Developing an International Master's Course on Environmental Management

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De Universiteit Twente is een universiteit voor technische en maatschappijwetenschappen. Het Centrum voor Schone Technologie en Milieubeleid (CSTM) is binnen de Universiteit Twente het interfacultair insti-
tuut voor milieuvraagstukken. Onderzoek, onderwijs en advisering van het CSTM zijn gericht op de ontwikkeling van nieuwe strategieën voor overheidsbeleid, technologie en management als condities voor een verantwoord milieubeheer.
Developing an International Master’s Course on Environmental Management

Discussion-paper, first draft

Involved parties:

University of Twente, Department of Public Administration (BSK)
Center for Clean Technology and Environmental Policy (CCTEP)
Technology and Development Group (TDG) at the Department of Technology and Management

Padjadjaran University, Department of Post Graduate Studies
Institute of Ecology
1. Introduction

The Padjadjaran University in Indonesia and the University of Twente in the Netherlands have initiated a joint project that aims at developing a curriculum in the field of environmental management. To the short term this means that the two universities will work together in developing a international course that will run at the university of Twente. The course will be open to Indonesian participants. The aim of the Padjadjaran University in the long run is to install a masters program on environmental management in Indonesia. The two universities have expressed the intend to work together on their joint Post graduate master's-courses on environmental management.

This discussion paper can be considered the start of the development of an International Master's Course on Environmental Management at the University of Twente. (In its present form) it has been written by a team from CSTM/ TDG [Center for Clean Technology and Environmental Policy, and the Technology and Development Group], the future host of the Master’s Course at the University of Twente. The purpose of this paper is to open the discussion between the partners in the project by exchanging ideas on the potential form of the International Master’s Program which will eventually have a curriculum produced through joint effort.

The discussion paper is set up as follows:
Chapter 1 introduces the project and its background.
Chapter 2 provides background information on the hosting institutions, the CSTM and TDG and especially elaborates on CSTM’s experiences with Master’s Programs in environmental subjects.
In Chapter 3 a framework for the Master’s program is developed and an explanation of the various components is provided.
Chapter 4 concludes with a proposal for the process in the future.

Collaboration between Padjadjaran and Twente

CSTM has over 10 years experience in designing and implementing Master's Programs on environmental management. These programs have been very successful: more than 500 graduates have found jobs and careers in the environmental management field.
TDG has organized international courses on Energy and Environment for Sustainable Development and on Energy Management and Cleaner Production in small and medium Scale Industries for nearly 15 years. The combined experiences of the two groups will be used in developing an International Master's Program on environmental management.
The Padjadjaran University is developing a post graduate course on eco-studies. This will involve four programs of which two will focus on private and public environmental management. Thus both universities have an interest in developing an International Master's Program on environmental management. For this reason Twente and Padjadjaran decided to cooperate.

Contact between the two universities was established during a visit to Twente in April 1997 by dr. Nani Djuangsih at that time Director of the Ecological Institute, Padjadjaran University. From Twente the Centre of Clean Technology and Environmental Policy (CSTM), and the Technology and Development Group (TDG) of the faculty of Technology and Management were involved. After the visit a report on an initial cooperation program was written and
exchanged. On the basis of that document, Prof. Dr. Maman P. Rukmana, Rector of the Universitas Padjadjaran wrote a letter of endorsement in August 1997.

Since then, the CSTM and the TDG have initiated a number of activities:

1. The Department of Education and Culture of The Netherlands is financially supporting the initial stage for preparing this International Master’s Program based on the proposal submitted in September 1997;
2. In March 1998, Dr. Nico Schulte Nordholt of the TDG visited the Padjadjaran University and especially its Institute of Ecology. This preparatory visit affirmed the earlier positions despite the impact of the present crisis in Indonesia.
3. The Padjadjaran University regards the intended Master’s courses on private environmental management and public environmental management as part of the yet to be established post graduate Eco-studies. The Rector of the Universitas Padjadjaran reconfirmed his endorsement.
4. At the University of Twente the existing Master’s courses on private environmental management and on public environmental management were revised in order to service more appropriately the objectives of the intended International Master’s Courses.
5. The intention to start the International Master’s Program at Twente by the year 1999 has been reconfirmed. It is planned that annually at least 15 Indonesian participants will follow the 12-month program in 1999/2000, 2000/2001 and 2001/2002.

