3. DEUTSCH-BRASILIANISCHES SYMPOSIUM

Nachhaltige Entwicklung

23. – 27. Juli 2007

3° SIMPÓSIO BRASIL-ALEMANHA

Desenvolvimento sustentavel

Book of Abstracts

Albert-Ludwigs-University Freiburg
with collaboration of
Baden-Württembergisches Brasilien-Zentrum
of the University of Tübingen

550 Jahre
Albert-Ludwigs-
Universität Freiburg
1457 – 2007

Location:

Kollegiengebäude 1

Werthmannplatz 3

Editor: Ernst Hildebrand, Jürgen Steck and Sabine Heinle

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IMPRESSUM
Tagungsband des 3. Deutsch-Brasilianischen Symposiums
Anais do 3° Simpósio Alemanha-Brasil
Freiburg, 23. – 27.07.2007
2nd. Edition, September 2007

Ernst Hildebrand, Jürgen Steck, Sabine Heinle (Hrsg./Ed.)

www.uni-tuebingen.de/brasilien-zentrum
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Organization Committee

DEAR COLLEAGUES AND FRIENDS

It is a pleasure and a great honour for me to welcome you to the third German-Brazilian Symposium at the Albert-Ludwigs-University of Freiburg.

The German-Brazilian Symposium is a spirited new forum for the scientific environmental exchange between Germany and Brazil and was held for the first time in the year 2003 in Tübingen/Germany followed by meetings in Santa Maria and Santa Cruz (2005). Today we can continue this important dialogue within the framework of the 550th birthday of the Albert-Ludwigs-University of Freiburg. Six sessions covering all important and actual topics of environmental sciences in our two homelands will be chaired by internationally acknowledged scientists. I am grateful to these colleagues for their important and challenging contributions. My special thanks go to the key-note speakers, Philip Fearnside from Manaus and Volker Mosbrugger from Frankfurt.

Besides a scientific program with high “biodiversity”, the city of Freiburg with its famous Gothic cathedral and its enjoyable environment (Black Forest, “Kaiserstuhl”) is awaiting you. Especially for ecological scientists Freiburg is a privileged locality: within the radius of a one-day excursion we can find parent materials from all geological periods from the Palaeozoic period until the Holocene (except: the Cretaceous one). Freiburg is therefore surrounded by a geologically, botanically, climatically and last but not least cultural-historically highly structured landscape. Moreover your congress documents include a ticket for all public traffic within a radius of 50 km around Freiburg. This may be an “appetizer” to explore Freiburg with its unique medieval buildings and its exciting surrounding countryside.

I will briefly come back to the most famous building of Freiburg: the Gothic cathedral, because I think especially we as environmental scientists can learn a lot from this fascinating building: As far as I know this Gothic cathedral is the only one still standing in Germany that was completed in the 15th Century. If you look at the cathedral, be aware that this building is nearly unchanged since five hundred years! I think there are some analogies between the cathedral and the maintenance of highly diversified landscapes in our region. Both are complex structures, which can only survive in time, if there is a continuous input of energy. Thermodynamically we call those dissipative structures. However, energy alone is not sufficient, because you can not preserve the cathedral by heating it. The energy input must be structured in time and space by sophisticated knowledge and expertise. For these reasons you will never see the cathedral without scaffolding used by men which counteract the decay of the complex structures. This challenge also applies for the management of landscapes if we want to preserve its potentials, richness and resources. The builders of the cathedral did know that their creation will commit their offspring to work hard for ensuring the sustainability of the church. I think we also should feel this commitment and work hard to find ways which allow us to preserve the richness of structures and resources of our planet.

We would be happy if the contents of the symposium will make you keen on the German-Brazilian Symposium in Freiburg. The members of the local organizing committee work hard to ensure that the German-Brazilian Symposium will be a good and unique opportunity to meet colleagues and friends in a stimulating atmosphere.

Last but not least I have to thank all persons and institutions who supported this meeting. My special thanks go to the rectorate of the University of Freiburg for the broad minded help.

Prof. Dr. E. E. Hildebrand

Speaker of the Organization Committee

Rector of the University of Freiburg

DEAR LADIES AND GENTLEMEN,

I am pleased to open and to host the third German-Brazilian Symposium on sustainable development in Freiburg and I especially would like to welcome our Brazilian guests who have travelled a long way to participate in this symposium. The symposium coincides with the anniversary of the University of Freiburg founded 550 years ago, in 1457. For us, the anniversary is not only a reason to celebrate, but also motivation to further present our University as a top-level, cutting edge institution in national and international competition. With the autonomy of the University, a scientific involvement beneficial to mankind, unity of research and teaching, a constructive connection between comprehensive education and practice-oriented training, as well as the necessary creative freedom of academics, we have set a very clear course for the future. During the anniversary festivities we will present the achievements made by members of our university from its beginnings to the present day. I am very happy that this third German-Brazilian Symposium takes place in Freiburg as part of our anniversary celebrations.

Brazil is compared to Germany and our university a young nation with a fascinating richness of natural resources thus being an important partner to discuss the future ways of a harmonic development which are in agreement with our planet's longterm buffering potentials. The intensive cultural, scientific and personal links between Brazil and Germany will help to strengthen this dialogue. Especially the Faculty of Forestry and Environmental Sciences has strong relations to Brazil. The first forestry faculty in Latin America was founded in the late sixties of the last century in Curitiba/Paraná with the colaboration of the forestry faculty in Freiburg. It is a pleasure for me to remind of the outstanding engagement of Professor Gerhard Speidel as “spiritus rex” of the traditional colaboration between Brazil and Germany in the field of forestry and landscape research.

Looking at the current state of the World, I think we are all aware that an increasing degree of environmental sciences expertise will be required in the future.

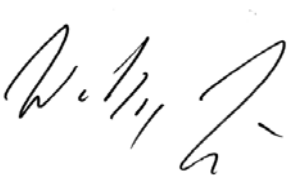
The importance of the world’s renewable resources will increase and the future of the population not only in developing countries but also in developed countries will largely depend on the question if we are able to implement sustainable management strategies.

I think the expertise which is assembled here in this room today is predestined and well-equipped to search answers for urgent environmental questions of mankind. The basic idea of the interdisciplinary environmental dialogue in the German-Brazilian Symposium can be visualized by a concept adapted from wildlife ecology: Removing a mortality factor of a population does not reduce the mortality of the individuals proportionally to the effect of the removed factor. The same applies, if we try to solve complex environmental problems of mankind. Solving one aspect of the problem for example in natural sciences does not result in proportional improvement of the situation because other and formerly hidden restrictions become more significant as limiting factors. For this reason, it is more effective to solve complex problems by simultaneously working at the different aspects of the same problem instead of insisting on the fundamentalism of one's own discipline. Therefore we need such inter- and transdisciplinary panels to overcome rigid discipline barriers.

I think we can learn a lot from each other and realize an added value for landscape research and management for our two countries. In conclusion I would like to thank our Faculty of Forestry and Environmental Sciences, presented by Professor Hildebrand and the Brasilien-Zentrum of the University of Tübingen for organising this symposium.

I wish you a fruitful symposium and I hope it also contributes to the sustainability of the good scientific and personal relations between Brazil and Germany.

Thank you very much.



Prof. Dr. Wolfgang Jäger
Rector of the University of Freiburg

Attorney of the Federal University of Santa Maria (UFSM)

DEAR GENTLEMEN, LADIES AND MEMBERS OF 3RD *GERMAN-BRAZILIAN SYMPOSIUM*.

As attorney for the Rector of Federal University of Santa Maria-Brazil (UFSM) I have the honor to compliment the Organizer Committee of this Symposium, to the University of *Freiburg*, our host, for this uneven moment: to host one more very important scientific event among Brazilian and German communities and for the commemoration of 550 years of *Freiburg* University's foundation. This experience is important for Brazilian people and mainly for our university, because the UFSM still is a young university, founded in 1960 in the center of the state of *Rio Grande do Sul-Brazil*, it passed for fast expansion in all the areas of knowing and today it has more than 50 courses of graduation and more than 40 courses and programs of pos-graduate (among doctor, master and specializations). At the same time our university participates of a vigorous plan of university expansion through the recent creation of new campus in the north of the state of *Rio Grande do Sul* and to tutor the founding of a new university in *Rio Grande do Sul*' south.

In a globalized world by the communications, where knowledge grows in speed up rhythm, where the Internet democratizes the technology, our University does not do without the support and cooperation facilitated by the diverse existing interchanges, being many with German entities, our presence and the presence of all the participant colleagues of these agreements mark this cooperation in the growth of the UFSM and region.

In a time where the climatic changes, the use of the energy, the destination of residues and the welfare human and animal meet at critical moment, we hope the subjects treated on this symposium not only contribute with immediate and future solutions for an adequate development of the human being, but also narrow the partnerships between our academic and technological communities.

On this way, our University is felt honored by having very successfully hosted 2nd German-Brazilian Symposium occurred in the south of Brazil, partnership by University of Santa Cruz-Brazil and with the inestimable support of the *Brasilien-Zentrum* of the University of *Tübingen*. We hope the success of the previous events serves as combustible for the increment of this and of the future events with the contribution and support of our university.

Prof. Dr. Chem. Eng. Djalma Dias da Silveira

Oberbürgermeister der Stadt Freiburg

ZUM GELEIT

Im Namen der Stadt Freiburg übermittele ich allen Teilnehmern und Gästen des 3. Deutsch-Brasilianischen Symposiums zur nachhaltigen Entwicklung herzliche Grüße und heiße Sie in Freiburg willkommen. Ein besonderer Gruß gilt den Wissenschaftlerinnen und Wissenschaftlern aus Brasilien.

Im Mittelpunkt dieses Symposiums steht die Entwicklung neuer Lösungswege in der nachhaltigen Bewirtschaftung und Nutzung von Ressourcen. Der Begriff der Nachhaltigkeit hat seinen historischen Ursprung in der Forstwirtschaft. Dieses Wort ist in vielen Sprachen zu einem weltweit verständlichen und respektierten Synonym dafür geworden, behutsam und verantwortungsbewusst mit natürlichen Ressourcen unserer Welt umzugehen, keinen Raubbau zu betreiben und für die nachkommenden Generationen das gewachsene Gleichgewicht zu schützen. Dies beinhaltet nahezu alle Lebensbereiche wie den Einsatz regenerativer Energien, eine flächenschonende Siedlungspolitik, alternative Verkehrskonzepte oder den Schutz von Boden und Wasser.

Die Realität sieht leider anders. Eine Verschwendung endlicher Energiequellen, eine dramatische Veränderung des Klimas aufgrund der CO-2-Emissionen oder ein täglicher Verlust großer Wald- und Naturflächen sind nur einige Erscheinungsweisen der alltäglichen unserer natürlichen Lebensgrundlagen.

Dabei spielt namentlich weltweit die Erhaltung des Waldes als nachwachsender Baustoff und Energiequelle sowie aufgrund seiner vielfältigen Ausgleichsfunktionen eine herausragende Rolle. Ich freue mich deshalb, dass dieses Thema im Mittelpunkt des 3. Deutsch-Brasilianisches Symposiums zur nachhaltigen Entwicklung steht und uns wichtige Hinweise für die Praxis geben wird. Freiburg gehört zu den größten kommunalen Waldbesitzern in Deutschland und ist besonders durch die Lage am Rand des Schwarzwalds geprägt. An der Universität Freiburg ist eine renommierte Forstwissenschaftliche Fakultät zu Hause, die in vielen praktischen Fragen eng mit der städtischen Forstwirtschaft zusammen arbeitet und wichtige Hinweise für die Praxis gibt.

Ich wünsche allen Teilnehmerinnen und Teilnehmern einen interessanten und anregenden Aufenthalt in Freiburg und dem Symposium einen guten und fruchtbaren Verlauf!

Dr. Dieter Salomon
Oberbürgermeister

THE BADEN-WÜRTTEMBERG BRAZIL CENTRE OF THE UNIVERSITY OF TÜBINGEN

After the first meeting in 2003 at Tübingen, the German-Brazilian Symposia are organised at a biannual schedule in Baden-Württemberg and in Brazil. The Brazil Centre is supporting these meetings. The last was held at Santa Maria and Santa Cruz do Sul, the forthcoming will be at Freiburg in July of 2007.

Since the year 2000, the Brazil Centre of the University of Tübingen is operating for all academic disciplines as an institution of the State of Baden-Württemberg after an agreement was signed with the government of the State of Rio Grande do Sul to intensify the scientific cooperation. In Baden-Württemberg the Brazil Centre is acting for all universities and other academic schools as well as the technical schools. In Porto Alegre the state funding foundation FAPERGS is the responsible counterpart.

In both directions we are advising and organising the exchange of graduate and doctoral students, PostDocs, visiting professors and trainees. For this purpose funds are available. The submitting country is covering the travel expenses, and the hosting country is providing a scholarship, usually for a 12 months period.

In addition at Tübingen we are offering seminars and courses and annual botanical and zoological excursions into Brazil. In all semester turns language training in Brazilian Portuguese is organised on different levels, and also meetings of the actual scholars. In April a 3-week-field course in geo-ecology is run in Rio Grande do Sul.

