



Capacity building for Landscape Ecological research

At the State University of Mato Grosso UNEMAT, Brazil

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Anne van Doorn, Rob Jongman, Carolina da Silva, Jan Klijn and Michiel van Eupen

Capacity buiding for Landscape Ecological
research

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Abstract

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The state of Mato Grosso in Brasil faces environmental challenges since agricultural developments threaten biodiversity and other environmental values. The mission of the state university of Mato Grosso (UNEMAT) is to contribute to the knowledge needed for the sustainable development of the state. However, there is a need for academic capacity building. Collaboration with Wageningen University intends to improve the quality of the education and science especially concerning landscape ecological research.

Keywords: Brasil, landscape ecology, land management, sustainability, capacity building.

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Wageningen, april 2010

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Preface

With the signing of the pre-letter of intent on mutual contributions to the development of academic education and training capacities on 15 October 2007 the starting shot has been given to strengthen the collaboration between UNEMAT and Wageningen UR. For both institutes the collaboration promises to be very fruitfull. The state of Mato Grosso faces enormous environmental challenges in sustainable land use development and conservation of its biodiversity, and both universities feel their responsibility to contribute in the improvement of knowledge on sustainable land management.

The present report is the elaboration of this letter of intent and is the result of a consultation process that was concluded by a workshop that has taken place in December 2009. Researchers from both UNEMAT and Wageningen UR participated in the workshop. Exchange of research ideas, approaches, methodologies and capacity building needs was part of the workshop. But also the personal acquaintance, the understanding of the cultures of both countries and attempts to speak the same language was an (probably even more) important aspect of the meeting.

Therefore, the results of the workshop promise to serve as a fertile basis for further cooperation.

A handwritten signature in black ink, consisting of a stylized loop followed by a horizontal line.

Peter Zuurbier

Director of the Wageningen UR Latin America office

Summary

Introduction

In the autumn of 2007 the governor of Mato Grosso (Blairo Borges Maggi) and the rector of Wageningen UR (Aalt Dijkhuizen) signed a letter of intent to cooperate. In this letter they express their wish to establish scientific cooperation between the State University of Mato Grosso (UNEMAT) and Wageningen University in the Plant, forestry, animal and environmental sciences. In its mission statement UNEMAT declares to intend to contribute to the knowledge needed for the sustainable development of the Mato Grosso state maintaining the integrity of the biomes and its biodiversity. However, the present knowledge base of UNEMAT for achieving these objectives is limited. To improve its quality in education and science the university focuses on capacity building to carry out the required research. The knowledge at Wageningen UR in landscape ecological research, especially ecological monitoring, land use change analysis and environmental planning will be used to contribute to this capacity building.

Mato Grosso

Mato Grosso is the third largest state of Brazil, and covers the three major biomes Cerrado (41%), Amazon forest (52%) and Pantanal (7%). In Mato Grosso agricultural development, mainly soy and animal husbandry, threatens biodiversity and other environmental values. The challenge is to minimize the negative externalities of agricultural production, to recuperate nature and landscape diversity and conserve soil, water and biodiversity.

Policy background & research programmes

The policy programme of Mato Grosso MT +20 has been set up as a future strategy for the development of the state. The programme includes several objectives, among others (in italic are the objectives on which the cooperation between both universities should focus): 1) *Capacity building UNEMAT (quantity and quality)*; 2) Poverty alleviation; 3) *Conservation of the environment and biodiversity*; 4) Reduction of deforestation; 5) Diversification of productivity.

The same objectives can be found in the federal research programmes Bionorte and Centroeste. In Bionorte the objective is to develop the research on the Amazon forest and its biodiversity. It has two main research lines: 1) Biodiversity in the Amazon; 2) Application of biotechnology. In Centroest the objective is to develop environmental research in the Pantanal and Cerrado. It has also two research lines: 1) Biodiversity in the Cerrado and Pantanal, 2) Geodiversity in Cerrado and Pantanal.

Opportunities for cooperation

As internationally leading university and research centre, the mission of Wageningen UR is 'to contribute to improving the Quality of Life through cutting edge scientific research and innovative education in the domains of healthy food, sustainable food production, a viable green space and social transition processes'.

Wageningen UR works at national, European and global level and strives for sustainable use of land and environment. Therefore cooperation with UNEMAT (Mato Grosso, Brazil) in these fields is logical, as both countries have common interests and responsibilities (land use change, climate change; biodiversity) and because Europe and the Netherlands have a large ecological footprint in this part of the world. Moreover concepts and methodologies developed in Wageningen could be very useful in the context of Mato Grosso. The alleviation of major environmental and biodiversity problems by means of research on how to maintain biodiversity and provide good living conditions for people involved can be part of this.

From mission to actions.

As a first step towards a further cooperation between both universities, a workshop was organized in December 2009 in Cuiabá, with researchers of both universities. The Ministry of ANF of the Netherlands considered this cooperation important and financed the development of this cooperation programme. A three day program was organised in December 2009 focusing on the identification of most important elements for cooperation between UNEMAT and Wageningen UR.

During the workshop exchange of knowledge concerning land use change analysis, landscape ecology, and sustainability impact assessment took place. Concerning the objects of research consensus has been reached on the following themes:

1. The landscape ecological patterns and processes in Mato Grosso.
2. The impact of land use (also including water systems) and climate change on biodiversity and sustainable development..

Concerning the more specific content of the research, five lines of research were identified, that preferably should be carried out in the three biomes (Amazonia, Cerrado, Pantanal): Development of landscape typologies, Land use change analysis (past/present), Identification and monitoring of 3P indicators, Modelling and scenario development (normative), Impact assessment on sustainability.

The last day of the workshop was dedicated to set up an action list to put the cooperation between both universities into practice. These actions concern capacity building (courses in landscape ecology, GIS, land use change modelling), research cooperation (carrying out projects, publishing papers) and assisting in setting up PhD courses.

This means that UNEMAT has to invest in: internal digital communication structures, language courses and possibilities for exchange of academics with Wageningen UR. Wageningen UR explores the possibilities to: assist in organizing the set up PhD schools, organize courses on landscape ecology, GIS and land use change and contribute to joint scientific publications.

Financial resources

For UNEMAT the following research networks, programmes and funds are important: BioNorte, Pro Centro Oeste Sinergia the Round Table of Responsible Soy CAPES. For Wageningen UR an important fund is the WOTRO programme and also the Dutch policy programme 'Beleidsprogramma Biodiversiteit 2008-2011'.