In order to achieve this goal the following preparatory process was agreed upon:

1. A workshop in Bandung will be held from June 24th until July 1st, 1998. A key factor during this workshop will be a series of meetings between representatives of the Padjadjaran University and of CSTM/TDG-University of Twente [Prof.Dr. Hans Bressers, Dr. Kris Lulofs, Drs. Ellis Brand and Dr. Nico Schulte Nordholt]. Input for the meetings is provided by the Twente team in the form of a draft curriculum. An intensive exchange of thoughts on this document will result in to an improved position paper, which will be the point of departure for another activity.
2. A graduate student of the Department of Applied Education will make an inventory of the local Indonesian needs and will re-design our curriculum towards the needs of Indonesian attendants. This version will be tested, evaluated and adjusted by the Indonesian participants of our courses.
3. A second workshop will be organized at the University of Twente during autumn 1998. The outcomes so far will be discussed, adjustments will be made on the curriculum. Besides this, there will be ample time available to get to know the institutes and persons involved, to make contacts and to visit places/organizations of interest to the participants. There will be an opportunity for the exchange of thoughts about environmental management and to get to know methods of environmental management. For these meetings CSTM and TDG will invite a limited number of guest-lectures.

As agreed by both parties, this will complete the start-up phase. In order to make an energetic start on the second stage, a number of more practical issues should be dealt with. Among other things, recruitment and selection of Indonesian participants for the second stage of the program is essential. This second stage will, depending on the speed of progress, probably start 15 January 2000 (but preferably already by September 1999). Participation of Indonesians in the CSTM/TDG courses is scheduled over 3 years. After that, the Padjadjaran University will be able to conduct its own Master’s Program and the two universities will continue with a joint research and PhD collaboration program.
2. Introducing the hosting institutions at the university of Twente: CSTM and TDG

The purpose of this chapter is to give some background information on the participating institutes at the University of Twente; the CSTM and the TDG. The CSTM has experience in running Master's Programs on environmental management for over a decade. These programs have traditionally focused on the Dutch students the Dutch environment. The CSTM has also educated employees of companies and governments. From its involvement in international activities, the CSTM sees a clear interest and need for international programs focusing on environmental management. This knowledge and experience is combined with the knowledge and experience of the Technology and Development Group on technology and management in developing countries in different phases of evolution and transformation. The TDG has an international curriculum on environmental technology and energy.

The Center for Clean Technology and Environmental Policy
The Center for Clean Technology and Environmental Policy, CSTM, is the institute for environmental issues within the University of Twente. The activities of the CSTM can be divided into three categories (which partly overlap):

1. Research
2. International activities
3. Master's Programs

1. Research
Research is being performed within doctoral research projects, projects for the European Commission, projects for the National government, projects for provinces and municipalities, projects for industry, consultancy projects, etc. The actual research program (till 2000) consists of the following main themes:

Environmental / Energy management and Technology: The environmental questions with which industrial society is faced are largely the result of the ongoing, large-scale conversion of raw materials and energy into material goods and services. These conversion processes not only consume irreplaceable raw materials and energy, but the emissions associated with them and the resulting waste products also place considerable pressure on the natural environment. Therefore the optimization of the conversion of raw materials and energy into industrial processes is an important condition for a more responsible environmental management. Studies focus on: environmental management in firms and pollution prevention; analysis and improvement of product life cycle analysis; recycling technology and clean up technology; energy efficiency and energy management; institutional analysis of the energy market.