More information and actual opportunities can be found at our homepage:

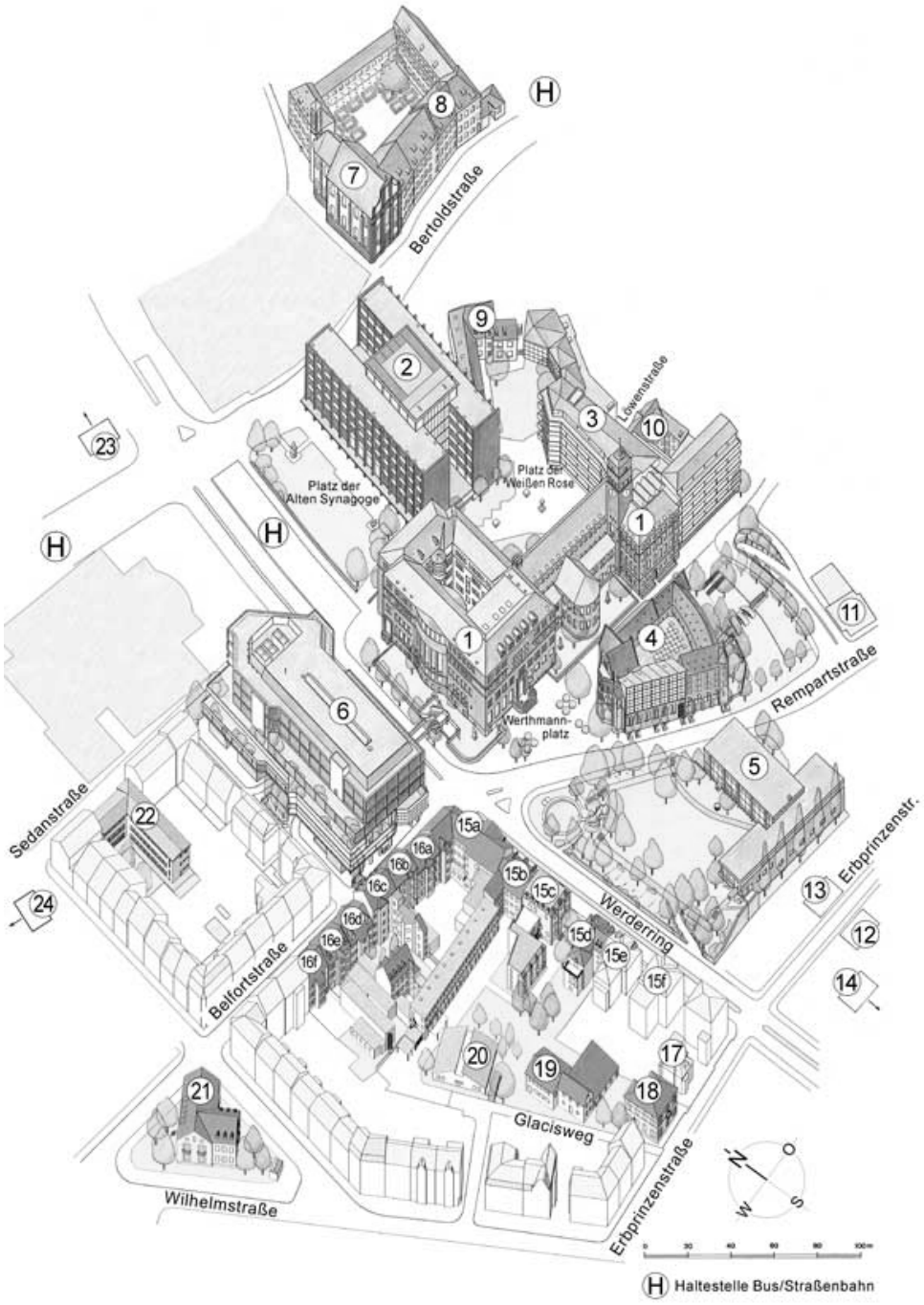
www.uni-tuebingen.de/brasilien-zentrum

Sabine Heinle, coordinator of the Brazil Centre
Tübingen, April 2007

LOCATION

Albert-Ludwigs-Universität Freiburg

① Kollegiengebäude I
Werthmannplatz 3
HS 1199



②③④ Kollegiengebäude II - IV
⑤ Mensa
⑥ Bibliothek
⑦ Universitätskirche
⑧ Forstwissenschaftliche Institute
⑨ Sedanstr. 6, Seminarräume, *Jour fix der Deutsch-Brasilianischen Gesellschaft*
⑩ Casino *Haus zur Lieben Hand*

3. Deutsch-Brasilianisches Symposium - 3° Simpósio Brasil-Alemanha

Sunday 22.07.2007

20.00 - 22:00	**Public presentation** **(lecture with slides; in German)** **Gerd Kohlhepp,** Tübingen: *Brasilien - Entwicklungsland,* *oder tropische Großmacht des 21. Jhdts.?*

Monday 23.07.2007

starting 8:30	*Registration*
9:30 - 11:00	**Opening**
	Music with "Bejgelech" Prof. Dr. Ernst Hildebrand, Speaker of the Organisation group Rector of the University of Freiburg Prof. Dr. Wolfgang Jäger Djalma Dias da Silveira, attorney in fact for the rector of UFSM Prof. Dr. Dr. Hans Eßmann, city councillor Freiburg Dr. Uwe Kästner, Ex-Ambassador, President of Deutsch-Brasilianische Gesellschaft Volker Wehle, Environment Ministry of Baden-Württemberg Music with "Bejgelech"
	Keynote speech
11:00 - 12:00	**Philip Fearnside**, INPA, Manaus: *Environmental Services as a Means of Sustainably Managing the Amazonian Rain Forest*
12:00 - 13:00	*Lunch*
	Management / Education *Chair: Dieter Mecke, Tania Resener*
13:00 - 13:20	Dietrich Halm, DFG: International co-operation in DFG-programmes: participation and perspectives
13:20 - 13:40	Djalma Dias da Silveira, UFSM: Environmental management model proposed for nephrology services
13:40 - 14:00	Katia Madruga, FURB: Web-Portal for environmental management - ECORADAR BRASIL
14:00 - 14:20	Uwe Menzel, Stuttgart: Implementation of German environmental engineering Master of Science programmes at universities in Brazil under German supervision and at German standards - EDUBRAS
14:20 - 14:40	Caroline Ruschel, PUCRS: The Brazilian Law of the Management of the Public Forests
14:40 - 15:30	**Poster session**
15:30 - 15:50	*Coffee break*
	Strategic planning and regional development *Chair: Gerd Kohlhepp, Josanidia Lima*
15:50 - 16:10	Angela Maria Gabriella Rossi, UFRJ, Peter José Schweizer, PUC-Salvador: The Brazilian Experience of the local integrated plan as basis for the new master plans
16:10 - 16:30	Valéria Teixeira de Paiva, Unicamp: The concept of sustainability and its impact on architectural and urban design processes
16:30 - 16:50	Jörgdieter Anhalt, IDER: Dissemination of Efficient Cook Stoves in Northeast Brazil: An Initiative to combat Desertification and Respiratory Diseases
16:50 - 17:10	Jumana Al-Sibai, Bosch Stuttgart: Good Environmental Performance: Ethanol as a Fuel
17:10 - 17:30	Susanne Hartard, Darmstadt: Global Compact: Case Study of Automobile Sector Companies in Brazil and Germany
17:30 - 17:50	Gerd Rathgeb, POEMA Stuttgart: The POEMA project with Poematec in Belem/Brasilien
17:50 - 18:10	Josanidia Santana Lima, UFBA:Technical-Scientifical Cooperation Network for Sustainable Development of a Rural Community in Nova Itapecirica-Itanagra
19:30	**Energy - round table** *Chair: Gero Becker, Freiburg; Raimundo Damasceno, UFF*
	Maria Antonieta de Souza, Brazilian Agency of Petroleum and Biofuels, Rio de Janeiro; Rodrigo Rodrigues, Executive Biodiesel Interministerial Commission, Brasilia Gerhard Enver Schrömbgens, Department Latin America, Foreign Office, Berlin; Dieter Seiferling, Energie Baden-Württemberg AG, Karlsruhe

Tuesday 24.07.2007

	Soil and water protection *Chair: Ernst Hildebrand, Paulo Fenner*
08:30 - 08:50	Günter Günkel, Berlin: Contamination and eutrophication risk in the Itaparica reservoir, São Francisco, Brazil
08:50 - 09:10	Maria do Carmo Sobral, Berlin: Sustainable management of multiple purpose reservoirs and ist surroundings in the semi-arid area of São Francisco river basin, Northeast Brazil
09:10 - 09:30	Berit Schwalger, Hamburg: POLCAMAR: a study of the impact of sugar-cane monocultures upon coastal waters in Northeast Brazil
09:30 - 09:50	Paulo Torres Fenner, UNESP: Macro and micro porosities behaviour due to the harvesting forestry traffic
09:50 - 10:10	João Moreno, Piracicaba: Hydrographical basin: convergence of scientific investigation and unit of territorial management - the contribution of geoprocessing
10:10 - 10:40	**Poster session**
10:40 - 11:00	*Coffee break*
11:00 - 12:00	**Keynote speech** **Volker Mosbrugger**, Senckenberg Forschungsinstitut, Frankfurt: *Biodiversity loss and ecosystem services – the new challenges*
12:00 - 13:00	*Lunch time*
	Keys to sustainable forestry *Chair: Ernst Hildebrand, Paulo Fenner*
13:00 - 13:20	Renato Robert, Isabel Christina Regis, UFPR, Quality Control As A Development Opportunity To The Forest Utilization Of Acre State
13:20 - 13:40	Jorge Luis Monteiro de Matos, UFPR: Solidwood products of Mimosa scabrella (bracatinga) - lumber recovery rate and carbon storage balances
13:40 - 14:00	Benno Pokorny, Freiburg: "The king is naked": a critical analysis of the Community Forestry concept as applied in the Amazonian region
14:00 - 14:20	Peter Trüby, Freiburg: Nutrient Stock and Distribution in a Secondary Forest Provided for Slash and Burn in Rio Grande do Sul
14:20 - 14:40	Jens Günther, Freiburg: Growth analyses on four native tree-species of the Brazilian Atlantic Rainforest: seasonal and long-term dynamics
14:40 - 15:00	Leif Nutto, Freiburg: The potenmtial of Brazilian eucalypt sawnwood at the world market
15:00 - 15:20	Althen Teixeira Filho, UFPEL: Eucalyptus monoculture: sustainable development or green desert?
15:20 - 15:40	*Coffee break*
	Keys to sustainable forestry *Chair: Peter Trüby, Mauro Schumacher*
15:40 - 16:00	Mauro Valdir Schumacher, UFSM: Environmental effects of Pinus, Eucalyptus and Black wattle plantations in the south of Brazil
16:00 - 16:20	Miriam Hansbauer, Freiburg: Biodiversity conservation in fragmented landscapes at the Atlantic Plateau of São Paulo
16:20 - 16:40	Stefan Ruge, Rottenburg: Near-natural regeneration of araucaria mixed forests (Araucaria angustifolia) in the southern Mata Atlântica
16:40 - 17:00	Yeda Maria Malheiros de Oliveira, Embrapa Florestas: Strategies for sustainable management in Brazilian Araucaria Forests
17:00 - 17:20	Julia-Maria Hermann, München: Makings of a successful pioneer forest species: Myrsine parvula in grasslands of Southern Brazil
17:20 - 17:40	Klaus Henle, Leipzig: Effects of habitat fragmentation of the Mata Atlantica on amphibians and identification of priority sites for habitat network
17:40 - 18:00	Anabel Aparecida de Mello, UFS: Carbon fixation in the biomass of Mimosa scrabella Benth (bracatinga)
18:00 - 18:20	Gerda Nickel Maia, IDER Fortaleza: Caatinga - white forest or a second Sahara
18:20 - 18:40	Gilson Martins, Freiburg: Sustainable development, forest management and the furniture industry - An empirical study in Brazil and Germany
19:30	**Conference Dinner**
	Parallel (room 1010)
	Photocatalytic degradation / environmental pollution *Chair: Klaus Kümmerer, Ayrton Martins*
15:40 - 16:00	Wolf-Ulrich Palm, Lüneburg: Influence of clouds on the photochemical degradation of pesticides in aqueous media
16:00 - 16:20	Carla da Silveira Frank, UFSM: Heterogeneous photocatalytic degradation of amoxicillin and COD removal from hospital wastewater
16:20 - 16:40	Danielle Marranquiel Henriques, UFSM: Photodegradation of Cephalosporin Antibiotics
16:40 - 17:00	Raquel Pupo Nogueira, UNESP: Treatment of DDT contaminated soil by Fenton and photo-Fenton process - advantages, drawbacks and alternatives

Wednesday 25.07.2007

	Waste management / recycling / sustainable chemistry *Chair: Jürgen Steck, Djalma da Silveira*
08:30 - 09:20	**Müfit Bahadir**, Braunschweig: Research and Education in Sustainable Organic Chemistry
09:20 - 09:40	Sebastian Bojanowski, Gießen-Friedberg: Low temperature conversion of biomass
09:40 - 10:00	Martin Kranert, Stuttgart: Assessment of new strategic approaches for the treatment of household wastes
10:00 - 10:20	Rafael Kuster de Oliveira, PUC Parana, Freiburg: Eco-efficiency Indicator System for Mass and Energy Flows of Industrial Processes
10:20 - 10:40	João Manzi, Recife: Chemical Reactor Analysis by Entropy Generation Minimization
10:40 - 11.00	*Coffee break*
11:00 - 12:00	**Poster session**
12:00 - 13:30	*Lunch time*
13:30 - 15:00	**Project platform** *Chair: Roswitha Meyer, Elaine Resener* Matthias Frattini, BMBF: Scientific and Technological Cooperation between Germany and Brazil Jorge Alberto Müller, FAEMA, Blumenau: Bromberg Village - A social environmental sanitation project for the improvement of the local life quality Blumenau, Santa Catarina, Brazil Nelson Zang, URI: Trinacional Ecological Corridor: the gaucho connection Irene Haydeé Costas, Curitiba: The wicker productive chain of Campo Magro, PR, Brazil Hans-Joachim Huf, Frankfurt: Senior Expert Chemists International (SEC Int.) of the Society of Greman Chemists (Gesellschaft Deutscher Chemiker, GDCh) Juliana Barilli, Tocantins: Socio-economic and energetic analysis of different production systems of bio-fuel to small farmers Márcio Costa dos Santos, José Luiz Zaganelli, Niterói: Socio-environmental and sustainability assessment for regional development in Angra dos Reis, RJ - Brazil
15:00 - 15:30	*Coffee break*
15:30 - 16:00	**Poster contest** *Chair: Jürgen Steck*
16:00 - 17:00	**Conclusion and outlook** *Chair: Ernst Hildebrand*
19:00	**Jour Fix - informal meeting**

Thursday 26.07.2007

	Excursions all day 1. Bioliq, Karlsruhe, in connection with Fraunhofer, Heidelberg-Neurott 2. Rottenburg University of Applied Forestry

Friday 27.07.2007

	Excursion all day *3. Sonderabfallverbrennungsanlage* Basel together with Kläranlage Forchheim **Excursions**
in the morning	4. Conventwald 5. Biogasanlage Freiburg
afternoon	6. Visit of Institute of Environmental Medicine and Hospital Epidemiology (Kümmerer) and the Department of Environmental Protection (Steck)
17:00 - 18:30	**City tour Freiburg (engl.)**

LECTURES

ENVIRONMENTAL SERVICES AS A MEANS OF SUSTAINABLE MANAGING THE AMAZONIAN RAIN FOREST

Philip M. Fearnside

National Institute for Research in the Amazon (INPA)
Manaus, Amazonas, Brazil

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Keywords: Amazonia, Avoided deforestation, Brazil, Carbon, Deforestation, Extractivism, Forest management, Global warming, Greenhouse-gas emissions, Logging

Sustainable management of traditional commodities in Amazonian forests, such as timber and non-timber forest products, faces a variety of limitations that often lead either to unsustainable land uses, to failure to sustain the local human population, or both. Environmental services of Amazonian forest, such as maintaining biodiversity, water cycling and avoiding global warming, are worth much more to human society than are the traditional commodities that can be obtained by either managing or destroying the forest. Monetary flows derived from the value of environmental services can serve as supplementary income streams in systems that sustainably manage the forest for products. These flows can also operate on a wider regional scale that includes the value of standing forest that is not under management for traditional commodities. Progress continues on quantification of environmental services, accounting methods and modeling the benefits of different policy options. Most needed is creation of institutional mechanisms to reward the environmental services of forest maintenance.