1 Introduction

In the Brazilian state of Mato Grosso agricultural development, mainly soy and animal husbandry is an important economic driver. It is the basis of the economy, but in this way it also can be a threat to biodiversity and other environmental values. The challenge for the State of Mato Grosso is to develop its economy while minimizing the negative externalities of agricultural production such as deforestation and pollution and species extinction, to protect and recover nature and landscape diversity and conserve soil, water and biodiversity. The State University of Mato Grosso (UNEMAT) intends to contribute to the development of knowledge needed for sustainable development. However, the present knowledge base of UNEMAT for achieving these objectives is limited. To improve its quality in education and science the university is building new campuses and setting up environmental research units. This requires strongly capacity building to carry out the required research. The knowledge at Wageningen UR in landscape ecological research, especially ecological monitoring, land use change analysis and environmental planning will be used to contribute to this capacity building.

The goal of the cooperation project between UNEMAT and Wageningen UR is to contribute to the development of a knowledge base for biodiversity and natural resource conservation and sustainable land use planning in UNEMAT. The main issue to be developed is research capacity in landscape ecological modelling and impact assessments and scenario studies at the landscape level including the development of models from concept to actual models. To finetune the supply and demand of research capacity it is important to:

1. Identify the existing knowledge, the gaps and to prioritize these;
2. Give an overview of the available knowledge of Wageningen UR;
3. Discuss and conclude on a potential research strategy of UNEMAT;
4. Discuss the required capacity and facilities.

1.1 Mato Grosso State: description and environmental problems

The Mato Grosso state is the third largest state in Brasil with 903.357,908 km², distributed over 141 administrative units. The state covers 3 different biomes: the Amazon forest (52%), the Brasil Cerrado (41%) and the Pantanal (7%) (Mato Grosso, 2006; Silveira, 2009). Furthermore there are three large hydrological basins: the region of the Paraguai, (176.800 Km², 19,6%); the Amazônica region (592.382 Km², 65,7%), and the Tocantins-Araguaia region, (132.238 Km²). In 2000 the population of Mato Grosso was 2.531.324 inhabitants. 32,1% lives in the region of the Amazon, in the region of the Paraguai 56,9%, and in the Tocantins-Araguaia region 11%.



Figure 1.1:
Location of the state of Mato Grosso

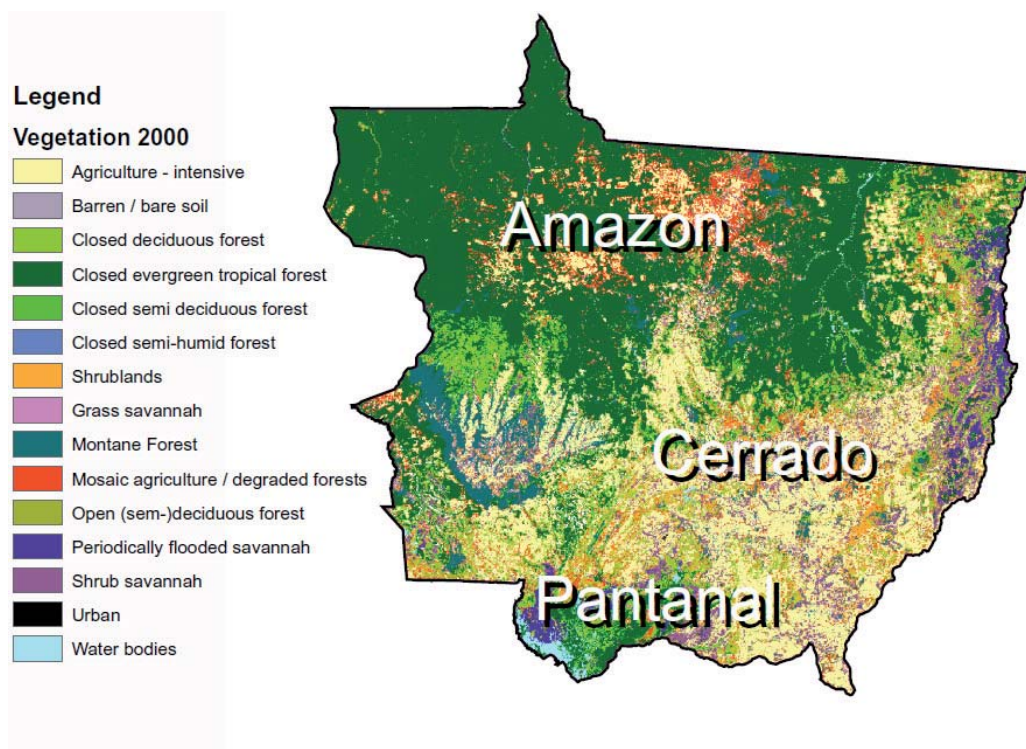


Figure 1.2:
Land Cover in Mato Grosso

Biome Amazonia

The Brazil Amazon, being the largest Biome in Brazil, contains an enormous species richness: approximately 15% of all known species of the planet. Besides the richness in biodiversity the Amazon accommodates also an enormous cultural diversity, with about 170 indigenous tribes and 180 thousands people. The Amazon has an important function in maintaining a number of ecosystem functions like the carbon cycle, regulation of the climate by mitigating global warming, as well as serving as a natural barrier against wildfires because of its humidity, regulating the water balance in the region and prevention of soil erosion. All these function and the role the Amazon takes in primary products and genetic resources justify the necessity of its conservation.

Main environmental challenges

Known as the major tropical forest in the world, the Amazon is endangered by deforestation, forest fires, mainly carried out for agricultural purposes (Kirby et al 2006). But also urbanization is a major threat, in Mato Grosso urbanization increased with 79% between 1980 – 2000. Also other antropogenic activities as mining, soil , infrastructures (like the highway Cuiabá – Santarém, BR-163 BR-070, BR-364, rail and water ways) and livestock breeding put a pressure on the biodiversity of the Amazon (Fearnside, 2005). The increase of these activities is the result of several development plans and policies that were initiated in the 1970's.