Environmental regulation and policy Analysis: The social range and scope of environmental issues contributes to a re-assessment of the position and function of the state authorities within society. Contrary to the concept of reduction of the role of authorities, which is advocated in the context of a restructuring of the welfare state, the reality of the environmental problem calls for a more dominant role of the state. Market parties appear to find it difficult to develop less environmentally polluting behavior, while at the same time the usefulness of physical regulation as a predominant control mechanism is being questioned. This calls for the evaluation of control mechanisms. Studies focus on: evaluation of policy implementation and effectiveness; evaluation of licensing to firms and target group convenants; analysis of policy-making and choice of market oriented policy instruments.
Administrative capacity building: Environmental problems not only raise the issue of the control mechanisms of governmental policies, but also that of the administrative scale on which government intervention would be required. Environmental problems often transcend regional and national borders, and thus require intergovernmental cooperation between local, regional and national authorities or international cooperation between countries. Establishing intergovernmental and international cooperation is deemed necessary in order to provide a more adequate response to the trans-border consequences of environmental problems. Studies focus on: green planning; local environmental policy; Agenda 21 at the local level; public participation in environmentally oriented decision making.

2. International activities
The CSTM participates in several international research groups. Two are of particular interest in this context: The European Environmental Management Network and the Greening of Industry Network. The European Environmental Management Network is a joint venture between about 70 universities and the World Council for Sustainable Development. The main objective of this network is the development of environmental management curricula for different types of programs. The Greening of Industry Network is an international partnership, dedicated to building a sustainable future. The Network has three coordinating offices: at Clark University in the US, at Chulalongkorn University in Thailand and at the University of Twente in the Netherlands. The Network stimulates, coordinates and promotes research of high quality, relevance and usefulness towards ensuring that the activities of industry - including those of business, labor, consumers, government and others - are consistent with building a sustainable future. Guided by an international advisory board, the Network carries out this mission through linked international meetings, publications and a communications network. The Network involves over 1600 people from more than 54 countries. The CSTM hosts the European coordination center of this network.

3. The Master's Programs of the CSTM
Since 1989 the CSTM has run two Master's programs: one focusing on environmental management within the public sector (Master of Environmental Public Management) and one focusing on Environmental Management within the private sector (Master of Environmental Business Administration). These programs are intended for students in the Netherlands with an advanced level of education who, after completing their studies, want to expand their knowledge and experience in environmental affairs for a period of one year full-time. Annually, 50 participants are selected for these profession-oriented programs (which are given in Dutch). The Master's programs are accredited by the Twente Post Graduate School and have been inspected by the Dutch Ministry for Education, Culture and Science. The approximate 500 graduates of our Master's programs have found jobs in public- and private public management. They work for provinces, regions, larger municipalities, water authorities, etc. or they became advisers in consultancy or engineering agencies or work for larger firms, or started their own consultancy businesses.
**Post-graduate program Master of Environmental Business Administration**

This program is focused on jobs in environmental management and consultancy in business and industry. Participants should have completed a university study. This program has been certified to grant the MBA title and it is acknowledged by the Graduate School Twente (Institute for Post-Graduate Studies).

The program is made up of different parts. The first part offers a training in the field of:
- Environmental management; environmental strategies in companies; integral chain management
- Chemistry; process technology; environmental technology
- Organizational change and management consulting; production management; business economics
- Public administration; environmental law; environmental policy

Meanwhile, the students acquire profession-oriented experience through brief consultancy projects with companies and institutions. Much attention is paid to the development of consultancy skills by means of training in consultancy reporting, information acquisition, presentation, team building, discussion techniques and acquisition of assignments.

After an introduction into the integration and certification of environmental management, health and safety management, and quality management, a complete consultancy project is carried out in a company for six weeks. During this second part of the program, students work under real life conditions under supervision of lecturers. This part of the project results in a consultancy report for the company.

In the last part of the program, students receive a practical training of ten weeks in consultancy practice (with an environmental consultancy firm or in a company). Afterwards a thesis or article is written to finish the program. The articles are published as a book.

**Post-graduate program Master on Environmental Public Management**

This program focuses on positions with the government (civil service, provinces, municipalities, police, district water boards) or in government consultancy in the field of environmental policy and project management. This program has been certified to grant the title Master of Environmental Public Management (EPM) and is acknowledged by the Graduate School Twente (Institute for Post-Graduate Studies).