BIODIVERSITY LOSS AND ECOSYSTEM SERVICES – THE NEW CHALLENGES

Volker Mosbrugger

Senckenberg Research Institute and Natural History Museum,
Frankfurt a.M., Germany

volker.mosbrugger@senckenberg.de

Present-day biodiversity loss is an important scientific, economic and political issue of global dimensions. Taxonomists estimate that presently we are loosing up to about 100 species per day; around 150.000 km^2 of tropical forests are destroyed each year, about 75% of all agricultural plant varieties were lost since the 19^{th} century and one race of animal livestock disappears every week. So far, no one dares to quantify the overall loss in genetic diversity. Thus, present-day man-made biodiversity loss is real and enormous although we cannot quantify it reliably. From recent field, greenhouse and laboratory experiments it is evident those compensatory effects between species and functional groups exist and that a change in biodiversity directly influences ecosystem functions and ecosystem services such as pollination and biomass production. However, the total impact of biodiversity loss depends on the species, functional groups and ecosystems involved. Unfortunately, the field of functional biodiversity is still poorly explored and little is known about the functional role of species. Correspondingly no scientific prediction (and thus mitigation) of the overall impact of the actual biodiversity loss is possible. However, palaeontological studies indicate that mass extinctions may impact the global biogeochemical cycles and biodiversity for one to several million years. Thus, a systems approach of biodiversity research is required that integrates taxonomic-systematic studies, analysis of functional biodiversity and biodiversity impact research.

ENVIRONMENTAL MANAGEMENT MODEL PROPOSED FOR NEPHROLOGY SERVICES

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The environmental question has being a great society's concern, besides being a relevant theme in the national and international governmental politics. The current moment demands new models of management and, consequently, new ways of environmental management with a bigger social responsibility. The aim of this study is propose a new model of Environmental Management to Santa Maria/RS Nephrology Services. The methodology used was the descriptive quantitative exploratory with multicase techniques. Three different instruments were used to the data collect, which were answered by interviewees in the period of December 2005. The following professionals form the sample: nurses, managers, nursing technicians and servants, besides patients who suffered of chronicle renal insufficiency and who were submitted to hemodialysis treatment. The detailed analyses of the processes identified opportunities of improvement as well as the diagnosis, which enabled the collect of data to the identification and to the evaluation of the non-conformities of the Environmental Management services, based on the valid legislation. The instrument of evaluation applied in three different groups showed being an efficient tool in the identification of the non-conformity factors, what enabled the elaboration of a propose of environmental management system applicable in the nephrology services. The initial results for the model proposed showed cost reduction of US$ 19,285.00/year by change of materials more environmental friendly. The implantation of the Environmental Management in services brought many benefices such as the reduction of residues and liquids effluents, the natural resources preservation, the use of materials and inputs more environmentally correct to the preservation of the human health and to the environment as well.

E-LEARNING INTEGRATED TO ECORADAR BRASIL PROJECT: THE CASE OF UNIVERSITY OF BLUMENAU

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Ecoradar Brasil is a Brazilian prototype of a German Web Portal http://www.oekoradar.de for environmental management. Within the framework of the German portal project there are two important proposals: internationalisation of the website and environmental management education through E-Learning tools. The Brazilian version, therefore, considered these two objectives. The prototype in Portuguese language was a fundamental step to the internationalisation. Other steps, for example, organisation of a network of universities in order to keep developing contents to this homepage, are being taken to assure the gradual growth of Ecoradar Brasil. Concerning E-Learning, a course “Introduction to Sustainable Business” is being planned to be offered through a distance learning platform in the University of Blumenau in South of Brazil. This course is planned to be offered as an introductory and compulsory course to all study areas of this university. This paper will focus on the experience of Blumenau University and will show the steps that have been taken to introduce E-Learning integrated to Ecoradar Brasil project.

IMPLEMENTATION OF GERMAN ENVIRONMENTAL ENGINEERING MASTER OF SCIENCE PROGRAMMES AT UNIVERSITIES IN BRAZIL UNDER GERMAN SUPERVISION AND AT GERMAN STANDARDS – EDUBRAS

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In the course of an onward industrialisation, environmental pollution causes central problems in emerging and developing countries. In Brazil, which is the most populous country in South America, this is particularly visible in densely populated areas.

Lecturers of the University of Stuttgart have many years of experience in building up new environmental study courses such as the study course “Umweltschutztechnik” and the English Master of Science programmes WAREM and WASTE, which have been successful for the past 10 years. This experience ought to be exported to Brazil, initially to the state of Paraná, as a pre-operating study.

The basics of the planned study programme were established by the environmental inventory of Dr. Uwe Menzel during the research project “Export orientated research on the field of water supply and water disposal, Part 2: Wastewater treatment and water reuse” funded by the German “Federal Ministry for Education and Research (BMBF)”. This revealed the urgent need of exporting environmental technologies to Brazil. At the same time there is a need to educate skilled specialists, who are able to operate the imported technologies sustainable.

The Summer-School-courses from 2002 until 2005 with the topics wastewater / industrial wastewater and waste / industrial waste showed the great interest for environmental topics but also the need to enlarge the offer in the form of permanent study courses in Brazil. Finally the know-how and the qualification of the appropriate specialised staff are casting for the sustainability and therefore the success of all environmental procedures.

The Programme “Course offers from German Universities in foreign countries“ will offer study modules, study matters and also an additional study course shall be developed and offered directly at an university in Brazil. The master programme environmental engineering will be inducted at the national university “Universidade Federal do Paraná - UFPR” in Curitiba in July 2007. The final degree „Master of Science“ will be acquired after the fourth and the sixth semester respectively. The “Master of Science” shall be accepted in Brazil or alternatively in Germany and Brazil and its accreditation is aimed. The study programme will be financed by tuition fees.

The linking of university lectures and research is intended firstly to be established by a close cooperation with the University of Stuttgart and later on by the building up of infrastructure at the UFPR. The lectures will be held in German as well as in Portuguese. Accompanying the lectures, German language courses will be offered to intensify the contacts to Germany. Lecturers from Germany will take part in the forming of the course’s design and they will be responsible for the quality control of the course. The German side will be in charge of the administration and coordination

of the overall project. The structure of the study programme offers a wide variety in the field of environmental engineering and the positions will be filled out from Germans and Brazilians.

The cooperation with the project-partner UFPR is regulated by a cooperation treaty. The UFPR provides e.g. the infrastructure and lecturers and is responsible for the fee and the coordination on the Brazilian side. The public relations and the contact to the local industry and therefore the warranty of practice-orientation is realised by the partnership to the industrial alliance SENAI.

Project Funding source:
DAAD (Deutscher Akademischer Austauschdienst)

Project Partners:
Universidade Federal do Paraná (UFPR)
SENAI - Excelência em Educação e Tecnologia

Project Director:
Dr.-Ing. Uwe Menzel, Acad. Director

THE BRAZILIAN LAW OF THE PUBLIC FORESTS'S MANAGEMENT

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The present paper looks for to study and to discuss about the effectiveness of the Law n. 11.284, from 02 of March from 2006; which makes use on the management of public forests for sustainable production. It is understood by public forests, the natural or planted forests, located in different Brazilian biomass pertaining to the Union, the states, the cities, the Federal District or to the indirect administration's entities. This law appeared as an attempt to decrease the deforestation in all the Brazilian areas, mainly in the Amazonian Forest, where the deforestation has the most critical situation. Also the Amazonian Forest's population is living, mainly after the beginning of the 20's century, in the middle of a constant conflict between the developers and those who wants to preserve the nature. The first objective of this law is to finish with the illegal occupancy of the Amazonian land. The second is to give some permission to use these areas for sustainable exploration preventing the deforestation and the illegal work. For this aim, the law foresees the management of the forest in three different ways, which are, the direct management, the destination of land to the local communities and the forest concession. The management must count with the public participation, then those who are going to be benefited can also help with the fiscalization of the process. Also, according to the terms of the concession, the private initiative is going to be responsible for caring and handling the forests, practicing a supported exploration, which characterizes a partnership between the public power and the community. The forest's management principles have to be considerate so that the law can be effective. Amongst them, there is the protection of the ecosystem and the biodiversity, the efficient and rational use of the Forest, the respect to the rights of the local populations and the support to the knowledge and promotion of the awareness of the population. In addition, for this law to become effective, the forest's community must be informed about all the process that is involving the forest management so that the law can fulfill its objective, which mainly is the protection of the forests.

THE BRAZILIAN EXPERIENCE OF THE LOCAL INTEGRATED PLAN AS BASIS FOR THE NEW MASTER PLANS

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This study aims to describe and analyze the Brazilian experience in the field of the local urban planning of the 1970s, in order to contribute to the formulation of the new Master Plans that the Brazilian Constitution of 1988 has put down as obligatory for all the cities with more of 20.000 inhabitants. The experiences of urban planning before 1967 were focused more on the territorial field (land use, transport, without the preoccupation with the community participation. These plans were forgotten. After 1967, there was intent to integrate local plans to regional and federal plans of development. But during the next 20 years, the importance of the urban planning was also forgotten and only in 1988, with the back of democracy in Brazil, has began a new phase an a new chance to remake the undone work. This article aims to analyze the old plans, in order to restore the basis for the Master Plans in the local planning in Brazil.

THE CONCEPT OF SUSTAINABILITY AND ITS IMPACT ON ARCHITECTURAL AND URBAN DESIGN PROCESSES

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Keywords: sustainability, design process, building, urban development.

Domestic Studies on sustainability investigate the complex interactions between society and nature. In the building industry environmental quality is discussed according to a wide variety of perspectives. The development's footprint, construction density, impermeability rates, materials and soil conservation are typical indicators found in the official lists used by governments. Most sustainability indicators have quantitative measures, which permit testing; however subjective issues exist demanding an inclusive decision making process. The complexity of sustainability impacts the building design process, which needs new procedures, teams and support tools. Sustainability also demands new forms of relation between social-economical development, urban growth and environmental quality. Sustainable land use indicators are related to a variety of themes, normally expressed as a percentage of the total municipal area. The vitality of the described region is, however, not properly captured.

The concept of sustainability adds an increasing number of concerns. Many ideas that shaped buildings and urban spaces are no longer sufficiently valid in a world with growing sustainability concerns and that the implementation of "sustainable design" cannot be simply prescriptive. A largely subjective design method is no longer a safe means of achieving positive results efficiently. Both horizontal and vertical integration actions are necessary.

At the urban scale, recent experiences and discussions on intervention approaches suggest that cultural investments are not enough to promote livable spaces on the long run, as the promoted land use is often seasonal or punctual in time and the region tends to return to a dormant status.

This work reflects on the complexity of sustainability issues and their impact on design processes at both building and urban levels. Systematic analysis are carried out regarding (1) how creative methods can formally intertwine with traditional design, drafting, prototyping and testing activities to provide the foundation for greater innovation and awareness raising; (2) new team compositions and interconnected decision areas must be identified; (3) strategies to restore, revitalize and promote urban centers infill to take advantage of existing infrastructure and create vibrant, lively and diverse neighborhoods. **FEC/UNICAMP**

GOOD ENVIRONMENTAL PERFORMANCE: ETHANOL AS A FUEL

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Increasingly less fossil resources and stringent emission standards, especially regarding CO2 reductions, demand a review of current powertrain concepts. Rising fuel prices, as well an increased environmental awareness, put a new focus on alternative fuels to ensure future mobility. In countries where biomass is available in large amounts and inexpensive, ethanol is a low-cost and environmentally friendly fuel option.

Ethanol is derived from sustainable plants. The world's largest producer of ethanol as a fuel is the US with 5.3 billion gallons in 2006. Second largest is Brazil with 4.5 billion gallons, where using diesel engines in passenger cars was banned and Ethanol has been used for 30 years. The standard fuels used in Europe are E0 and E5 comprising no more than five percent of anhydrous alcohol and 95 percent gasoline. The US and Sweden rely on E85: 85 percent anhydrous ethanol and 15 percent gasoline. In Brazil, vehicles run on E100 and E24.

More flexibility is offered by FlexFuel. Vehicles with a Flex Fuel System can be operated with a random mixture of gasoline and ethanol and are thus independent from the fuel type available.

The FlexFuel System by Bosch consists of its well-known manifold and direct injection components (amongst others fuel pump, injection valves, spark plugs) which were modified for ethanol operation and are thereby resistant to its corrosive effects. There are also modifications in emissions as the exhaust gas produced during ethanol combustion contains approximately 30 percent more water than produced during gasoline combustion. Due to the low energy density of ethanol up to 50 percent more fuel needs to be fed to the engine. Currently in most E85 markets, like US, Germany or Sweden, subsidizes assist in making ethanol pricing comparable to gasoline so there is no cost disadvantage to use this fuel. In Brazil, however, utilizing a FlexFuel equipped vehicle will be less expensive due to lower fuel costs.

The first mass-produced car incorporating the new Bosch engine management system was the VW Fox Total Flex, launched in Brazil in 2003. Since then, various manufacturers are counting on the FlexFuel System made by Bosch.

DISSEMINATION OF EFFICIENT COOK STOVES IN THE NORTHEAST OF BRAZIL AN INITIATIVE TO COMBAT DESERTIFICATION AND RESPIRATORY DISEASES

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Keywords: Efficient cook stoves, fuel wood, respiratory ailments.