Biome Cerrado

The Cerrado is the second largest Brazilian biome, extending from the Amazon forest in the north to the borders of Sao Paulo state in the Southeast. The cerrado is characterised by a Savannah-like vegetation, which can vary from dense grassland (Cerrado lenhosa) to an almost closed woodland (Cerradão). The dominant climate is seasonal tropical with dry and wet seasons. The average temperature is 25 °C. During the dry, hot season, with temperature above 40 °C, wildfires can occur occasionally. The annual precipitation is between 1200 and 1800 mm and falls during the wet season, from March – October (Elbersen et al., 2008).

Main environmental challenges

Until the 1960s there were limited agricultural activities. However, because of the urban and industrial development, agriculture started to intensify and occupying more and more territory. At present more than 70% of the Cerrado has been modified (Klink and Machado, 2005). From the mid-1970's governmental programs accelerated the development of agriculture and cattle production. The monocultures of soybeans, sugar cane and livestock breeding are the main threats for biodiversity. Habitat fragmentation is a principal problem, less than 20% of the territory has still its original vegetation, 40% has lost already all its original vegetation. Since the infertile soils are used too intensively, soil erosion and overexploitation of natural resources is a major problem. Also illegal hunting and the limited number of protected areas do not contribute to the conservation of biodiversity.

Biome Pantanal

The Pantanal is located in the centre of South America. The Pantanal is situated in the depression of the upper Paraguay River that extends between the shield of Central Brazil and its transition zone to the foothills of the Andes. Mato Grosso state covers a major part of the wetland. The Pantanal covers 160.000 km² of which 140.000 is situated in Brazil (Junk et al., 2006) The Pantanal belongs is a wetland with annual flooding in the wet season, varying from three to six months, depending on the location. According to Junk et al (1989) it is subject to to predictable monomodal flood pulses.

The biome accommodates many different habitats and has a rich aquatic and terrestrial biota (Da Silva et al., 2001). Although little data are available, the Pantanal is considered as an important biome for conserving biodiversity.

Main environmental challenges

The most important natural rhythm in the Pantanal is the cycle of droughts and inundations. The animals and plants are adapted to these extreme circumstances. All types of management that interfere with this cycle, like the construction of dikes, drainage canals, land use change, construction of hydro-power plants, influence fundamentally the system. In this way the fragile balance of the ecosystem of the Pantanal is endangered.

1.2 Environmental Policies in MG

Considering the economic, social and environmental challenges, the government implemented a couple of planning policies like: MT +20 (Mato Grosso 20 years more) and the ZSEE (Socio Economic and Ecological Zoning).

MT+20

The main concepts of the MT+20 programme are: 1. Sustainable development, 2. Participative planning, and 3. Scenarios to deepen the discussion about the need and opportunity for the transition of the agribusiness towards economic diversification and added value. The main objectives of the programme are:

1. Capacity building for science and technology
2. Reduction of poverty (access to goods and services)
3. Conservation of the environment and biodiversity
4. Reduction of the deforestation and recovering of degraded areas.
5. Diversification of production

The MT20 program also aims to strengthen the environmental management by: 1) creating, implementing and maintaining conservation units, 2) promoting the sustainable use of natural resources through incentives, 3) the recuperation, preservation and management of hydrological basins and 4) the recuperation of degraded areas, especially the deforested areas.

Socio Economic and Ecological Zoning of the Mato Grosso state

The ZSEE-MT is a state public policy that has great importance for the planning of human activities in the state of Mato Grosso. Based on an integrated analysis the zoning areas contain information to define directions for its use. In this way the ZSEE permits interventions and actions through integrated sectoral plans and spatial planning.

The process of defining the appropriate zones was organized through thematic seminars and public meeting. According to the specific characteristics that were identified, it resulted in the identification of four categories, subdivided in several subcategories:

Category 1. Productive areas

Category 2. Areas that need more adequate management systems.

Category 3. Areas that need specific types of management, with high biotic potentials:

Category 4. Protected areas

Another challenge in the field of planning and land management is the environmental law concerning deforestation in the Amazon and the Cerrado. In the Amazon it is allowed to deforest 20% of the territory, while in the Cerrado 80% is allowed. However, because of the lack of a consistent map that defines where the Cerrado begins and where the Amazon forest ends, also a broad transition zone has been defined. In this zone the deforestation continues by applying the threshold of the Cerrado, what results in very high deforestation rates.

A step towards a solution is to define more precisely the environmental boundaries between the biomes of the Cerrado and the Amazon forest.

2 Environmental research in Mato Grosso

2.1 The State University of Mato Grosso (UNEMAT)

UNEMAT is the state university that is dispersed over the whole territory of the Mato Grosso and is present in 108 of the 141 municipalities, with 11 university campuses and 14 pedagogic nuclei.

Actually, UNEMAT has 82 graduate courses given by 619 teachers, of which 150 have a PhD degree and 328 a Msc degree. Figure 2 shows the distribution of the campuses that have departments related to the environmental sciences.

At present UNEMAT has **115** research projects in the human sciences, as well as the environmental and technological sciences. The projects are supposed to contribute to the scientific knowledge, but also to the society of Mato Grosso.