During the first part of the program, students are trained in the field of environment and project management, environmental law, environmental policy and management, environmental and process technology.

In the second part of the program, students conduct projects (dealing with environmental issues) in governmental organizations, practising their skills in project management. Emphasis is on the ability to control projects in which people from different scientific disciplines cooperate.

During the last part, students work in a long-term project with the environmental department of a municipality, province, state, water district or police department or in a consultancy firm that is government-oriented.

**Figure 1: Outline of the CSTM's Master's Courses on Environmental Management**

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**Board of CSTM**

The board of the Center of Clean Technology reflects the character of our research institute as operating on the edge of public and private environmental management. Besides academic representatives in public administration, business management and technology and chemical technology, the director of the Dutch Ministry of Housing and Environment, division International Environmental Policy is a member of the Board. The international character of the CSTM is further strengthened by connections in the United States, for example through the University of Georgia, members of which are also participating in the
Center of Clean Technology and Environmental Policy. Between the CSTM and the Technology and Development Group strong co-operation exists. In total, our institutional experience makes it possible to offer, within a general course, a tailor-made approach designed for participants from different parts of the world.

The Technology and Development Group (TDG)

The Technology and Development Group (TDG) of the University of Twente was formed in 1979 to introduce a development perspective into technological and social subjects with which the University is involved, and to examine the problems of implementing technology in developing countries. The mission of the TDG is to study the interaction between technology and development and to contribute to the formulation of possible answers to related problems.

Research and consultancy programs
Research is being performed on the following main themes:

Energy technology and environmental technology
Research on rural energy mainly relates to the planning and utilization of energy. Specific subjects currently investigated are energy management in ceramic industries, social forestry and briquetting of agro-residues. Much of the research is concerned with the planning methodology of energy projects, including the interactive aspects between parties involved, and the strategic management of energy projects. This work is strongly empirical, based on field studies in South and South East Asia and East and Southern Africa.

Natural resources management (water, land use, forestry)
Research is being conducted into traditional and indigenous methods of natural resource management, particularly forest and irrigation management. This includes the social impacts of natural resources degradation.

Policy analysis in the field of institutional and environmental sustainability
The concept of institutional development as one of the most important means to achieve the ultimate objective of sustainable development is a central research theme. This includes, among other things, research into decentralization and privatization, corruption and legitimacy, natural resources management and institutional development for drinking water and sanitation.

Business management
Focuses on business management itself as well as on the relations between companies in industrially developed countries and developing countries. Three sub-themes are distinguished: business management in non-western countries, relations between companies in western and non-western countries and industrial development in non-western countries.

International courses
The TDG offers two annual training programs:
- International Training Workshop on Energy and Environment for Sustainable Development;
- International Course on Energy Management and Cleaner Production in Small and Medium Scale Industries.
The TDG also contributes to training courses abroad and offers programs for in-country training within the field of energy and environment. On request the TDG offers Training Programs and Study Tours on specific topics.

3. A Framework for an International Master's Course on Environmental Management

Developing a Framework

In order to meet the high and growing international demand for managers in the field of public environmental management and private environmental management, the Center for Clean Technology and Environmental Management plans to offer a Master's Course on Environmental Management.

**Overall target of CSTM's master programme**

The overall target of CSTM's Master's programme is to prepare decision makers in companies, governments and non-governmental organisations to be able to analyze, decide and act in an environmentally pro-active way when making decisions about policy, production and consumption. All courses in the program concern Cleaner Production and Cleaner Consumption in the context of sustainable development or are preparatory for these courses.

There will be a choice of specializing in either environmental public management or environmental private management.

In the international full-time Master's courses at CSTM a six-phase track is foreseen.

**Phase 1 (8 weeks)**

After a short introductory period the essential knowledge about environmental analysis, environmental policy and environmental regulation is discussed. This process includes comparative analysis of approaches that are known in different states. The participant is challenged to: make an inventory of the situation in his home country, to make an comparison with alternatives that are in use in other countries, to judge various alternatives and think about improvements. The goal is to bring the group to an optimum level of understanding of some basic concepts, methods and tools that are essential in the world of environmental management. Secondly we try to reach for a deep understanding and consciousness of the local situation of the participant, evaluated in terms of the world's standards.