Unsustainable biomass extraction for fuel wood has already destroyed more than 80% of the forests of the State of Ceará. Practically all the rural population is using traditional, low efficient cook stoves with high fuel wood consumption, thus causing advanced deforestation in large regions around the villages. While fuel-efficient stoves have been effectively disseminated in many developing countries, they are almost totally ignored in Brazil, despite their beneficial effects in mitigating deforestation, and hence, global climate change.

Efficient firewood combustion and exhaust management decrease also respiratory ailments, particularly those of women and their children, who spend considerable time exposed to indoor air pollution in the kitchen. The technology application used here is clean, sustainable, and affordable, and will make a difference in people's lives by supporting communities and involving women.

The purpose of the project is providing a step towards the integration of a dissemination strategy of efficient cook stoves into the development plans of the local government of the state of Ceará/Brazil, training local cook stove builders and introducing sustainable planting of fuel wood in order to decrease substantially deforestation and taking a step toward curbing indoor air pollution.

The project has developed efficient cook stoves suitable to and accepted by the Brazilian rural households. This year local metal shops and masons were trained to manufacture cook stoves and provide knowledge for its installation. After careful selection of three communities, one hundred efficient cook stoves were installed in rural households and the women capacitated to use the equipment adequately. Beside this, an ambitious program to recover the native vegetation is carried out in cooperation with the population and local schools, in order to guarantee sustainable fuel wood supply in future. Analyses on health and environment impact, and survey on stove marketing are aimed to create the basis for a dissemination/replication strategy. The project achieved exceptional results in terms of acceptance of the cook stove design and performance by the women. Fuel wood consumption is nearly cut to half and the kitchens are clean and smoke free. The benefits on health are proven by comparing the base line data with follow-up investigation and showed significant reduction in respiratory illnesses. The landscape recovery and fuel wood planting activities are still under way, but first signs of improvement are already visible.

GVEP – Global Village Energy Project.

LOW-INCOME HOUSING PROJECTS IN THE REGION OF CAMPINAS, BRAZIL: WAYS TO INCREASE QUALITY OF LIFE AND SUSTAINABILITY

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Keywords: Quality of life, Housing, Low Income, Sustainability, Site-planning.

This work is part of a broader study dedicated to development of design evaluation tools. This particular research, aimed to identify quality of life indicators and site-planning parameters for low-income public housing projects in the region of Campinas, Brazil. Five low-income developments were investigated, all of them built by the São Paulo State housing authority CDHU (Companhia de Desenvolvimento Habitacional e Urbano do Estado de São Paulo) in the region of Campinas. CDHU is the largest producer of public housing in the State since 1986, when Brazil stopped its national housing program. The company's projects are based on similar design principles for similar population strata, and the design concept has changed little in the last 10 years. The ownership condition of single-family dwellings induces a process of rapid transformation of the residential unit. Although such modifications break the typical monotonous repetition of standard units, they may be considered a waste of public investment. The transformation of houses in public projects has been extensively studied and in most cases the causes are related to insufficient functional space and designs based on flawed architectural programs.

The conducted survey revealed that local housing developments, especially those built for low-income level families, are slow in adopting recommended practices and perpetuate a standard design model often not adapted to specific geographic and social situations. It also showed that the studied housing developments lack many of the recommended design elements for quality and sustainable communities. Satisfaction rates are high but are not directly related to physical elements of the home and its neighbourhood, being very much dependent on the home ownership condition. The studied population relates quality of life to economic factors and sustainability to reduced utility bills, not really being aware of specific sustainability issues. Some habits can be harnessed to make local communities more sustainable though. Thus, income generation with recycling habits and energy and water saving attitudes to reduce utility bills are positive. The lack of a community spirit and the actual user interventions, such as the proliferation of fences, are seen as problems to be overcome by specific post occupancy programs, which companies like CDHU should test.

Most sensitive quality of life and sustainability indicators related to site planning should permeate these tools and establish design guidelines. The inclusion of a large number of qualitative design issues into the decision-making process and the questioning of existing standardized solutions are seen as essential means to increase local housing quality.

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DAIMLERCHRYSLER BECOMES SHORT OF BREATH IN THE BRAZILIAN RAINFOREST

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On the one hand there is the story of how DaimlerChrysler started to get involved in the Poematec factory in Belem which processes coconut fibres for – among other things - seats and seat backs for Daimler trucks which are made in Brazil; on the other hand there is that of DaimlerChrysler's retreat from this factory. The company is no longer prepared to support and expand the project, instead it is looking for an investor who will take over the whole factory as well as the debts incurred. The managers of DaimlerChrysler do very well know that the factory cannot survive just as supplier of truck seats. DaimerChrysler lacks the entrepreneurial will to extend the production of natural fibres like coconut fibres and thus to retreat - step by step - from oil-based synthetics and foam material. "The short breath of DaimlerChrysler" is certainly connected with the company's policy of "short-term realization of profits and increase in yield".

TECHNICAL-SCIENTIFICAL COOPERATION NETWORK FOR SUSTAINABLE DEVELOPMENT OF A RURAL COMMUNITY IN NOVA ITAPECIRICA-ITANAGRA

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Besides the development of the research project approved by DAAD & CAPES during scientific exchange between 1st May and 30th July, 2005 by Prof. Dr A. Fangmeier at the Hohenheim Universität, a technical-scientific cooperation program was elaborated. A cooperation between Hohenheim Universität and Universidade Federal da Bahia could make viable the development of several projects aiming the sustainable agricultural development of a rural community called Nova Itapecirica located in Itanagra, North Coast Region of Bahia, Brazil. After discussions with professors and researchers a visit of an interdisciplinary commission was proposed to assess possibilities to elaborate and implement a cooperation program. Despite the interest of professors and researchers, the proposal did not happen until now mainly because of the absence a program with doctor level at Institute of Biology of Federal University of Bahia (UFBA) that could make possible the exchange of students and researchers. However, the program of local development at the community of Nova Itapecirica was initiated in April, 2006. Several activities guided by Agenda 21 principles have been developed with the help of students from the Institute of Biology of Federal University of Bahia like the characterization of social and economic levels of the community and identification of local problems and potentialities for the definition of an action plan. This type of work is more effective if a cooperation network is established. We count already with the partnership of an American NGO, Focus Conservation Fund (www.focusconservation.org), that is organizing the participation of American volunteers. The Learn Abroad Program (www.learnabroadprogram.com) is also a partner that is organizing the exchange of American students, who will have opportunities to develop projects of short, medium or long duration focused on sustainable development related to preservation and conservation of Atlantic Forest. Bahia Pulp, a multinational group that produces paper and cellulose, withholds thousands of hectares pine and eucalyptus plantation and 1,377 hectares of preserved Atlantic Forest in the region. Bahia Pulp is a company that has demonstrated interest to be a partner in the cooperation network. Despite the initial phase of the work, preliminary data characterize the community as extremely poor with enormous problems. This community is located only 13 Km from one of the most important hotel complex in the region, with hotels of international category, like Marriott, Sofitel, Superclubs Breezes and Renaissance Resort. We are sure that a cooperation network with partnership of Federal University of Bahia, Focus Conservation Fund, Learn Abroad Program, Bahia Pulp, German Universities and Institutions, etc, can more effectively, solve or minimize problems like lack of school, unsustainable exploration of natural resources, production and destination of garbage, lack of water despite its abundance, production of vegetable despite the hard weather conditions, etc. The search and adoption of sustainable solutions will be ground for good education and high qualification of human resources. Well qualified professionals will respond more quickly and more properly to social, economic and environmental demands that become more and more complex as time passes by.

BIODIESEL – TECHNICAL, ENVIROMENTAL, LEGAL, SOCIAL AND POLITICAL ASPECTS

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Keywords: biodiesel, biofuel, bioenergy

The oil crisis encompasses a number of issues and explanation, maybe, the true ones being the running out of the wells, the geopolitical aspects and the uneven distribution of producing and consuming countries. A positive consequence of the oil age decline is the search for more sustainable sources of energy among them the fuels derived from biomass are probably the most promising. One of the main focus of the (re)search for new sources of energy is its sustainability and compatibility with the installed infra-structure, such as transportation facilities (vehicles, navies, airplanes, electrical generators, etc). These are some of the reasons why liquid biofuels (ethanol, biodiesel, and other liquid biofuels) have been highlighted in recent time. None of the other renewable sources of energy (solar, wind, hydrogen, ocean waves or tides) has such a compatibility with the installed infra-structure (evaluated in a quite a few trillion of dollars). Brazil and Germany are betting on biofuels as a part of their energetic grid. In the particular case of mineral diesel the equivalent fuel is the biodiesel. However there are similarities and some differences between the Brazilian and the German biodiesel programs, beginning with the “leit motive" of each program – the Brazilian decision behind biodiesel is socially driven and the German one seems to be much more based on environmental reasons. The definition of biodiesel is also different – the German definition is chemical and the Brazilin one, operational. Nevertheless, there is a common board between Brazil and Germany which must be shared and developed together, such as, technical improvements, new seeds (e.g., use of non-edible seeds as feedstock), new processes and route to get biodiesel (e.g. enzymatic, pyrolisis), regulation intercomparison, healthy and environmental effects of the use of biodiesel, analysis and control of quality and many others, exploration of partnerships. These have been some of the objectives of the Brazilian-German Workshop on Biodiesel.

PETROBRAS, CNPq, Vital Biomass

CONTAMINATION AND EUTROPHICATION RISK OF THE RESERVOIR ITAPARICA, SÃO FRANCISCO, BRAZIL

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The reservoir Itaparica is a nearly 20 year old, large reservoir (828 km^2) in the São Francisco River, Brazil, built up in 1988 for hydroelectric power production. Nowadays the sub-watershed of the reservoir is settled and used for irrigation agriculture and an aquaculture industry with net cages and pond systems at the shoreline will be established as it is already done in other reservoirs of the São Francisco River. Significant environmental impacts are recognizable like damage of the littoral zone by operational water level variation and a trophic upsurge with severe eutrophication related processes (occurrence of cyanobacteria, deficit of oxygen in the hypolimnion, development of organic rich sediment, and occurrence of Schistosomiasis). The sensibility of the reservoir to contamination processes is determined by longitudinal and lateral mixing processes as well as by thermal stratification and seasonal variation of phytoplankton and macrophyte dominance. An integrated water basin management concept must be developed to guarantee an adequate and sustainable water use and the environmental impact by emissions from irrigation agriculture and the direct input by aquaculture must be quantified and evaluated.

DAAD & CNPq

SUSTAINABLE MANAGEMENT OF MULTIPLE PURPOSE RESERVOIRS AND ITS SURROUNDINGS IN THE SEMI-ARID AREA OF SÃO FRANCISCO RIVER BASIN, NORTHEAST BRAZIL

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Great reservoirs are constructed for power generation in the whole world and in Brazil; about 76% of available energy comes of these hydro sources. The São Francisco river, considered the river of the national unit, due to cross 7 units of federation in its 2700 km of extension, contains a series of 8 reservoirs constructed with the principal purpose of power generation, being 6 of them located in the sub-medium semi-arid, in Northeast Brazil, which are managed by the Hydroelectric Company of São Francisco – CHESF. These reservoirs have been used for power generation, industrial and human supply of water, irrigation, aquiculture, navigation, tourism, leisure, dilution of wastewater and ecology protection. The construction and operation of these reservoirs cause several environmental impacts and conflicts between the multiple uses of water and soil, which are accentuated during the extreme climatic periods of droughts and floods. The Resolution 001/1986 from the Environmental National Council-Conama has established the requirements of implementing environmental impact assessment-EIA only at project level. Therefore, for the time being, there is a lack of cumulative and strategic environmental impact assessment in Brazil. This article presents an evaluation of the major socio-environmental impacts of these reservoirs and discusses some proposals for the sustainable use of water and land in the surrounded area. This analysis includes the development of mitigation and adaptation strategies and regional socio-economic implementations, such as increasing the production of oilseed that can be used as feedstocks for biodiesel, including castorbeans, african oil palm (*Elaeis guianensis*) and sunflower. This new agriculture approach can help mitigating the climate changes. The results presented here can be applied to other reservoirs of similar characteristics and contribute for the development of the environmental assessment instrument in the semi-arid area of São Francisco river basin in Brazil. Other contribution is to amend the implementation of regulative instruments such as Cumulative Impact Assessment and Strategic Impact Assessment in Brazil.

POLCAMAR: A STUDY OF THE IMPACT OF SUGAR-CANE MONOCULTURES UPON COASTAL WATERS IN NORTHEAST BRAZIL

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Keywords: sugar-cane, monoculture, coastal waters, organic material.

Sugar-cane monocultures have multiple adverse effects on soil (erosion and degradation), air (pre-harvest burning of sugar cane leaves) and water (eutrophication from fertilizers, metal and organic pollutant contamination from fertilizers and other agrochemicals). Foreseeing the growth of Brazil's biodiesel agro-business it is conceivable that coastal waters near sugar cane production areas will be affected in specific ways yet to be explored.

BMBF and CNPQ jointly fund POLCAMAR - one out of three recently selected bilateral German-Brazilian Marine Science projects. POLCAMAR relates to the study of coastal water quality response to sugar-cane monocultures. Our study site is the Mundau-Manguaba coastal lagoon system near Maceio, AL, North East Brazil. These lagoons are surrounded by sugar-cane monocultures since the 17th century and discharge directly into the Atlantic. Their material sources related to sugar cane production are twofold: (i) sugar-cane processing plants are intensive point sources of carbohydrate-rich organic material (OM) discharged into surface waters, (ii) sugar cane fields are extensive area sources of agrochemicals flushed into surface and ground waters. In the lagoons' the cocktail of carbohydrate, nutrients and xenobiotics from received waters is processed, transformed and fractionally disposed to the sediment, the atmosphere and the estuary/coastal ocean. In our subproject on OM fluxes and OM speciation we hypothesise that much of the abovementioned material exported towards the sea is associated with carbohydrate rich organic colloids (carbohydrates easily aggregate to larger networks, colloids and gels, and organic colloids in turn effectively complex xenobiotics and nutrient elements, supporting their passive advection in flowing waters). The OM's carbohydrate precursor component can be quantitatively traced by d13C due to the highly specific stable carbon isotope ratio of sugar cane.

We report results from a first field campaign in March 2007 on OM's flux and speciation along a salinity gradient in the river-lagoon-estuary system and on the OM's sugar cane derived component.