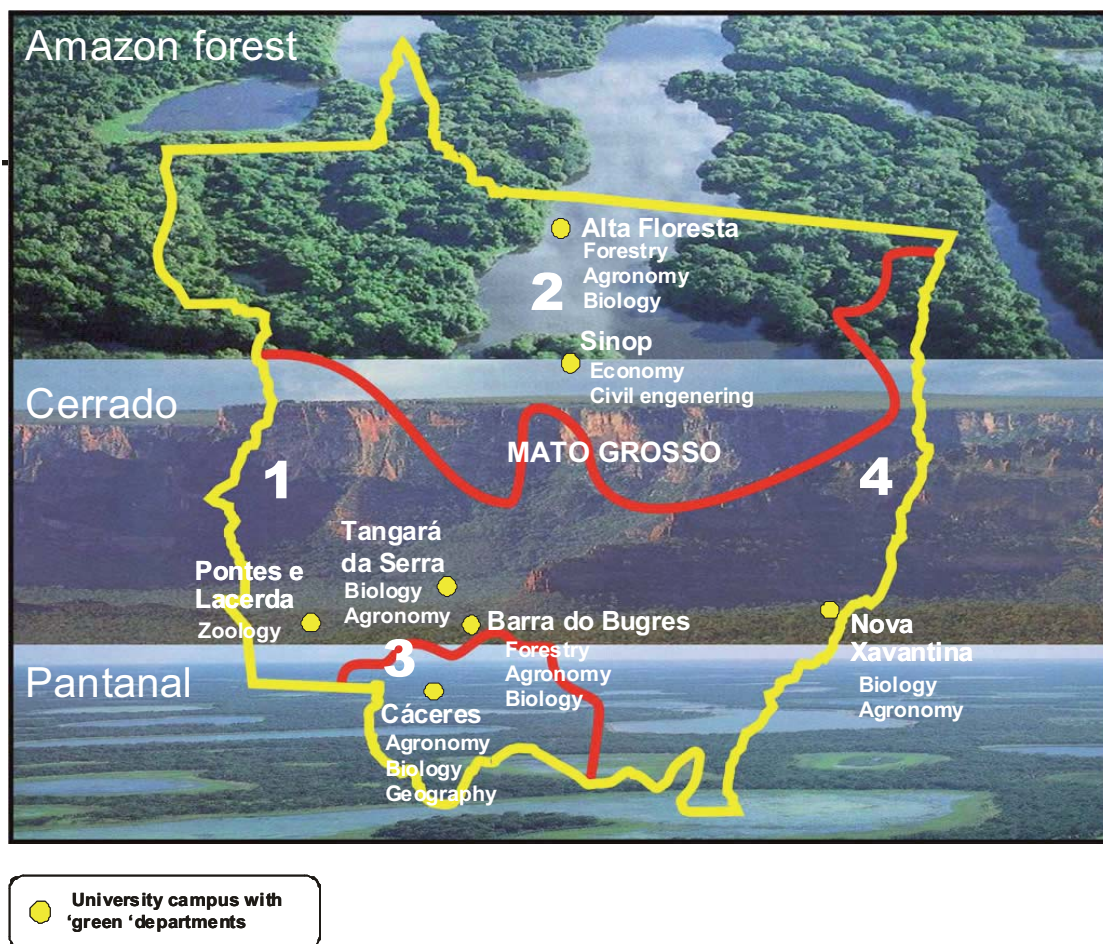


Figure 2.1.

Location of UNEMAT University and its Campuses with indication of their environmental research units.

Within Mato Grosso four potential nuclei of environmental research have been identified:

1. Border transect: Pontes de Lacerda, Cáceres (Jaurú and Paraguai river);
2. BR 163: Alta Floresta, Sinop Tangará da Serra in Amazônia (Teles Pires river),
3. Ecological Corridor of the Pantanal: Tangará da Serra and Cáceres (Rio Sepotuba/Rio Paraguai)
4. Ecological-Economic corridor of Araguaia river: Alto Araguaia, Nova Xavantina

The issues to be investigated are described below.

The region of the border transect from Pontes de Lacerda to Cáceres includes the Jaurú and Paraguai river and focuses on biodiversity, hydrology, erosion, sediment transport, land use and limnological aspects;

The BR 163 region with Alta Floresta, Sinop Tangará da Serra in Amazônia (Teles Pires river), is the focus of agricultural development and maintaining biodiversity through development of ecological corridors along rivers and remnant forests and wetlands.

The ecological corridor of the Pantanal from Tangará da Serra to Cáceres (Rio Sepotuba/Rio Paraguai) and the Parque Nacional Matogrossense is a region with land use change, erosion processes, establishment of conservation areas, species conservation and indigenous people.

Ecological-Economic corridor of Araguaia river contains areas with intensive agriculture, but also with large areas of indigenous land. Research should focus on these issues.

2.2 Research goals and questions

Considering the present environmental challenges that Mato Grosso state is facing, the following research questions were identified:

5. Which ecosystems occur in the biomes of the Amazon, Cerrado and Pantanal in Mato Grosso?
6. What is the state of the conservation of the biodiversity in the identified regions?
7. Which spatial scale allows to make distinction between the biomes of the Cerrado and Amazon forest?
8. How do the processes of land use/cover change take place in the identified regions?
9. What is the influence of climate change on land cover / use change?
10. Which species are most appropriate for the indication of climate change, using phenology?
11. How does the carbon sequestration vary when ecosystems change?
12. How does the conversion of ecosystems influence the hydrological cycle?
13. How does the conversion of ecosystems influence the source and availability of rain?
14. How does the conversion of ecosystems effect the hydrologic connectivity between the three different biomes?
15. How do changes in water variability effect biodiversity?
16. How does the metabolism of the selected ecosystems function in each biome?
17. How does the biodiversity function in the selected ecosystems?
18. What is the role of different stakeholders in the biomes, what are their interests, conflicts and the agreements that have been established through public policies and projects?
19. What are the costs and benefits of land use change in terms of ecosystem goods and services
20. Does the conversion of ecosystems influence the well being of human?
21. Which stakeholders pay for and which benefit from the conservation of biodiversity?
22. Are the models we use for the modelling of carbon sequestration, land use change and fragmentation adequate for our analysis?

Subsequently, the following research goals were identified:

1. Identify and classify the ecosystems of the 3 biomes of the Mato Grosso state.
2. Identify the landscape patterns that distinguish the Cerrado and the Amazon forest.
3. Select landscape patches for the monitoring of species diversity of flora and fauna that differ in origin (Cerrado ou Floresta);
4. Characterize the past land use change processes in the identified regions.
5. Identify sites for Long Term Ecological Research (LTER) in the Mato Grosso state.
6. Characterize the state of are of the biodiversity in the selected municipalities;
7. Identify the functional species (key species, top predators, dispersers and polinimators) of the selected ecosystems.

2.3 Research needs

Data concerning the native vegetation and biodiversity in the Cerrado and the Pantanal is incomplete and fragmented. Because of this lack of data the development of knowledge about the processes will be complicated. Not only data are fragmented, also the capacity for research is dispersed and limited, as well in terms of people as in facilities.

The MT+20 programme offers opportunities to develop the research needs of UNEMAT, through the research programmes Bionorte and Pró Centro Oeste. In Bionorte the objective is to develop the research on the Amazon forest and its biodiversity. It has two main research lines: 1) Biodiversity in the Amazon; 2) application of biotechnology. In Centro Oeste the objective is to develop environmental research in the Pantanal and Cerrado. It has also two research lines: 1) Biodiversity in the Cerrado and Pantanal, 2) Geodiversity (landscape diversity) in Cerrado and Pantanal.

