanaan Pembangunan Daerah Kota Prabumulih, Prov. Sumatera Selatan
	Adi Kunarso	Improvement of water management at tertiary level for increasing pulpwood production in tidal lowlands	Peneliti Pertama Balai Penelitian Kehutanan Palembang, Kementerian Kehutanan
	Windiyanto Nugroho	Analysis and evaluation of flood protection development in Kudus Regency. Case study: Srep Sub-river Basin	Staf Dinas Pertanian, Perikanan dan Kehutanan Kabupaten Kudus, Prov. Jawa Tengah
IV	Dadang Nurdin	Titles of MSc theses to be decided in July - August 2012	Staf Dinas Kehutan Pemerintah Kabupaten Garut, Jawa Barat
	Aries Purwanto		Staf Dinas Lingkungan Hidup, Pertambangan Pemerintah Kabupaten Karawang, Prov.
	Rini Yuniati		Staf PHKA Jambi, Kenterian Kehutanan
	Djoko Purnomo		Staf Dinas Lingkungan Hidup Pemerintah Kota Magelang, Jawa Tengah
	Rahmat Ruzniar		Penyuluh Pertanian, Perikanan, Kehutanan dan Tanaman Pangan, Pemerintah Kota Singkawang, Prov. Kalimantan Barat
	Evi Damayanti		Staf Balai Taman Nasional Way Kambas, Lampung. Kementerian Kehutanan
	Andri Tri Atmojo		Staf Balai Pemantauan Pemanfaatan Hutan Produksi Wily. V, Palembang, Sumsel. Kementerian Kuhutanan

	Trisia Ranti Fani		Staf Dinas Kehutanan Perintah Provinsi Sumatera Selatan
	A. Saifullah		Staf Balai Pemantauan Pemanfaatan Hutan Produksi Wily. V, Palembang, Sumsel. Kementerian Kehutanan
	Ujang Wisnu Barata		Staf Balai Besar Taman Nasional Gunung Leuser, Medan, Sumatera Utara. Kementerian Kehutanan
	Maruddin Fernandus Marpaung		Staf Balai Rawa, Pusat Litbang SDA Banjarmasin, Badan Litbang Kementerian PU
	Wahidah Wahyu Ramadhani		Subdit. Operation and Maintenance, Ministry of Public Works

Appendix Table IV. Lowlands related Cities (Urban Drainage) and Districts (Rural Drainage) in 5 big island of Indonesia

NO.	Island	Province	District/ City
1.	Sumatera	Nangroe Aceh Darussalam	Aceh Timur, Aceh Utara, Kota Langsa, Banda Aceh,
		Sumatera Utara	Tapanuli Selatan, Labuhan Ratu, Asahan, Karo, Deli Serdang, Serdang Bedagi, Langkat
		Sumatera Barat	Pesisir Selatan, Agam, Padang Pariaman, Lima Puluh Kota
		Riau	Siak, Indra Giri Hulu, Indragiri Hilir, Pelalawan, Dumai, Kodya Pekan Baru, Rokan Hilir
		Riau Island (Kepri)	Tanjung Pinang, Batam
		Jambi	Kerinci, Sarko, Batanghari, Tanjung Jabung Barat, Tanjung Jabung Timur, Bungo, Tebo
		Sumatera Selatan	Ogan Komering Ulu, Ogan Komering Ilir, Muara Enim, Musi Rawas, Musi Banyuasin, Banyuasin, Kodya Palembang
		Bangka Belitung	Bangka, Bangka Selatan,
		Bengkulu	Bengkulu Selatan, Bengkulu Utara
		Lampung	Lampung Selatan, Lampung Tengah, Lampung Utara
2.	Kalimantan	Kalimantan Barat	Sambas, Pontianak, Kubu Raya, Ketapang, Kapuas Hulu
		Kalimantan Selatan	Tanah Laut, Kota Baru, Banjar, Barito Kuala, Tapin, Hulu Sungai Selatan, Hulu Sungai Tengah, Hulu Sungai Utara, Tabalong
		Kalimantan Tengah	Kota Waringin Barat, Kota Waringin Timur, Wilayah Katingan, Kapuas, Barito Selatan, Barito Utara, Barito Timur, Wil. Kahayan Gunung Mas, Kodya Palangkaraya
		Kalimantan Timur	Pasir, Kutai, Kodya Samarinda
3.	Sulawesi		
		Sulawesi Utara	Bolang Mongondow, Minahasa, Sangihe Talaud
		Gorontalo	
		Sulawesi Tengah	Banggai, Poso, Donggala, Bual Toli-Toli

		Sulawesi Utara	Buton, Muna, Kendari, Kolaka
		Sulawesi Selatan	Selayar, Bulu Kumba, Bantaeng, Jeneponto, Takalar, Sinjai, Maros, Pangkajene Kepulauan, Barru, Soppeng, Wajo, Sidenreng Rappang, Pinrang, Luwu, Poliwali, Mamasa, Majenu, Ujung Pandang
4.	Papua	Papua	Merauke, Mappi, Boven Digoel, Asmat, Mimika, Nabire, Waropen, Memberamo Raya, Sarmi, Keerom
		Papua Barat	Faf-Fak, Kaimana, Manokwari, Sorong, Sorong Selatan, Teluk Bintani, Teluk Wondana, Kota Sorong
5.	Java	DKI. Jakarta	North Jakarta, Central Jakarta,
		Banten	Tangerang
		West Java	Karawang, Bekasi,Cirebon,
		Central Java	Semarang, Pemalang, Kudus, Banjar
		East Java	Surabaya, Lamongan,