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MACRO AND MICRO POROSITIES BEHAVIOR DUE TO THE HARVESTING FORESTRY TRAFFIC

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Considering some soil physical and mechanical parameters, a behavior study of macro and micro porosity was conduced on a Red-Yellow Latosol with 43% of clay and 48% of sand. The objective was to evaluate the influence in the soil caused by the traffic of machines in wood harvesting and hauling forest operations. Heavy forest machines like a tracked-harvester and a wheeled-forwarder were used, operating with and without slash. In addition, others physical parameters were observed like soil bulk density, water availability and infiltration, soil temperature and mean aggregate sizes and also mechanical parameters: soil penetrometer resistance, shear strength, Proctor test and the pressure applied on the soil. Results have shown that wheeled-forwarder operating without slash increased macro porosity among all the traffic conditions, while same machine hauling over to the forestry slash did not differ to macro porosity levels of the harvester and the witness. All the machines evaluated in both conditions did not differ to the witness considering the micro porosity. Even so, the levels of micro porosity presented to the tracked-harvester were better than the wheeled-forwarder when it traveled over slash. In general, the soil pressure imposed by the tracked-harvester results in better performance than the wheeled-forwarder travel one, regarding to physicals parameters studied.

CAPES and DAAD

HYDROGRAPHICAL BASIN: CONVERGENCE OF SCIENTIFIC INVESTIGATION AND UNIT OF TERRITORIAL MANAGEMENT - THE CONTRIBUTION OF GEOPROCESSING

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Keywords: Decision-making, Geoprocessing, Geographical Information Systems GIS

The availability of new technologies that relate different information in a spatial context has opened many possibilities for the integrated study of information. The territorial planning is one of the areas that require a crossing point between the environment and social-economics aspects, so to understand the occupation process considering action. Therefore, the GIS technology is being used by professionals for territory management according to the system capacity of capturing, storing, analyzing, and displaying geographically referenced information. One of the advanced functions in Geoprocessing supports the decision making – (for example the AHP method - Analytic Hierarchy Process), which provides new information to be applied in this process, becoming an efficient tool to understand natural geographic information, considering the complexity that define them. This research aims to present complex concepts about the Spatial Territory Analysis, providing a good method structure to discuss its application in urban space – (research contribution), as a support instrument to the management and planning from researches about the technology usage in Geoprocessing applied to the territory. By the way, it converges to the Quilombo's Brook Basin as a territorial area (wide object of convergence and investigation) in which will be developed a complex analyze in GIS. The results obtained with it will show that this powerful tool is able to respond quickly and precisely to the related questions. This way, the process of the method construction structured in GIS responds to understand the inter-relationship between evaluative pressures caused by the human being and the environment consequences generated from it to the Quilombo's Basin. The referred method can be applied to any hydrographic basin.

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Methodist University of Piracicaba – UNIMEP

INFLUENCE OF CLOUDS ON THE PHOTOCHEMICAL DEGRADATION OF PESTICIDES IN AQUEOUS MEDIA

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Keywords: metamitron, photolysis, clouds, STAR model

Photochemical degradation reactions in the environment are divided in direct photolysis (i.e. reaction after absorption of sun light) and indirect photolysis (i.e. reaction with OH-radicals, ozone and nitrate-radicals, influenced by light reactions). Direct photolysis of organic compounds in the environment in the aqueous phase and in the gas phase in general and for pesticides in particular in the aqueous phase is a well known and extensively investigated degradation reaction.

The photolysis of pesticides is one of the key parameters to assess the lifetime in the environment and quantum yields are even requested in the authorization process. However, an overview and a comprehensive compilation of quantum yields and UV-spectra (i.e. absorption coefficients) of pesticides in the aqueous phase is still missing. Furthermore, experimentally determined photolysis rates at different latitudes are usually calculated at noon for summer months and a clear sky scenario and have to be regarded as progressive values. In addition, the influence of cloud cover on the photolysis is neglected or not known and lower, diurnal-mean values valid for the time of application are ignored.

Measurement campaigns (2006 and 2007) at two highly different locations in Germany (Lüneburg, 53.25 ^{o}N, 10.45 ^{o}E) and Brazil (Santa Maria, 29.68 ^{o}S, 53.80 ^{o}W) were performed using the pesticide metamitron in aqueous solution as a model actinometer. Experimental results were compared and explained with the model STAR using meteorological data (including global radiance, time resolution 0.5-3 h) and additional parameters such as optical- depth data for aerosols and ozone-column concentrations for both locations.

Irradiations were performed using home-made concentric hemispheres (V=1 ml) made of quartz glass at different times of day for cloudy and cloud-free conditions. Concentrations of metamitron and the main product desaminometamitron were obtained using HPLC and rate constants were calculated from concentrations before and after irradiation. Experimental results are compared for both locations. A model approach is discussed and applied to experimental data combining a correlation of global radiance data (and therefore cloud cover) with wavelength resolved intensities and calculated rate constants. Furthermore, the model was used to calculate the true photolysis of metamitron within a seasonal cycle using diurnal meteorological mean values. Hence, for the first time the decrease of rate constants for pesticides by the influence of clouds is quantified

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HETEROGENEOUS PHOTOCATALYTIC DEGRADATION OF AMOXICILLIN AND COD REMOVAL FROM HOSPITAL WASTEWATER

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Keywords: amoxicillin, heterogeneous photocatalytic degradation, hospital wastewater

Pharmaceuticals in the environment have become a subject of major public interest due to the risks of contamination. Antimicrobials can cause chronic and acute effects, as well as the appearance of bacterial resistance in ecosystems. Among the advanced oxidation processes (AOPs) that have been proposed for the degradation of organic pollutants, heterogeneous photocatalysis with TiO_2 shows many advantages. In this study, the reduction of COD (chemical oxygen demand) and the efficiency of amoxicillin degradation by TiO_2 photocatalysis applied to the wastewater of the University Hospital of Santa Maria (HUSM) were investigated. The toxicity (LC_{50} values) of the hospital wastewater pre- and post-treatment was determined by means of the bioassay *Artemia salina*. All treatments were performed on bench scale using a batch recirculation Dewar-like photoreactor provided with a light intensity of 274 Wm^{-2} irradiated by a 125 W medium pressure mercury lamp (protected by a quartz cover). The amoxicillin degradation efficiency was evaluated through HPLC-UV (228 nm) under the following conditions: 1000 mg TiO_2 L^{-1}, aeration (8,5 L min^{-1}), 30 °C and 60 min treatment; pH 3, 5, 7, 9 and 11. The measured mean concentration of amoxicillin in the studied hospital effluent was 8,3 μg L^{-1} (RSD ± 5,2%; n=3). As mobile phase, MeOH:H_2O:0,01M KH_2PO_4 (20:70:10, v/v) at pH 4 was used. The C_{18} cartridges were preconditioned with 4 mL of MeOH, 4 mL of Milli-Q water, 4 mL of acetone and 5 mL of MeOH. 100 mL the sample were percolated at 3 mL min^{-1} and were eluted with 2 x 1 mL de MeOH and evaporated to dryness under nitrogen. The extraction recovery was 82% (100 mL of wastewater aliquots, pH 4). Best conditions were reached by means of factorial design. The toxicity reduction by the degradation process was 45%, and the COD reduction, 59% (best conditions: pH 3, 800 mg TiO_2 L^{-1}, 30 °C, 60 min). For the degradation of amoxicillin (36,5%), the best conditions were: pH 5, 1000 mg TiO_2 L^{-1}, 30 ºC, 60 min treatment.

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PHOTODEGRADATION OF CEPHALOSPORIN ANTIBIOTICS

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Keywords: Photodegradation, Toxicity, Cefazolin, Ceftazidime.

There is growing concern about antibiotics in the aquatic environment. They may contribute to the emergence of resistant bacterial strains due the long-term environmental exposure to low concentrations (ng/L-µg/L) through their presence in wastewater and surface water. Hospitals, for instance the HUSM (Universitary Hospital of Santa Maria), are an important source of these substances. In Brazil, treatment of hospital effluent is not very common. Very often the effluents are emitted into an open ditch with access of sun light. Regarding the fact that cephalosporins are among the most widely prescribed antibiotics in HUSM, the photodegradation and toxicity of the cephalosporins Cefazolin, Ceftazidime and the resulting primary photoproducts were investigated in aqueous solution.

Solutions with a final concentration of 10 and 50 µg mL^{-1} were prepared before each experiment with a final volume of 800 mL. The irradiation experiments were carried out in a 1L batch photoreactor equipped with a 150 W medium-pressure mercury lamp and a cooling device. The temperature was kept 20 - 22 °C. Three different pH-levels (4, 7 and 9) were applied. The samples were collected at several times during the photoprocess. The parameters evaluated were concentration of Cefazolin and Ceftazidime by HPLC and LC-MS/MS and Dissolved Organic Carbon (DOC). For the evaluation of the bacterial toxicity, the luminescent test with *Vibrio fisheri* (Lumistox kit) was used.

The results suggest a very efficient removal of both parent compounds (> 99%, 1 min) what could be attributed to the instability of ß-lactam ring. One hour was necessary to reach 65% and 70% of DOC decay for Cefazolin and Ceftazidim, respectively. Photoproducts that are not easily photodegraded were detected by LC-MS. pH did have no significant impact. The antibiotics here studied didn't have a remarkable effect with relation the luminescent test but it was verified a little increase on toxicity due to the photoproducts when compared with the antibiotics themselves. One reason could be that the applied test is a short term test. Antibiotics interfere with bacterial cell growth. A test should therefore last at least 2-3 generation times of the bacteria which was not the case in the standardized luminescent test applied in this study. More advanced studies are necessary to clarify significance of the photoproducts formed.

TREATMENT OF DDT CONTAMINATED SOIL BY FENTON AND PHOTO-FENTON PROCESS – ADVANTAGES, DRAWBACKS AND ALTERNATIVES

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The contamination of soil represents a serious environmental problem. Point contaminations generally result in high concentrations of contaminants in small areas, what imposes serious threat to the surface and groundwater. For remediation of soils, the processes based on Fenton reaction have been considered as good alternatives due to its low cost and high oxidation power. The Fenton reaction consists of H_2O_2 decomposition catalyzed by iron ions, which generates hydroxyl radical, strong oxidizing agent capable of oxidizing a variety of organic compounds. The reaction is accelerated under UV-Vis irradiation what is known by photo-Fenton process. DDT is a very persistent organochlorine pesticide known to have toxic effects to human health. This work describes the remediation of a soil highly contaminated with DDT using Fenton reaction. The soil under study was accidentally contaminated with DDT seven years before the sampling for this study as a consequence of inadequate storage after its use was restricted by law in the state of Mato Grosso, Brazil, resulting in high-level concentrations of DDT (1.6 g kg^{-1}). The degradation of DDT was carried out in a slurry system (150 g of soil/500 g water) at pH 2.5-3.0. The addition of 0.55 mol H_2O_2 to the slurry containing 6 mmol L^{-1} Fe^{2+} resulted in 50% degradation after 8 h reaction, reaching 75% after 64 h. Although an efficient degradation of DDT was observed, some drawback effects were observed such as the high concentration of dissolved organic carbon (DOC) of the slurry filtrate, which increased 10 times, reaching 900 mg L^{-1}. The DDT concentration also increased from 10 to 50 μg L^{-1}, suggesting that the dissolved organic matter contributed for the dissolution of DDT. Solubilization of metals from the soil such as Zn, Cr, Ni and Cu was also observed, probably due to the low pH necessary for the Fenton reaction (2.5-3.0) and the strong oxidizing condition. Moreover, 80% of the organic matter naturally present in the soil was degraded. To avoid these collateral effects of Fenton process during soil remediation, the soil was washed with surfactant solution (Triton X-100) and the washing solution was treated with solar photo-Fenton process. The washing step removed 60% of DDT from the soil in a first wash, which was only slightly improved after the second and third wash. This result suggests that there is a strongly adsorbed fraction of DDT, consequence of the long contact time between the pesticide and soil. The washing solutions (6000 mg L^{-1} DOC) were exposed to solar radiation in the presence of 12 mmol L^{-1} Fe^{2+} and H_2O_2 (18 sequential additions of 2 mL of 10 mol L^{-1} solution) resulting in less than 30 mg L^{-1} of DOC and 0.51 mg L^{-1} DDT after 6 hours reaction, what corresponds to 99% degradation of DDT in the washing solution. In this study, the surfactant washing and further solar photo-Fenton treatment was efficient and the least impacting process for the soil remediation.

QUALITY CONTROL AS A DEVELOPMENT OPPORTUNITY TO THE FOREST UTILIZATION OF ACRE STATE, BRAZIL

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Keywords: Quality Control, Regional Development, Residues and Certification.

The present work has the objective to diagnose quality controls used by the lumber industry of the Baixo Acre region in order to improve conditions for regional development. Visits were made to 50 companies and also to forest areas to analyze the panorama of the wood/furniture production chain. The product quality depends on the interrelationships between all involved sectors. The forestry sector was defined as activities applied to manage the forests, Lumber sector are the Sawmills who provide products to the furniture sector. In the region there is not a company with a quality management program, to indicate the many required educational activities and training, as well as standardizations and studies about the use of lesser known tree species. For the evaluation of the different sectors, SWOT and graphic analyses were carried out and 3 quality tools were applied: the Ishikawa diagram, 5W2H and PDCA. The data were obtained through interviews with the companies personnel (managers, directors and supervisors). The most important data shows that furniture companies demand are: obtaining of work capital (50%), qualified labour (47%), adequate industrial processes (47%) and used equipment maintenance (47%). Difficulties are: 78% of the furniture companies point out that they find problems during the finishing process and 41% initiate their problems in the moment of obtaining raw material. Another problem is the lack of qualified labour for accomplishing activities in each process, with 38% of achievement. However, physical facilities space and the drying of the wood are not considered obstacles for 3% of the carpentries. As a barrier for development of correct forest management, these companies aren't developed enough to use small size timber (< 30 cm diameter). The lack of modern technology causes losses of huge volumes of wood residues.

The results had shown different problems in each evaluated sector. In the forest sector the problems have characteristics that show a more political influence in the structure of the productive chain and thus have a bigger possibility of articulating improvements when public politicies succeed. For the lumber and furniture sector a bigger interaction between the companies is necessary, because the companies are characterized as sufficiently focused in your own business. A standard of quality and proposals for residues reduction, the implantation of chains of custody and product classification and workers training are the main bottlenecks observed in this study, and if these bottlenecks are overcome, quality can be added to the wood products and to the manufacturing processes and in favour of the region's development.