The funding of BioNorte and Centro Oeste is secured by the federal government (Ministério da Ciência e Tecnologia (MCT)) and additional funding is given through the State governments involved.

3 Cooperation between Unemat and Wageningen UR

3.1 Motive, missions & expectations

In the autumn of 2007 the governor of Mato Grosso on behalf of the University of Mato Grosso (Blairo Borges Maggi) and the chairman of the Executive Board of Wageningen UR (Aalt Dijkhuizen) signed a letter of intent to cooperate (see Appendix 1). In this letter they express their wish of both institutions to establish scientific cooperation between the State University of Mato Grosso (UNEMAT) and Wageningen University in the plant, forestry, animal and environmental sciences.

In its mission statement UNEMAT declares to intend to contribute to the knowledge needed for the sustainable development of the Mato Grosso state maintaining the integrity of the biomes and its biodiversity.

UNEMAT foresees that the cooperation with Wageningen UR contributes to the enhancement of the university for the qualification of the staff (Phd's and Msc's) the facilities, the participation in regional, national and international research networks, the scientific production and the involvement in the planning policies of the municipalities of the Mato Grosso state. The cooperation will bring about an "upgrade" of its position as an Institute of Higher Education. Collaborating with an internationally operating university will contribute to a develop into a better position in the national and international scientific arena.

The main products resulting of the cooperation are envisaged as:

23. Development of tools for environmental monitoring;
24. Proposal for the environmental zoning of the identified regions that might evolve to an environmental zoning of the state;
25. Development of an ecosystem map of Mato Grosso;
26. Enhancement of the quality and quantity of the human resources of UNEMAT.;
27. Strengthening of the post-graduate courses (Msc and PhD);
28. Increase of the scientific publishing in scientific journals with an A-status;
29. Conversion of the environmental Post-graduate courses towards landscape ecology;
30. Participation of UNEMAT in international projects;
31. Integration in the research networks of programmes of Integração Bionorte and Pro Centro-Oeste.

As internationally leading University and Research Centre, the mission of Wageningen UR is 'to contribute to improving the Quality of Life through cutting edge scientific research and innovative education in the domains of healthy food, sustainable food production, a viable green space and social transition processes'.

Wageningen UR works at national, European and global level and strives for sustainable use of land and environment. Therefore cooperation with UNEMAT in these fields is logical, as both countries have common interests and responsibilities (climate change; biodiversity) and because Europe and the Netherlands have a large ecological footprint in this part of the world. Moreover concepts and methodologies developed in Wageningen could be very useful in the context of Mato Grosso's context. The alleviation of major environmental and biodiversity problems by means of research on how to maintain biodiversity and provide good living conditions for people involved can be part of this.

3.2 Workshop Capacity building and research development at UNEMAT

As a first step to a further development of the cooperation between UNEMAT and Wageningen UR a workshop was organized from 9 – 11 december 2009, with the participation of researchers of both universities (see Appendix 3 for the participants list). The workshop was entitled *Capacity building and research development at UNEMAT (Mato Grosso): Integrated research for biodiversity conservation and sustainable land use* and took place in Cuiabá, Mato Grosso Brazil. The three day program (see Appendix 4) focused on the identification of most important elements for cooperation between UNEMAT and Wageningen UR.



Figure 3.1:
Debate during the workshop

The workshop consisted of three parts, discussion on visions and approaches (day 1), approaches for research and exchange of knowledge on land use change analysis, landscape ecology, and sustainability impact assessment (day 2) and identification of concrete actions (day 3). Concerning the objectives of research consensus has been reached on the following themes:

1. The landscape ecological patterns and processes in Mato Grosso.
2. The impact of land use (also including water systems) and climate change on biodiversity and sustainable development.

Concerning the more specific content of the research, five lines of research were identified, that preferably should be carried out in the three biomes (Amazonia, Cerrado, Pantanal), but will have a different implications for the four selected regions. The lines of research will include:

32. Development of landscape typologies
33. Land use change analysis (past/present)
34. Identification and monitoring of 3P indicators
35. Modelling and scenario development (normative)
36. Impact assessment

Data collection and quality assurance is part of all steps.

The last day of the workshop was dedicated to the identification of actions to put the cooperation between both universities into practice. These actions concern capacity building (courses in landscape ecology, GIS, land use change modelling), research cooperation (carrying out projects, publishing papers) and assisting in setting up PhD courses.

The preconditions for this are among others good communication between the campuses of UNEMAT and with the outside world in Brazil and elsewhere in the world. This means that UNEMAT has to invest in: internal digital communication structures, language courses and possibilities for exchange of academics with Wageningen UR. Wageningen UR will explore the possibilities to assist in organizing a PhD school, to organize courses on landscape ecology, GIS and land use change and contribute to joint scientific publications. The specific actions to be taken are listed in the table below.

Object	Action	By
Digital Communication	Virtual university	UNEMAT
	Virtual discussion groups	UNEMAT, Wageningen UR
	Web site with research programme and mailing list/feeds	UNEMAT
Facilities	Lab for Ecology and EO/GIS (in Cáceres, Tangará da Serra , Nova Xavantina and Alta Floresta)	UNEMAT
	Guest houses/rooms (for foreign PhDs/researchers)	UNEMAT
	Purchase of hardware and software	UNEMAT
	Appropriate database structures	UNEMAT
Courses	Access to international literature (CAPES/ Elsevier portal)	UNEMAT
	English	UNEMAT
	Landscape ecology (Msc and PhD)	UNEMAT, Wageningen UR
	Land use modelling / Applied GIS	UNEMAT, Wageningen UR
PhD course	Inventory of PhD candidates	UNEMAT
	Assistance in organizing PhD courses	Wageningen UR
Disciplines	Humanities	UNEMAT, Wageningen UR
Exchange and cooperation	Inclusion in the research network of Bionorte and Pro'centro oeste	UNEMAT
	Obtaining scholarships and write proposals for exchange of students of UNEMAT	UNEMAT, Wageningen UR
	Invite senior researchers of Wageningen for a period at UNEMAT	UNEMAT
	Cooperation with UFMT Sinergia: Paraguai river: no research but stakeholder relations	UNEMAT, Wageningen UR
	Cooperation with Wageningen UR: Exchange and CAPES sandwich PhDs and post docs (10) also through People EU-FP7	UNEMAT, Wageningen UR
	Collaborate for joint publishing and review of project proposals	UNEMAT, Wageningen UR
Peer-review informal Projects	Collaborating on project basis	UNEMAT, Wageningen UR

3.3 Formalisation and Time planning

To formalise and concretize the cooperation between both universities a draft memorandum of understanding has been agreed between the UNEMAT and Wageningen UR (see Appendix 2).