**Phase 2 (6 weeks)**

In the second phase the group is brought to an optimum level of basic theory on how necessary adjustments can be managed. The knowledge and tools that are offered as far as private management is concerned are product management, production management, organizational change theories and practices, consultant theory and guidelines. As far as public management is concerned we provide a thorough grounding on public policy making and public administration. We provide the participant with in-depth knowledge on the key
elements of organizational theory and methods for organizational change. The participant develops skills to analyze environmental problems and threats in a broad context, and to select and use suitable methods and tools to meet the challenges. Secondly we try to reach for a deep understanding and consciousness of the local situation of the participant, evaluated in terms of the methods and tools.

Phase 3 (10 weeks)
In this third period emphasis is laid on finding technological solutions for environmental problems. After getting the analysis right, the finding of solutions demands a thorough knowledge of environmental chemistry and the availability and applicability of clean technology. The participant obtains the knowledge and skills for making an inventory of applicable technology. A variety of technological solutions is discussed.

Phase 4 (6 weeks)
The knowledge gained in the first three phases is central in this essential phase in our programs. As the teaching of core subjects and tools of environment management continues at a more in-depth level, various possibilities for practicing skills are offered, sometimes in a structured form, based on the past experiences of CSTM staff members, sometimes in unstructured forms where highly realistic consultancy issues are at stake and sometimes on a practical working assignment for clients of the CSTM. These are opportunities for the participants to demonstrate the competence they have gained in dealing with real issues and challenges of environmental management. In this period there is space for specialization.

Phase 5 (12 weeks)
Putting knowledge and skills into practice is the objective in the fifth phase. The participant is placed in charge of a environmental management assignment. This practical assignment can be carried out in the country of origin of the participant.

Phase 6 Finishing period (2 weeks)
At the end of our program we make an assessment to assess to what extent the personal development plans of participants have been successfully achieved.

Frame 6: subjects of the basic period
phase 1: introduction
  environmental policy systems
  environmental law systems
phase 2: business management
  public management
phase 3: environmental chemistry
  environmental technology
phase 4: environmental management methods/tools
Specializations: Public or private environmental management

The specialization begins early in the program. The ball is thrown to the participants by additional meetings, tailor-made assignments and feedback in addition to the plenary elements.

The differences between the specializations have been growing as the program develops. Every subject includes an in-depth specialization part. In this specialization space, the two curricula are almost totally separated. Of course, flexibility in this is possible when suitable for individual participants' personal development plans.

In addition there are a large number of specialized methods and tools offered. Some are integrated in the plenary subject or presented as side-dishes to the plenary subjects. These elements contain topics, cases and training relevant for either public environmental management or private environmental management.

The part of the curriculum that offers specialization in Environmental Private Management concentrates on knowledge and skills (cases and training) that qualifies the participant as a consultant on aspects of environmental management. Those aspects include:

- environmental policy statements
- green marketing
- environmental accounting
- environmental reporting
- ISO 14001
- EMAS
- pollution prevention projects
- analysis of material and energy (technical analysis)
- analysis of organizational aspects
- analysis of demands to be met
- environmental programming
- Life Cycle Analysis
- environmental product design
- integral chain management

The specialization on public environmental management offers cases and training on topics related to the analysis, design and evaluation of environmental policy at national, provincial or regional level as well as for environmental planning and planning techniques at various levels and the organization and co-ordination of important environmentally relevant markets:

- analysis and designing of environmental policy (agendassetting, goalsetting, choice of instruments)
- evaluation of environmental policy (top-down vs. bottom up; closed and structured vs. open; theory-driven and explaining vs. hermeneutic)
- green planning
- local environmental planning
- environmental impact assessment
- environmental life cycle assessment (LCA) (macro-level)
- agenda 21 at the local level
- licensing to firms
- control and enforcement (both laws and permits)
- management of energy-markets
- management of waste-removal, waste re-use, and waste-elimination
- management of natural resources
Teaching techniques
Various teaching techniques are used. Working in sub-groups, individual assignments, discussions, workshops, external visits, paper-cases and real life situations are important parts of our method. Presentations, written communication, meeting skills, group-building skills, project and time management are basics that are strengthened in our program. Structuring in a context of imperfect information, and working with others towards solutions that fit in the local context, are the ultimate skill gathered in our master program.