Word University Service and Agência Brasil Alemanha

SOLIDWOOD PRODUCTS OF *MIMOSA SCABRELLA* (BRACATINGA) – LUMBER RECOVERY RATE AND CARBON STORAGE BALANCES

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Keywords: carbon storage, solid wood products, bracatinga.

In Southern Brazil wood industry is mainly based on species like *Eucalyptus* or *Pinus*, grown in large plantations with intensive management. Problems and risks that may occur in monocultures of exotic species grown in short rotation are well known. To reduce negative environmental impacts and give small farmers and rural population a chance for additional income, possibilities for growing native species for higher value utilizations in Southern Brazil were checked. The species should require less intensive management input and be less susceptible to pests and disease. One common hardwood species that fulfil these requirements and also shows high potentials for the production of solid wood products is *Mimosa scabrella* (bracatinga). Up to know only grown for fuel wood, recent studies involving wood industry showed promising results for using the wood of this species for flooring, panels and furniture. Two mayor concerns or questions form part of the wood industry and small forest owners were uttered when the study was designed: what lumber recovery factor can be achieved with bracatinga, reaching only limited diameters and what is the carbon storage in the wood. Both questions deal with the economic perspectives of the species that in the end will determine the profit that can be expected, involving the potential of negotiate carbon credits in the framework of Kyoto-protocol projects.

The study aimed to analyse these questions in detail. In a joint project with the wood and furniture industry potential products were developed and produced. Starting from the saw logs in the forests, lumber recovery rate in the primary and secondary transformation process was analysed and losses due to the production process noted. Detailed calculations about cubic meters round wood used and the quantity of wood in furniture and wood used for flooring were made. The data were, together with previously developed biomass carbon models for bracatinga, used to calculate carbon stored in the final products. The outcomes of the study form the base of future research about the substitution effects that wood may have in the discussion concerning CO_2 accumulation in the atmosphere and might be used by forest owners and wood industry to develop marketing concepts.

CAPES - PROBRAL

"THE KING IS NAKED": A CRITICAL ANALYSIS OF THE COMMUNITY FORESTRY CONCEPT AS APPLIED IN THE AMAZONIAN REGION

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Keywords: community forestry, rural development, Amazon.

Since the World summit in Rio in the year 1992, the concept of community forestry became more and more the focus of development organization acting in the Amazon region. Based on the assumption that poverty is one of the main drivers for forest destruction, sustainable timber management was expected to contribute to one of the priority challenges of Amazon countries, to combine forest conservation with rural development. The considerable efforts of national governments supported by the international community resulted in a number of promising demonstration projects and remarkable improvements of national laws and regulations. To analyze the potential of community forestry for rural development, the EU financed international research project ForLive studied 16 community forestry initiatives throughout the Amazon in Bolivia, Brazil, Peru and Ecuador. The study revealed that current community forestry concept is repeating the errors of former development initiatives based on modernization approaches. The implementation of predefined technological packages based on Reduced Impact Logging, the focus on timber and market approaches and its operationalization in externally driven pilot projects resulted in relatively low success, a low probability for replication and may generate even negative effects to poor people. Community forestry implies the danger that smallholders are encroached for achieving the economic and environmental goals of more powerful parts of the national and global society. To effectively use forests as a basis for sustainable rural development, a drastic re-orientation is necessary towards approaches, which enable local communities to develop their own resource management strategies in accordance with their demands and capacities.

NUTRIENT STOCK AND DISTRIBUTION IN A SECONDARY FOREST PROVIDED FOR SLASH AND BURN IN RIO GRANDE DO SUL

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Shifting cultivation plays a great role in the state of Rio Grande do Sul Brazil. For more than 300.000 people it is one of the main basic resources. However, currently there is a strong discussion about the ecological risks of this kind of land-use, although people practiced that since more than 100 years and there are no indication that this might be a non-sustainable practice in this region. Our investigation focused to clear how ecological risks can be minimized and how shifting cultivation can be carried out in a sustainable way. An ecological study was established with measurements of the biomass and the nutrient stock in the biomass as well as the element input by precipitation and output by soil water, respectively. This study deals with the nutrient stock in the biomass and the liberalization of nutrients after slash and burn. An assessment is done about the ecological risks and the effects on the total nutrient supply of the ecosystem.

GROWTH ANALYSES ON FOUR NATIVE TREE-SPECIES OF THE BRAZILIAN ATLANTIC RAINFOREST: SEASONAL AND LONG-TERM DYNAMICS

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Keywords: growth dynamics, dendrometer measurements, native species, Atlantic rain forest, growth analysis.

With less than eight percent of the original extent remaining and a magnitude of biological diversity similar to the Amazon forest the Brazilian Atlantic rain forest is one of the most endangered ecosystems of the world.

A sound understanding of growth patterns in mixed forests is essential for the conservation and successful reforestation of these unique forests and for efficient habitat management. For analyzing the seasonal growth dynamics of selected tree-species a dendrometer measurement station has been installed in a naturally regenerated forest stand near Antonina, Paraná. The area is located in the Reserva Natural do Rio Cachoeira owned by *SPVS - Sociedade de Pesquisa em Vida Selvagem e Educação Ambiental.*Electronic point dendrometers were installed on each of five individuals of *Andira anthelmia* (Vell.) Macbr.*, Pera glabrata* (Schott) Baill.*, Tapirira guianensis* Aubl. and *Vochysia bifalcata* Warm. These instruments allow to detect changes in stem radial dimension at high temporal (*e.g.* every 5 minutes) and spatial (up to 0.001 mm) resolution. To our knowledge, this activity is the first to study stem radius changes in tropical trees using such a high resolution in time and space.

The investigated sample trees show characteristic inter- and intra-specific patterns in stem radius variations. They differ in the magnitude of growth as well as in the daily amplitude of contraction and expansion. We analyzed the growth dynamics with respect to the species' status in natural succession and in relation to variations in environmental conditions. In a second step we use several biometric variables (*e.g.* diameter at breast height, total tree height, crown width, crown ratio) to test the hypothesis that intra-specific variation in diameter growth depends on tree size.

Using retrospective growth analysis based on increment cores, long-term dynamics and the tree growth effecting conditions can be analyzed. Therefore we used the method of High-Frequency Densitometry, developed at the Institute for Forest Growth, to detect the hardly visible growth zones and calculate the yearly increment over the whole life-span of the trees. The so analyzed species were *V.bifalcata, P. glabrata* and *Hyeronima alchornoides.* In total 75 trees were sampled, occurring on 4 sites varying in soil type and succession status. Preliminary results shows that the tree's status in competition as well as crown size indices correlate significant with their long-term growth dynamics.

DAAD and CAPES and Landesgraduiertenförderung Baden-Württemberg

THE POTENTIAL OF BRAZILIAN EUCALYPT SAWNWOOD AT THE WORLD MARKET

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Keywords: eucalyptus, lumber market, plantations, sawlogs

Plantation forestry is a very important part of the Brazilian forestry sector. Representing only 1.3 % of the total forest area of the country, it contributes to more than 60% of the wood production. From 7 million ha of plantation forests existing in Brazil, almost 5 million ha are considered as industrial plantations with the aim of producing pulpwood, mainly from the genus *Eucalyptus,* with approximately 3 million ha (Brown 1997). The growing conditions for *Eucalyptus* in Brazil in general are very good. For the cellulose production in general no thinnings are necessary, harvesting age varies between 5, 7 and on poorer sites about 10 years. At this age the trees show up heights of 26 to 35 m and stand densities of 1000 trees/ha can be observed.

The goal of high quality timber production with eucalypt is rarely mentioned in Brazilian forest management literature. To date, in Brazil the wood of eucalypt plantations has mainly been used for the production of cellulose, fuelwood and charcoal. However, within the last few years, a market sector using *Eucalyptus* in the furniture industry for panels and plywood has been established in Brazil and elsewhere, leading to longer rotations with the aim to produce trees with bigger dimension for higher value utilizations.

The reason for this development can be seen in various factors:

- temporarily global oversupply of eucalypt pulp and pulpwood, leading to low prices and returns of investment below the expected;
- decreasing availability of hardwood timber from native forests of Asia, Africa and South America due to over-exploitation and better environmental protection of native species, and at the same time an increasing demand for wood of higher quality;
- environmental concerns for the use of wood products of tropical rainforests and a movement towards the use of timber of certified and sustainable managed forests;
- advances in genetics and innovative techniques for processing eucalypts, solving most of the problems of drying and splitting.

The study aims to use existing statistics and data to analyze the potential of eucalypt sawnwood at the world market, with special focus on Brazilian eucalypt timber production. Based on these data, a forecast of the future role of Brazil in eucalypt timber supply will be made.

EUCALYPTUS MONOCULTURE: SUSTAINABLE DEVELOPMENT OR GREEN DESERT?

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Keywords: Sustainable development, Eucalyptus monoculture, green desert

In the state of Rio Grande do Sul, Brazil, plantations of *Eucalyptus, Pinus* and *Acacia* and the consequent establishment of paper mills have been the focus of intense debate. An initial goal of planting 150,000 hectares was announced for the next five years (70,000 hectares of *Eucalyptus*). Three companies, Votorantim Cellulose and Paper (VCP), Stora Enso and Aracruz, claim plantations and paper mills will bring great advantages to the region, such as the creation of thousands of jobs, development of the furniture sector and honey production, and protection of the soil where *Eucalyptus* trees are planted.

These plantations, established without a previous Environmental Impact Study, may threaten water sources, springs and riparian woodlands, and make indiscriminate use of herbicides. The legal principles of *supremacy and unavailability of public interest* and *the obligatory previous assessment of works or activities that potentially or actually cause pollution* have been disregarded.

At a rate of about 1,300 trees per hectare, 91 million trees will be grown in the next seven years. According to literature, these plantations will release 3.32 trillion liters of water into the atmosphere per year. The historic mean annual rainfall indices indicate an estimate of 1,500 mm per year in the Rio Grande do Sul's Pampa. Accordingly, the mean annual rainfall over the 70,000 ha planted with *Eucalyptus* will be 1.05 trillion liters of water. This is at least 3 times less than the amount of water eliminated by the planted trees in years of normal rainfall.

The discussion and preparation of alternative projects have been blocked, which weakened cultural resistance. The populations in the region have been led to see themselves as human capital and their natural and cultural resources as natural capital. Therefore, a negotiated economic compensation may be accepted and these public assets may be granted to the companies, which portray themselves as instances responsible for the management of common goods in the name of environmental balance and the well-being of current and future generations. Such perverse operation, whose objective is to make the population believe that no other alternatives are available, imposes a single project to which traditional rights to soil, work and culture can no longer be opposed. These companies, which have supported several political campaigns, "invested" about R$ 2,000,000.00 in the 2006 elections. The recently elected governor received R$ 504,556.55 (almost 10% of her total campaign costs). Aracruz alone made contributions of R$ 1,217,346.47 to 86 candidates to the state legislature, and elected 20 of a total of 55 state representatives, who now make up the "cellulose bloc" in the state (see data in www.tse.gov.br).

The attempts to denounce such facts have been played down or ignored by the media, while news of tree planting has been released to the public with great fanfare and emphasis on its "benefits".

ENVIRONMENTAL EFFECTS OF PINUS, EUCALYPTUS AND BLACK WATTLE PLANTATIONS IN THE SOUTH OF BRAZIL

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This study has as objective to show the results of some studies about biomass surveys and nutrients determinations in Pinus, Eucalyptus and Black wattle plantations done in south Brazil. The total area with forest plantations in Rio Grande do Sul is about 400.000 hectares, established in small, medium and big properties (farms). The results found until now, will be used as sources to adopt correct practices and ways that aim to maintain the productivity perpetuity from the sites where these species are planted.

BIODIVERSITY CONSERVATION IN FRAGMENTED LANDSCAPES AT THE ATLANTIC PLATEAU OF SÃO PAULO

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The Atlantic Rainforest of Brazil (Mata Atlântica) is one of the world's 25 biodiversity hotspots and amongst them it is the most highly threatened ecosystem. This region is rich in endemic and threatened animal and plant species, but due to urban development and agriculture, only 7-8 percent of the primary forest still remain. The Conselho Nacional de Desenvolvimento Científico e Tecnológico (Cnpq), Brazil, together with the Federal Ministry of Education and Research - BMBF, Germany launched the Brazilian-German co-operation program: "Science and Technology for the Mata Atlântica". In one of the projects (BIOCAPSP - Biodiversity conservation in fragmented landscapes at the Atlantic Plateau of São Paulo) research is conducted on different taxonomic groups (birds, mammals, amphibians) to contribute to biodiversity and hence diverging needs of the respective organisms. The gained scientific results shall provide an ecological basis to develop strategies for regional landscape planning that incorporates sustainable management and use of the remaining forest. The overall goal is to regenerate and maintain the typical biodiversity within this region. As one example habitat use patterns of understory birds are described to illustrate the differing landscape perceptions of forest organisms.

NEAR-NATURAL REGENERATION OF ARAUCARIA MIXED FORESTS (*ARAUCARIA ANGUSTIFOLIA* (BERT.) O. KUNTZE) IN THE SOUTHERN MATA ATLÂNTICA

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Between 1997 and 2001 experimental plots for seed, planting, succession and natural regeneration were established on 15 hectares in the southern Mata Atlântica at altitudes between 700 and 900 m above sea level. The objective was to develop a concept for the sustainable management of Araucaria and coastal rainforests in the Mata Atlântica in Rio Grande do Sul.

Previous to that ecological site mapping had been carried out and research into plant sociology had taken place. The experimental plots for artificial regeneration were analysed in 1998, 2000, 2001, 2002, 2004 and 2005, those for succession in 1998 and 2005 and those for natural regeneration in 2001, 2004 and 2005.

Plantation under the shelter of *Baccharis uncinella* within Araucaria mixed forest plant communities showed a mortality rate between 40 % and 82 %, plantations outside Araucaria mixed forest plant communities had a mortality of almost 100 %.

Plantations and seeds without shelter and outside Araucaria mixed forest plant societies failed.