To put the cooperation directly into practice regarding environmental research, appointments have been made to work jointly on a research proposal for the research program BioNorte and the following actions with deadlines were planned in the end of the workshop:

2009	15 December	Alterra sends Executive summary meeting to UNEMAT and other involved parties
2010	18 December:	UNEMAT sends draft proposal BioNorte to Alterra
	7 January:	Alterra Report of the meeting to UNEMAT
	11 January:	Alterra sends additions for the project proposal of UNEMAT
	25 January:	deadline project Bionorte BR\$ 1,800,000 (share) + 1,000,000 (MT)
	13 February	Draft proposal for FAPEMAT
	1 March	Alterra sends comments to UNEMAT on the draft proposal
	15 March	Final project for UNEMAT delivered at FAPEMAT
	15 March	Agreement UNEMAT Wageningen UR
	End of March is the deadline for the project proposal for FAPEMAT	

4 Other sources of funding for cooperation

BioNorte and Pro Centro Oeste are the two most obvious sources of funding of research for UNEMAT. However, there might be more sources for financing research and cooperation.

Sinergia is a mechanism to build a network on research around the Paraguai river. As UNEMAT aims to carry out research in the Paraguai catchment, a link with this network is very important.

In 2010 the Round Table of Responsible Soy is developing guidelines for producing soy in a responsible way. This has to lead to agreements on sustainable land use, biodiversity conservation and the rights of indigenous people. To report on these issues monitoring and assessments are needed and UNEMAT could be involved as it will have representative research regions and proposes environmental research that contributes to it.

There is still an agreement between Wageningen UR and CAPES on exchange of PhD students and postdocs. It should be explored what these opportunities are.

The Dutch WOTRO programme is open for Dutch research funding that contributes also to biodiversity research in the tropics. How this can be used needs further exploration. The Dutch policy programme 'Beleidsprogramma Biodiversiteit 2008-2011' explicitly focuses on impacts of land use (ecological footprint) in production of among others Soy, and development of international networks of knowledge and capacity building.

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Appendix 1 Pre-letter of intent



PRE-LETTER OF INTENT

Dated: OCTOBER 15, 2007

Between: Governo do Estado de Mato Grosso, Brazil, represented by Governour BLAIRO BORGES MAGGI, hereinafter referred to as **Unemat** (Universidade Estadual do Mato Grosso)

And: Wageningen University Research Centre, the Netherlands, represented by Dr. Aalt Dijkhuizen, Chairman of the Executive Board of Wageningen University and Research Centre, hereinafter referred to as **Wageningen UR**

WHEREAS: **Unemat** and **Wageningen UR** wish to establish mutual contributions to their development of academic education and training capacities;

WHEREAS: **Unemat** and **Wageningen UR** wish to encourage and develop collaborative scientific researches.

1. Objective

UNEMAT's and Wageningen UR wish to establish scientific cooperation between the two universities in the Plant, Forestry, Animal and Environmental sciences.

2. Follow-up

Each party will appoint a coordinator responsible for making a specific Letter of Intent.

The following persons will be responsible

- Carolina Joana da Silva (**Unemat**) and Peter Zuurbier (**Wageningen UR**)

Signed at Wageningen, October 15, 2007


Blairo Borges Maggi
Governador do Estado de Mato Grosso


Aalt Dijkhuizen
Chairman of the Executive Board of Wageningen University and Research Centre

Appendix 2 Memorandum of understanding

(proposal)
MEMORANDUM OF UNDERSTANDING
BETWEEN
STATE MATO GROSSO UNIVERSITY
AND
Wageningen University and Research Centre

Whereas both Mato Grosso State University (UNEMAT) and Wageningen UR, through the Environmental Sciences Group, are dedicated to increasing the number of Brazilian citizens, from Mato Grosso State, who receive first-rate educations in environmental problem solving and research, and whereas both parties subscribe to the notion of international academic cooperation, UNEMAT and, Wageningen UR acting as individuals and as partners, agree to enter into a Memorandum of Understanding having the specific provisions defined below.

The parties agree that this Memorandum of Understanding is not a formal legal agreement giving rise to any legal relationship, rights, duties, or consequences, but is only an expression and record of the purpose of the parties, to which they are bound in honor only.

This Memorandum of Understanding will be effective when both parties have signed it and shall remain in force for a period of five years unless it is mutually agreed otherwise. The Memorandum will be reviewed annually and, with mutual agreement, updated and modified as appropriate to best reflect the nature of the program in practice. The Memorandum may be extended for multiple periods with mutual agreement.

Students and researches numbers

UNEMAT Students and Researches

The goal is to prepare **20 to 25 Brazilians students and researches per year** through their enrollment in the Wageningen, made by annual training courses, in Brazil. This program provides broad interdisciplinary knowledge, skills, and training in both the natural and social sciences relevant to environmental science and management. The program has a professional orientation that distinguishes it from traditional research-based academic programs. The goal is to training masters students and researches, in Mato Grosso State, for have in their professional careers approaches founded in the Wageningen University, mainly in environmental problem solving in the public and private sectors. Each student and research will participate in a small term course Group Project, of 15 to 20 days, that serves as training, has an applied focus, and brings teams of 4 to 5 students from the 2 Master's courses in Environmental Sciences and Ecology and Conservation and researches from the Mato Grosso State University, involved in these courses, as well, Masters researches from Mato Grosso State Environmental and Plan Secretaries, together to solve an environmental problem for a real-world client.

PhD Students

The PhD is a research degree awarded upon demonstration of academic excellence and performance of original research. analytical powers, technical skills, and creative thinking demanded of leaders in environmental science and management. The program is also designed to accommodate a wide range of research interests, from those that are highly focused in a particular discipline to others that are strongly interdisciplinary.

The PhD program at Wageningen is a mentored program, with each PhD student working closely with one or more Wageningen professors in his or her area of expertise. As such, admittance to the PhD program requires the support of a Wageningen School faculty member who agrees to be the student's advisor.