Personal interests, skills and tools
In-depth knowledge about issues and methods of environmental private management and environmental public management are important in our Master's-courses. But the central point of our philosophy is drawing up a personal development plan. Right from the very start, we will ask each participant what he wants to achieve while attending our program. An important first choice is between private environmental management and public environmental management. But there are more choices to be made. Most core subjects finish with an assignment. Those assignments are given either in the context of private environmental management or in the context of public environmental management. Often there is space to have a very personal assignment, closely connected to participants' personal development plans. In the fourth phase the space for specialization can be used to reach for these personal goals, as will also the practical assignment in the fifth period, in real working surroundings. This practical assignment can very well be fulfilled in the home country of the participants.

An example of teaching approaches
As an example we will take the subject "environmental policy". The organization and content of Dutch environmental policy is only offered as reference basis. In order to discuss choices for a sound environmental policy a comparison is made with countries that have other environmental policies. In addition the participants get an assignment to make a similar comparison with the environmental policy (organization and content) of their country. The pros and cons of differences are discussed. The empirical results of different systems will play an important role. An agenda for improvements will be made for every country that is involved in the comparison. Within the specialized part of the curriculum (either public or private), the participants may proceed with subjects such as environmental planning (green plans and environmental impact assessment). A policy design assignment can also be a part of the specialization curriculum.

CSTM's graduates:
- are aware of the position of their organization in systems this effects the environment;
- know the decision-making of the players in their subsystem and how that affect the environment as well as their own position;
- are able to anticipate on decision-making of the other players;
- are able to formulate a sound environmental policy;
- are able to implement a sound environmental policy;
- are trained to know why, where and how to apply new tools in policy design and policy implementation.

Location, UT and Staff of the course
The course will be given at the University of Twente (UT), which was founded in 1961 and is one of the newest universities in The Netherlands. It is distinguished by its commitment in bringing together engineering sciences, applied sciences and social sciences, both in education and in research. The UT is a fully accredited, largely government-financed university with more than 6,500 students enrolled. Graduates are always in great demand, evidence of
the proficient functioning of the UT. The UT has also proved to be successful in expanding its networks of international relations. It is substantially involved in European research projects for industry. The UT places great emphasis on cooperation in academic areas with other universities. The UT participates in international exchange programs and aims at further internationalisation of its academic community.

The UT is situated amid the fields and woodlands of the former country estate Drienerlo in the Twente region, halfway between the towns of Hengelo and Enschede (75,000 and 150,000 inhabitants respectively), and about 150 kilometers from Amsterdam. The UT Campus offers extensive services. These include excellent sporting amenities, restaurants, pubs, accommodation for staff and students, a health center and a children's day care center.


In this paper we have presented a framework for an International Master's Course on public/private environmental management. It is a framework in the sense that the different elements of the course need to be worked out in more detail. The meetings in Indonesia will be used to further discuss the framework laid out in this paper and to exchange ideas regarding the Master's Course in terms of needed elements and accents offered in the course.

Based on the outcomes of our discussions in Indonesia, the CSTM will further develop the Master's program. Lecturers of CSTM and the TDG will make a proposal for the separate courses and the coordination team will ensure an optimal coordination between the courses over the year.

At the same time a graduate student from the Department of Applied Education will make an inventory of the Indonesian needs and will evaluate the curriculum accordingly.

By the end of this year, a second conference will be organized in Twente. This workshop will be jointly prepared by the CSTM/TDG and the Padjadjaran University, but will be fully financed by the UT. The agenda will include the (refined) Master's Course on private/public government management and more practical items such as the recruitment and selection of participants.