Investigation about natural regeneration of *Araucaria angustifolia* showed that:

- *Araucaria angustifolia* is no pure pioneer species but a secondary pioneer species
- an average density of 161 (0 to 600) individuals/ha could be found in 2001; on the same plots the density had almost doubled
- distance from natural regeneration to flowering ♀ trees should not exceed 150 m
- 69.3 % of regeneration < 50 cm tall, only 13.1 % > 1.0 m tall in 2001
- high mortality in the first years; very low mortality from 2001 to 2005
- lightly sheltered stands or shrub vegetation without grass are ideal for successful natural regeneration
- little natural regeneration below dense shelter in middle-aged stands with dense undergrowth

Recommendations for a near-natural reforestation with *Araucaria angustifolia*

- regeneration only at soil depths of > 40 cm, on northern exposures > 60 cm
- no regeneration on natural Campo sites
- no regeneration under a closed shelter
- natural regeneration ideal on slightly sheltered sites or shrub vegetation close to (< 130 m) flowering ♀ mother trees
- natural regeneration more successful in secondary forests than in primary forests
- slow and steady increase of light intensity, avoiding grass

Artificial regeneration of *Araucaria angustifolia*

- only in areas of central *Araucaria* plant communities
- planting more successful than sowing
- breeding of seedlings in special containers
- adapting light conditions in nursery to match planting field
- using pioneer crops like *Baccharis* spec. and *Mimosa scabrella*

STRATEGIES FOR SUSTAINABLE MANAGEMENT IN BRAZILIAN ARAUCARIAN FORESTS

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Keywords: management plan; GIS; monitoring; land use regulation.

A general management plan for protected areas of Araucaria Forest in Southern Brazil is being developed, which allows a flexible adaptation to specific local and regional circumstances. The database for the management plan is provided by an intensive case study of a pilot area owned by EMBRAPA, the Brazilian Agricultural Research Institution of the federal government. Embrapa-Epagri's Forest Reserve (RFEE) has an area of 1157 hectares and it is located in the municipality of Caçador, State of Santa Catarina. The RFEE is recognized as one of most conserved forest remnants of the Brazilian Mixed Ombrophylous Forest (Araucaria forests). The first phase of the project consisted in the cartographic compilation and the biophysical environmental surveys of the area with the goal of developing a Geographic Information System (GIS) that is able to support the territorial ordination or land-use regulation of the reserve. The vegetation layer and other uses of the soil (obtained by visual interpretation of IKONOS satellite images) as well as hidrography, altimetry, soils, slope, exposition, location of the riparian areas (defined by law as "preservation areas") and Legal Reserve (designed by the Brazilian law as "areas under restricted use") were provided from previous studies. Information about wood stock was provided through a forest inventory stratified by homogeneous physical classes considering slope and exposition. Growth data (average periodic annual increment over the last ten years) by stratum was obtained by the diametric increment analysis of some trees (located in the inventory plots) cores or cylinders of wood. The next stages of the project foresee the survey of endangered flora and fauna. The cross tabulation of all these spatial information layers will allow to assign uses or functions to the territory using a "Objectives Compatibility Matrix" that makes part of the methodology called Multicriteria Evaluation. In a preliminary analysis, the main objectives of the Reserve were defined as: 1) preservation; 2) research (non-destructive and destructive trials) with emphasis in forest management and; 3) people education and capacitation. The main result of the Multicriteria Evaluation – the Reserve Zoning Map – will be used as a base for the management plan elaboration. As a consequence of the general management plan, several programs or actions will be established or applied according to the specific objectives defined for each zone of the natural reserve. A special emphasis will be given to the areas destinated to research, intending the development and the implementation of a forest management model for the Araucaria Forests, aiming the utilization of timber and non-timber products. With this project, it is expected to answer questions formulated by the Brazilian environmental statutory law concerning the establishment of "… technical criteria, scientifically based, that guarantee the sustainability of the forest exploitation and the genetic conservation of the exploited populations". At the same time the project is looking for a new paradigm definition to the conservation and

sustainable use of the Araucaria Forest considering that the legislation – even though it is very restrictive to the exploitation of timber resources – hasn't been efficient in stopping the suppression of the natural vegetation and the land conversion to other uses as agriculture and cattle breeding for example. The project also aims to define and/or adapt Araucaria Forest sub-typologies to be more coherent with the observed situation in remnants that suffered anthropogenic intervention of different intensities, many of them presenting low potential of recovering or regeneration. In the next phase of the project, some silvicultural protocols - specific to each class - will be established and implemented, and their short, middle and long term effects will be evaluated by monitoring techniques.

MAKINGS OF A SUCCESSFUL PIONEER FOREST SPECIES: *MYRSINE PARVULA* IN GRASSLANDS OF SOUTHERN BRAZIL

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The grasslands of Southern Brazil, originally relicts from the last postglacial and nowadays grazed and burnt, are gradually colonised by native forest.

Myrsine parvula (Mez.) Otegui is the most successful pioneer forest species, in terms of individual abundance and cover, in both managed and unmanaged grasslands of the humid temperate highland of Rio Grande do Sul.

As field experiments and population studies have revealed, *Myrsine* has acquired this status by extraordinary versatility in establishment and growth.

For example, *Myrsine* juveniles may be recruited both from seed and by root sucker production. During the first 2-3ys of their life, root suckers grow significantly faster than seedlings: Ca twice as high as even-aged seedlings in abandoned grassland and ca. three times as high in pasture and short open grassland within one year. Root suckers are thus less affected by factors limiting seedling growth, e.g. frost in open sites and competition by high-growing grassland species in abandoned grassland. They account for 75 to 95% of juvenile recruitment in abandoned grassland.

However, root sucker production is a means of short-distance “dispersal”, i.e. is restricted to a radius of ca. 0-10 metres from feeder individuals. Scarcity of feeder individuals in adjacent forest probably accounts for low proportions of root suckers, relative to seedlings, in pasture.

Since seedling establishment and growth are limited, in pasture, by winter climate, cattle influence and fire, *Myrsine* populations in pasture grow slower than in abandoned grassland or even decline temporarily. However, without *Myrsine*’s ability to resprout after fire and mechanical biomass loss, even as a seedling, any establishment in pasture might be precluded.

Few other forest species show similar versatility in establishment and survival so that under present-day management forest expansion over grassland will proceed slowly.

EFFECTS OF HABITAT FRAGMENTATION OF THE MATA ATLANTICA ON AMPHIBIANS AND IDENTIFICATION OF PRIORITY SITES FOR HABITAT NETWORKS

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The Atlantic forest region, has been suffering the elimination and fragmentation of forested areas, land degradation, and the extinction of species due to the expansion of agricultural lands and urbanisation processes. A multidisciplinary Brazilian-German scientific cooperation program studied the effects of habitat fragmentation on biodiversity patterns, modelled forest regeneration, and assessed environmental perception, resource management, and socio-economic change on the Atlantic Plateau of the Mata Atlântica in the State of São Paulo, a landscape formed by secondary tropical forest fragments. We present selected results of the first phase of the project focussing on amphibians and the identification of priority sites for habitat networks. While some specialist species were found only in continuous mature forest, others, such as *Eleutherodactylus parvus*, were found only in a few fragments. Contrary to expectations, fragmentation did not show any effects on population parameters of the studied ground-dwelling amphibians. Thus, even small forest fragments are of conservation value for ground-dwelling amphibians. However, more extensive remnants allow the conservation of a community of anurans that is more integral, richer, and more stable over time. For the establishment of a reserve network, we compared network configurations based on species data of frogs, which were sampled during two consecutive years. The data of each year resulted in strikingly different networks, an effect that was predominantly caused by significant changes in the composition of the species community and not by random effects due to low capture probabilities.

CARBON FIXATION IN THE BIOMASS OF *MIMOSA SCRABELLA* BENTH (BRACATINGA)

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In times of global warming due to climate change, measures have to be taken to reduce negative impact of CO_2 accumulation in the atmosphere. One possibility is to use the potential of carbon sequestration of forest trees. In the Kyoto protocoll several instruments are implemented, that allow to valorize positive effects of forest management by negotiating carbon credits. The studies existing about carbon fixation are mainly focused on exotic species grown in plantations, only a few information is available about native species, often grown by small farmers. Those, rural populations, with less access to scientific and political informations, generally do not share the benefits that the negotiation of carbon credits brings to forest owners. The present study aims to provide more information about a native species widely planted in the Southern states of Brazil, named *Mimosa scrabella* Benth (bracatinga).

The study was conducted in stands located at the border between Paraná and Santa Catarina. For the quantification of the carbon content 30 trees were felled and subdivided in so called “biomass compartments”, as there are foliage, green and dead branches, stemwood, bark and roots. Representative samples of all compartments were taken to the laboratory and carbon content was determined by using the method of biomass combustion. Using statistical methods, differences in the carbon content of the differnet compartments could be detected. In a next step the carbon content of each compartment was modelled with help of multivariate regression analysis by estimating it with easy available tree parameters like diameter at breast height (DBH) and tree height. A model was developed to estimate carbon content of the species and fitted by searching for the highest coefficient of determination and reducing the standard error of the regression equation. The model that explained the overall carbon content of bracatinga best was: $C_{total} = \beta 0 + \beta 1*DBH + \beta 2*DBH^2$, showing an R^2 of 0,95 and an standard error of 25,9%. The outcomes of the study may be used to estimate with easy measurable tree parameter DBH and high precision carbon content of bracatinga in both, native forests and forest plantations.

CAATINGA – WHITE FOREST OR A SECOND SAHARA?

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Keywords: desertification, caatinga, sustainable management.

Brazil is well known through the Amazon-Forest and its worldwide influence. But Brazil is much larger and has several other biomes of tropical forests that are often forgotten, even if they have significance not only locally but also for the climate worldwide. The Caatinga up to now has not received much attention, because everyone thinks that in this region, there is “nothing – only scrubs, and the burrows eat rocks”. In the northeast of Brazil, there is a semiarid, tropical climate, with precipitation between 250 e 800mm/year and the medium temperature between 24° and 26°C – hot and dry. The nature adapted to these special conditions, and a biome developed here that is unique in the world and is still little known. In the last years some research was dedicated which showed that we have to change the image that was widely distributed about this living space – especially in years of drought the image is nourished that in the semi-arid northeast nothing grows because of the drought and there are only some scrubs and many rocks. There seems to be nothing, that might be useful to the people and some regions even are at risk of desertification. But the original vegetation was called “caatinga” by the aborigines, which means “white forest”. This is a very appropriate name for a forest, where during the dry season, almost all the trees have lost their leaves and many have a white or bright bark, which gives a silver-white brilliancy to the landscape. Today, almost all of the 935.000 km² that were covered by caatinga are altered by human influence, so that it is difficult to find a piece of original, unaltered vegetation. Caatinga originally is characterized by a great diversity of plants, insects and other animals, many endemic of the region, and many different forms of adaptation, depending on the soil and other abiotic factors. Almost every plant has different utilities for the human being – wood, firewood, ornamental, fruit, oil, bee-honey, fodder, medicinal plants, shadow-trees and others – and many are not recognized or not used. Introducing sustainable management therefore is of greatest urgency. Helping develop the consciousness of the need to preserve this unique biome can even help realize the millennium development goals, as for the generally poor people that live in this region, safer water access and using the many different products that nature can offer, could help achieve a better health situation in the population while at the same time, local plants and animals are preserved in their natural environment.

SUSTAINABLE DEVELOPMENT, FOREST MANAGEMENT AND THE FURNITURE INDUSTRY – AN EMPIRICAL STUDY IN BRAZIL AND GERMANY

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Keywords: sustainable forestry; furniture industry; value chains; clusters

The Agenda 21 (UNCED, 1992) attributes to the private sector an important role in the promotion of sustainable development. It proposes that, “the concept of stewardship in the management and utilization of natural resources by entrepreneurs” be encouraged, and “the number of entrepreneurs engaged in enterprises that subscribe to and implement sustainable development policies” increased. With these objectives in mind, the purpose of an ongoing PhD research project is to determine *whether* and *how* the furniture industry, as a division of the wood industry with a high added value component influences forest management. The research questions are:

1. What impulses (actions and behaviours) can furniture companies send out to forest management and which are relevant in practice?
2. What prompts the managers of furniture firms to generate such impulses?
3. Are there links between the environmental aspects of the management of furniture companies and their procurement of wood products for furniture making?
4. How does the involvement of furniture companies in national and international value chains and regional clusters shape the emergence of forest management impulses?

The information necessary to answer these questions will be gathered in three furniture producing regions with differing socio-economic and forestry conditions, namely Rio Branco do Acre and Sao Bento do Sul in Brazil, and Baden-Württemberg in Germany. During the symposium, the research concept will be put up for discussion, and preliminary results from the first two of a total of four research steps will be presented, namely the systematic evaluation of furniture industry journals and internet platforms, and expert interviews carried out in Brazil and Germany. Subsequent research components include case studies of furniture companies in the three regions, followed by numerous telephone interviews with the managers of furniture firms. These latter steps are planned for the second half of 2007.

DAAD

RESEARCH AND EDUCATION IN SUSTAINABLE ORGANIC CHEMISTRY

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Sustainable development needs chemical research

Research and innovation are preconditions for the transformation of economic and social processes in favor of a sustainable development. Chemistry, the science and practice of the transformation of matter, is of central importance. Everyone dealing with chemistry can contribute substantially to sustainable development and holds special responsibility. Already in education the links between reactions and substances with the consumption of energy and resources, toxicology and environmental pollution have to be treated consciously, so that graduates can provide for them in their professional life.

Organic chemistry lab courses are central for chemical education

Organic chemistry lab courses are obligatory in university courses in chemistry, biochemistry, biology, pharmacy, physics, medicine and even in some engineering science courses. Most of these courses are being carried out in the traditional manner: Students learn basic experimental techniques of synthesis and analysis as well as dealing with dangerous chemical substances. The efficiency of a reaction is generally only looked at in terms of its stoichiometric yield. Students don't learn to evaluate the overall efficiency of a chemical transformation which is a direct measure of its sustainability. Procedures for possible improvements of their efficiency are not taught in an explicit way.

Education contents must be complemented

In order for future generations of scientists to pay more attention to the topic of sustainable development already during their education, traditional contents and concepts of chemical education in schools, vocational schools, academies and universities have to be changed. Important contents of organic chemistry lab courses have to be preserved: Experiencing the joys of experimental activities, practicing of experimental skills, getting to know substances, equipment and reactions, safe handling of dangerous substances complying with legal regulations. These topics shall be complemented by aspects of efficiency and sustainability of a reaction. From this broader perspective students learn to plan, conduct and analyse organic synthesis reactions, including effects of the reaction on man and environment into the scope of their activities. Sustainability starts with planning the reaction!