The number of PhD students that can be accommodated varies from year to year depending upon the availability of faculty and their ability to take on additional students. Each year, after surveying faculty, the Wageningen will provide Mato Grosso State University with a list of specific research areas for which we seek potential PhD students in the Wageningen program. Mato Grosso State University will focus recruitment efforts on applicants whose interests coincide with faculty members' strengths and needs, and their ability to mentor new students at a given time. We project that the School could admit **1-3 new Brazilian PhD students per year.**

Post Doc

Wageningen UR will provide Mato Grosso State University researchers opportunities to work and publish together with Wageningen professors in his or her area of expertise. These studies will facilitate the international scientific experience, improvement in the interdisciplinary approaches courses and activities organized by the environmental program.

Student Recruitment

UNEMAT will work to increase awareness of the Wageningen School among students in Mato Grosso State University and recruit potential candidates for the Wageningen School's training and PhD programs. Mato Grosso State University and the Wageningen UR will work together to develop appropriate marketing materials to disseminate information about the program.

Criteria

UNEMAT will identify students in their graduate courses in Environmental Sciences and Ecology and Conservation to participate in the training courses, founded in the following criteria: 1) strong interest in graduate study focused on the environment; 2) good academic records; 3) high scholarly potential and; 4) good written and oral English communication skills.

Potential PhD candidates will also have: 1) well-defined research interests; 2) undergraduate backgrounds complementary to their research interests and; 3) strong potential to conduct excellent cutting-edge research.

Potential candidates having environmentally related work experience will be especially strong candidates.

In addition, recommended candidates will have the necessary funding for study in the Netherlands.

Application

Financial Support

PhD Applicants recommended and facilitated by UNEMAT who are admitted to the will be responsible for all education and living expenses during their graduate study. SECITEC, FAPEMAT and UNEMAT will provide financial aid as necessary.

Training Course in Brazil

SECITEC, FAPEMAT and UNEMAT will directly provide to Wageningen UR.....for each training course for five years to cover transportation, lodging, and per diem, fees, duty, health insurance, books.

This figure will be adjusted annually to account for any increases in the cost of living and/or education.

The total cost for a training course is \$....., plus annual adjustments.

PhD Students

SECITEC, FAPEMAT and UNEMAT will directly provide PhD students:

\$ per year for up to three years to cover non-resident tuition, fees, health insurance, books, and living expenses until they advance to candidacy (at which point they are exempt from non-resident tuition).

\$ per year after they have advanced to candidacy for up to three years for educational and living expenses.

\$ -\$ per year in discretionary research funding for data, lab supplies, software, hardware, and conference travel.

The total cost for a PhD student is \$, plus annual adjustments (assuming 5.5 years to complete the degree; 3 years to advancement to candidacy, and the highest level of discretionary funding).

Post doc studies

SECITEC, FAPEMAT and UNEMAT will directly provide to the Wageningen School:

\$.....for each researchers in post doc studies for one year to cover transportation, lodging, health insurance and living expenses.

This figure will be adjusted annually to account for any increases in the cost of living and/or education.

The total cost for a training course is \$....., plus annual adjustments.

Administrative Support for the School

With mutual agreement and as beneficial to the program, 1 to 2 Wageningen School representatives will travel to Brazil up to one times per year to assist in program development and recruitment and screening efforts. SECITEC, FAPEMAT and UNEMAT will provide necessary travel funding to the School for transportation, lodging, and per diem.

Appendix 3 Participantes workshop

Name	Research area	Universidade / Campus / organization	email
Carolina da Silva	Landscape ecology, perception of environment	UNEMAT	ecopanta@terra.com.br
Mara Abdo	Aquatic botany, limnology, Phd student	Tangará da serra	maraabdo@hotmail
Josúe Nunes	Bird ecology , population ecology	Tangará da serra	Joso73@yahoo.com.br
Marcia Lopes	Biology, project assistant	Caceres	
Amintas Rossete	Geologist, landscape ecology	Nova Xavantina	amnrote@uol.com.br
Ruth Albernaz Silva	Biology, Msc student bird ecology climate change	Caceres	Ruthalbernaz8@yahoo.com.br
Fatima	Environmental education	Sinop, Amazonia	
Rodrigo	Mathematics, GIS, photogrammetry	Sinop	
Jan Klijn	Fysical ecology, Landscape ecologist	Klijn advice	j.klijn16@kpnplanet.nl
Michiel v Eupen	Landscape ecologist, integrating knowledge in GIS	Wageningen UR	Michiel.vaneupen@wur.nl
Rob Jongman	Landscape ecologist,	Wageningen UR	Rob.jongman@wur.nl
Anne van Doorn	Landscape ecologist	Wageningen UR	Anne.doorn@wur.nl
Joao Carlos	Governo, environmental policies	(FAPEMAT)	
Tania	Translator		

Appendix 4 Programme of the UNEMAT – WUR workshop

Day 1 (9/12): Setting the scene & research for sustainable land use

Day chair:

Time	Title	Person
9:00- 9:30	Opening, welcome, goal of the work shop & program	Carolina da Silva, Rob Jongman, FAPEMAT, Bart Vrolijk
9.30- 10:00	Introduction to the program and the participants	Rob Jongman
10.00-10:30	Mato Grosso explained: demographic, land use, water and biodiversity processes, research questions	Carolina da Silva
10:30-11:00	Break	
11:00-12:00	Inventory existing knowledge and knowledge needs of UNEMAT (persons, facilities, projects and programs)	All (interactive, post-it / poster session)
12:00-14:00	Lunch	
14:00-14:30	Building a knowledge base for 3P sustainability research: concepts	Jan Klijn (Wageningen UR)
14.30-15:00	Landscape Ecology studies: integrating between scales in space and time	Rob Jongman (Wageningen UR)
15.00-15:30	A policy for the enhancement of biodiversity in Mato Grosso	FAPEMAT
15:30-16:00	Break	
16.00-17:30	Discussion: What should be and can be the ambition of UNEMAT in research	Lead....
17:30-18:00	Wrap up and conclusions	Rob Jongman
19:00	Dinner	

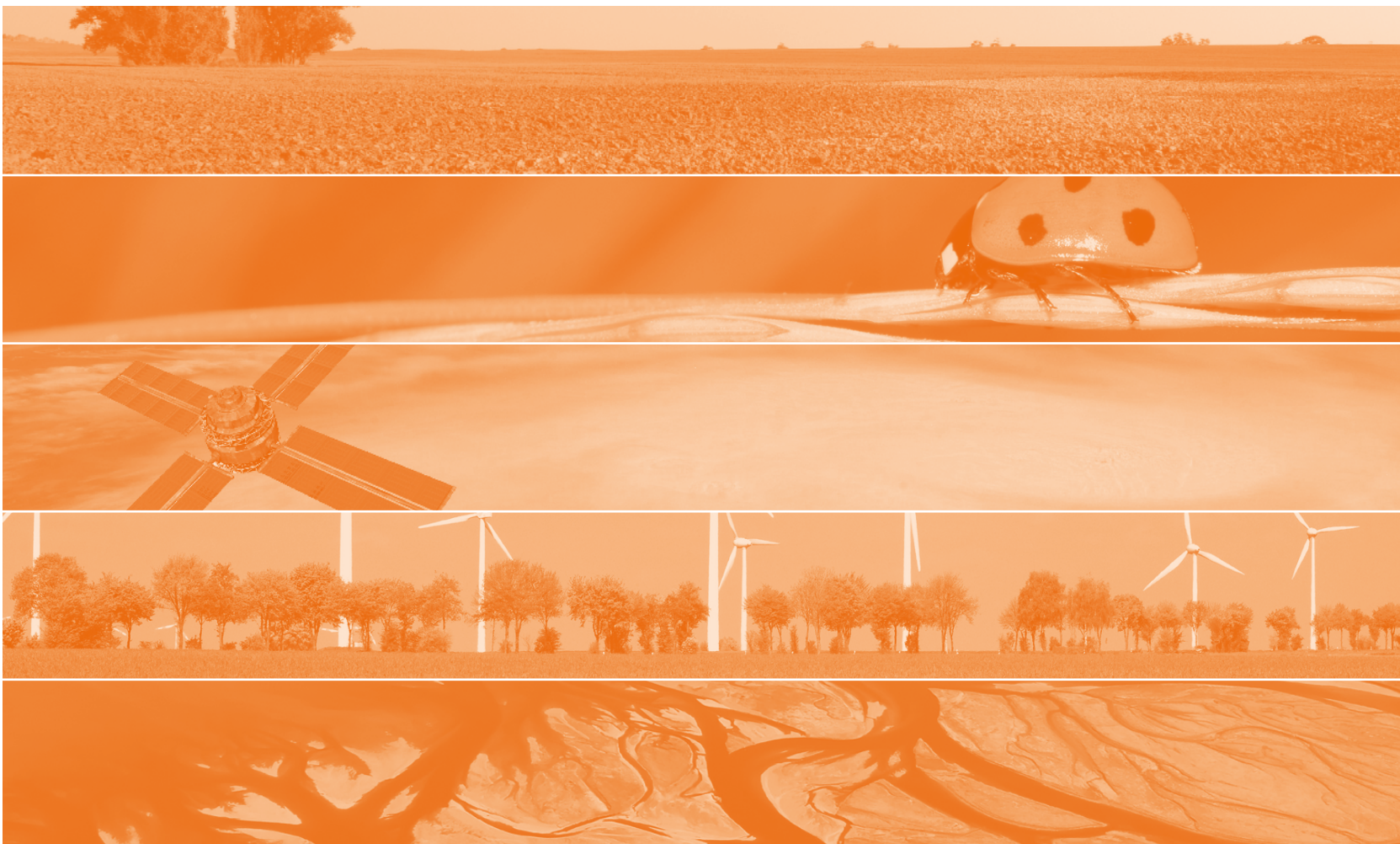
Day 2 (10/12): Methods for studying landscape processes and sustainability impact assessment.

Time	Title	person
9.00:9:30	Review of yesterday and introduction to today's program	Rob Jongman
9.30-10:00	Land use change and socio-economic aspects (based on PhD research in Portugal)	Anne van Doorn (Wageningen UR)
10:00-10.30	Monitoring the impact of land use and climate on biodiversity	Rob Jongman (Wageningen UR)
10:30-11:00	Break	
11:00-11:30	Analysis of land use changes and the effects: (Clue and LEDESS)	Michiel van Eupen
11:00-11:30	Sustainability impact assessment (examples form Sensor)	Heitor Coutinho
11:30-12:00	Land use dynamics and sustainability impact assessment (examples form EUruralis)	Jan Klijn
12:00-14:00	Lunch	
14:00-14:30	The role of hydrology for land use and biodiversity	Pierre Girard (UFMT)

14:30-15:00	Challenges of the Miranda Basin: land use, water and biodiversity	Marcia Divina (Embrapa Pantanal)
15.00-15:30	Break	
15:30-17:00	Feedback of UNEMAT and discussion: what does UNEMAT need and what can it offer	Carolina da Silva
17:00-17:30	Conclusions	
19:00	Dinner	

Day 3 (11/12) Integration & application

Time	Title	person
9.00-9:30	Review of yesterday and introduction to today's program	Rob Jongman
9.30-10:00	Interdisciplinary research: importance and challenges	Anne van Doorn
10:00-11:00	From theory to practice: Capacity building needs	Carolina da Silva
11:00-12:00	From theory to practice: facilities, data collection and data management system	All
12.00-14:00	Lunch	
14:00-15:00	Perspectives for collaboration with other research groups (ESALQ, WUR), interactive session)	All
15.00-15:30	Wrap up, the way forward, agreements	Carolina da Silva
15:30	Closure	Carolina da Silva



Alterra is part of the international expertise organisation Wageningen UR (University & Research centre). Our mission is 'To explore the potential of nature to improve the quality of life'. Within Wageningen UR, nine research institutes – both specialised and applied – have joined forces with Wageningen University and Van Hall Larenstein University of Applied Sciences to help answer the most important questions in the domain of healthy food and living environment. With approximately 40 locations (in the Netherlands, Brazil and China), 6,500 members of staff and 10,000 students, Wageningen UR is one of the leading organisations in its domain worldwide. The integral approach to problems and the cooperation between the exact sciences and the technological and social disciplines are at the heart of the Wageningen Approach.

Alterra is the research institute for our green living environment. We offer a combination of practical and scientific research in a multitude of disciplines related to the green world around us and the sustainable use of our living environment, such as flora and fauna, soil, water, the environment, geo-information and remote sensing, landscape and spatial planning, man and society.

More information: www.alterra.wur.nl/uk