Course material offered in a new way...

Depending on aim and level of studies the contents to be conveyed differ strongly. Therefore, a new format was chosen for the new organic chemistry lab course. Not a textbook but an interactive database was designed to offer all relevant information. The offer is meant for lab instructors and teachers responsible for practical education in organic chemistry in universities, academia and vocational schools. The NOP

material is intended to help set up modern lab courses and seminars, to get concepts and tools of sustainable chemistry across to generations of scientists to come. Lab experiments with experimental instructions, security information, safety information and analytical data have been amended with non-classical issues like life cycle assessment (LCA), energy consumption and (eco-)toxicological evaluations.

...and open for your contributions

Contrary to the "closed" nature of a textbook, only evolving by new editions in a confined way, this lab course is "open", meaning that authors not belonging to the original team can contribute. All materials are free of charge for students as well as teachers. For their application in a specific course, the instructor chooses adequate parts of the NOP collection. A pre-selection of topics, amplitude and structure of a course has been deliberately avoided. We hope that this open form of offering course material will widely be accepted and used on the different levels of education. Classical contents like experimental instructions are directly linked to, but not mixed with information, articles and data concerning sustainability, environmental protection and (eco)toxicology. In this way it is envisioned to convey these contents together with the classical "program".

Visit: www.oc-praktikum.de

LOW TEMPERATURE CONVERSION OF BIOMASS

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Keywords: biomass, LTC, bio fuel, catalyst, animal fat, rape cake.

Ambitions on energetic utilisation of biomass incl. biogenic residues have increased significantly in recent years. Meanwhile about 3.2 % of German primary energy is provided by biomass. An industry with an annual turnover of approx. 6 billion € and as many as 56,000 employees has developed. The aims of the European Commission and the German government on increasing the fraction of biogenic fuels to 5.75 % by 2010 as well as raising the portion of regenerative electricity to 20 % and regenerative energy consumption to 10 % by 2010 will additionally enforce this tendency in the near future.

Procedures on energetic and material recycling of biomass have a great ideal: Mother nature with its perfect cycles of matter. Effective simulation of these cycles is the challenge of processes for biomass utilisation. One of these processes is low temperature conversion (LTC). During the process biomass is heated to approx. 400°C under atmospheric pressure and exclusion of oxygen. Under these conditions hydrocarbons are developing from organic biomass as meat and bone meal (MBM) and sewage sludge, but also rape seed, rape cake and animal fat. The hydrocarbons are subsequently liquefied in a downstream condenser. Other products are reaction water, non condensable gases and a carbon containing solid residue, in which inorganic constituents are fixed.

All substrates and products are analysed by elemental analysis (CHNS), oils are analysed by kapillary viscosimeter, nuclear magnetic resonance (NMR), infrared spectrometry (FT-IR), gas chromatography (GC). Solid residues are analysed on dry substance (DS), organic dry substance (ODS) as well as phosphorus content. Reaction water is tested on COD, BOD and ammonia.

Depending on the substrate significant phosphorus contents are found in the solid products (up to 27% P_2O_5 in solid LTC-product of MBM). Usablility as substitute for mineral fertilizer could be shown by pot experiments. Biomass without inorganic trace-elements as animal fat or plant oils needs to be converted by an additional, external catalyst (Y-zeolites, ZSM-5 zeolites). Depending on reaction temperature and structure of catalyst either aliphatic (~400°C) or aromatic (~550°C) hydrocarbons prevail in the oil product (Yield: up to 70%). Kinematic viscosities of the oil products are as low as 0.7 – 2.4 mm²/s (at 40°C), depending on type of catalyst, net calorific values are between 37 and 42 MJ/kg. LTC oil from animal fat shows a good miscibility with pure rape oil. Kinematic viscosity of rape oil (~30 mm²/s) could therefore be enhanced by mixing with LTC oil in order to reach better fuel qualities. Combustion tests were conducted in a modified Buderus heating boiler Type G115 (power rating: 27 kW) with LTC oil from animal fat, converted at 400°C with Y-zeolite. Burning characteristics and emission values were similar to those of heating oil.

Further investigations will be realised within a current EU LIFE project (LIFE06 ENV/D/000458) at WWTP Mintraching/Germany.

ASSESSMENT OF NEW STRATEGIC APPROACHES FOR THE TREATMENT OF HOUSEHOLD WASTES

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Keywords: waste management strategies, resources and climate protection, model for balances calculation, waste management variants, resources efficiency.

Assessment of new strategic approaches for the treatment of household wastes
New waste management strategies for waste from households must be evaluated considering ecological and economic aspects and with regard to resources and climate protection. Particularly important is in this contest the efficiency of these strategies, which can be quantified and meaningfully compared, in order to weigh new technologies for the separation and preparation of mixed sorts of materials against the established systems. Based on the current situation of 10 districts in Baden-Wuerttemberg as well as the country-wide statistic waste management data, 18 waste management scenarios with thermal and mechanical-biological treatment procedures have been evaluated using a model for balances calculation. This included an evaluation of the relevant material flows in the procedure of the LCA. A substantial point of this assessment is the examination of the costs for the various waste management variants considering the different district specificities; moreover the disposal areas are aggregated in Clusters, whose resources efficiency and climatic relevance is again quantified and compared.

The results show that in the optimized scenarios over 300 kg CO2 /Mg of waste can be saved in comparison to the conventional landfill with utilization of landfill gas. In this case for example the efficiency parameter for CO2 savings goes between minus 40 to plus 30 kg CO2 /Mg. This means that integrated waste management systems with material and energetic utilization can bring to decisive CO2 savings, while costing less than the conventional system. In addition, the results show that the choice of efficient strategic approaches by the decision makers is substantially affected by the objectives and the local conditions.

Clearly the material flow-specific approaches are to be preferred to the product specific collecting systems for recyclable wastes. The results come from a research project promoted by the Ministry for Environment Baden-Wuerttemberg.

ECO-EFFICIENCY INDICATOR SYSTEM FOR MASS AND ENERGY FLOWS OF INDUSTRIAL PROCESSES

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Keywords: eco-efficiency, energy, mass flow, indicators.

The purpose of eco-efficiency is to create a balance between environmental protection and pollution control along with economic issues. The concept of emergy stands for the solar equivalent energy used up directly or indirectly to produce a product or service. The goal of this project consisted in establishing an eco-efficiency indicator system to evaluate the mass and the emergy flows of industrial processes, and in applying it, as a study case, to a potato industrial process. The proposed model considered the Information Flow as the criteria to create a hierarchical aggregation system for the metrics. The Indicator of Renewable Resources (IR), the Indicator of Productivity (IP), and the Indicator of Pollution Reduction (IRR) were set as the three integrated metrics of the Eco-efficiency Indicator of Mass Flows (EIMF). The weighted mean as a measure of central tendency was advisable for the composition of EIMF, for its weights could strongly emphasize the representative metric of the critical situation. For the peeling and slicing stages of the potato industrial process, in which a great deal of its water flow is consumed, the implantation possibility of a water reuse system and an air compressor device resulted in a combination of fifteen investment cases. The optimal situation in terms of mass eco-efficiency was reflected by the case that presented the most intensive variations in EIMF followed by the lower implantation cost. The water flows that were either reduced (air compressor) or reintegrated into the process (reuse system) along with their respective electricity demand were converted into emergy. The water emergy flows were given the positive sign whereas the electricity emergy flows were represented by the negative values. The sum of the emergy flows from each of the investment cases gave rise to the Indicator of Eco-efficiency Indicator of Emergy Flows (EIEF). The optimal solutions for EIEF reflected the cases with the higher positive values, meaning that the water is being used in a more sustainable way with lower electricity cost. The most cost-effective solutions for EIMF and EIEF were compared in order to define the case that would more equally favor the two evaluations. For both indicators the optimal situations were not the most expensive ones, in a sense that these two evaluation systems demonstrated to be adequate and valuable tools for decision making towards industrial eco-efficiency.

CHEMICAL REACTOR ANALYSIS BY ENTROPY GENERATION MINIMIZATION

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Although the concept of entropy is still of restricted use, its application together with other thermodynamic functions seems to be the best way to reach optimal operational conditions of industrial processes and thus contribute to a healthy environment. For instance, an increase in the production of by-products in the chemical reaction or the self-degradation of the main product can be related to the development of the entropy generation rate. In the case of the isolated use of the concept of energy for the optimization of such a process, it is possible that a spending of additional of energy can be observed in the separation section, so that the reduction in total consumption is not verified. Furthermore, the treatment and disposal of all or some by-products will certainly contribute towards additional energy consumption.

This study is concerned with the analysis of a jacketed CSTR based on Entropy Generation Minimization (EGM) for the determination of optimal parameters of design, as well as, of optimal operating conditions. The approach has been applied to a typical irreversible, exothermic, first order chemical reaction $A \rightarrow B$, in which an equation for the entropy generation rate has been developed, derived from a joint balance of mass, energy and entropy. Several operational temperature conditions were used to provide the behavior of the entropy production rate described by the response surface, in which a joint analysis of the lost available power, heat generated and heat removed from the system has been used to determine the optimal temperature as well as the heat-transfer surface. The results presented indicate the successful application of the concept of the minimum lost of available work to the optimization of reactive systems, as shown in Fig. 2 (inlet temperature 350^{o}C) and Fig.3 (inlet temperature 300^{o}C). A reduction of heat-transfer surface can be also verified, expressed by a change in conductance from 5x10^4 (J/min K) to 2.2x10^4 (J/min K), with the reaction remaining under optimal operating conditions.

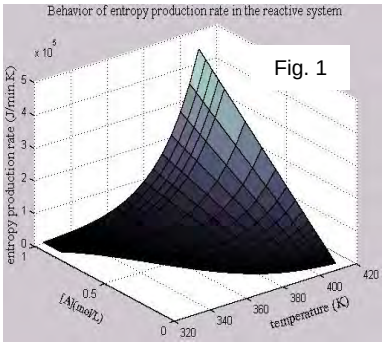

Fig. 1

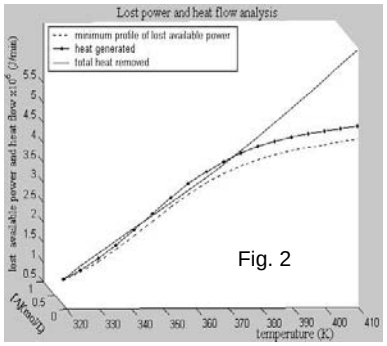

Fig. 2

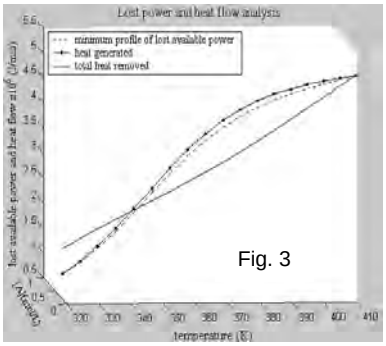

Fig. 3

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POSTER

RELATIONSHIP OF THE DECLIVITY AND THE DISTANCE BETWEEN CROSS DRAINS IN FOREST ROADS NETWORKS

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Keywords: forest roads, erosion, cross drain

Soil erosion on unpaved forest roads can be minimized by several methods. The construction of cross drains is one of the most utilized techniques. Cross drains are physical structures built transversally from roads or pathways, which prevents the runoff or reduces its speed, by conducting the water to drainage channels. The aim of this work was to determine the distances between cross drains in two different kinds of forest road networks: “orthogonal” and “level curve”. The data were obtained from a eucalyptus plantation area in Lençóis Paulista, São Paulo State, Brazil, with geographic co-ordinates of 22°47’37.86”S to 22°48’29.74”S and 48°58’56.39”W to 48°49’28.16”W. Data analysis was performed by the software “R Statistics”. It could be observed, in both road systems studied, a negative correlation between the declivity and the distance between cross drains, i.e., strongest declines implied in shorter distances between cross drains. “level curve” roads presented larger distances between cross drains than “orthogonal” roads.

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MONITORING OF SYSTEMATIC FOREST CHANGE AS PART OF AN INVESTIGATION INTO THE IMPACT OF ITAIPU/BRAZIL HYDROELECTRIC PLANT

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The monitoring described in this work relates to the distribution and coverage area of the primary and secondary vegetation and the areas cleared for farming, spanning a period of 30 years corresponding to the construction period of the ITAIPU hydro-electric plant up to the current day. These areas are conditioned to be recognised by medium resolution sensors: LANDSAT 1, 2, 5 TM, 7 ETM and CBERS II with resolutions of 20 to 80 meters. One of the principal forces for these alterations is the ITAIPU hydro-electric plant which is an active agent in the context of modifying the physical and human environment in its region of influence. The objective is a focused analysis of the area and distribution of forest, while also dealing with historical aspects relating to the legislation and socio-economic reorganization generated by the construction of the cited hydro electrical plant. Tests were carried out in a region that today is located on the periphery of the municipal reservoir of São Miguel do Iguaçu/PR. One of the topics is connected to the heterogeneity of the data, not only the spatial resolution but the radiometric quality of the sensors. The proposal is to use models which consider the spectral quality of the images used, as well as spatial resolution. An example would be the Landsat 1 MSS whose images have a greater rate of pixel loss and variability of spectral response in the same class. Because of this there is a lower reliability in relation to the data obtained, due to a lighter weight in comparison with sensors such as Landsat 5 TM. An analysis of the distribution of the classes of interest is another important aspect, the positioning of the forest area, which changes due to the diverse legal evolutions. Today there are a series of devices to protect and maintain the green areas, which were not known. Some examples are the ecological corridors and the study of environmental impacts. With this current knowledge the analysis can be directed to clearly describe the evolution of territorial reorganization in the region, and through this, lend support to new studies.

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INVESTIGATION OF ROOT LENGTHS IN FOREST SOILS AT ITAÁRA (RS)

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Keywords: root lengths, root auger, UTHSCSA ImageTool

Within the DAAD-Project „Wanderfeldbau (shifting cultivation) in Rio Grande do Sul: Nachhaltige Bewirtschaftungsform?“ the sum of root lengths as a parameter of the subterranean biomass were determined in a forest stand in Itaára (RS).

Soil cores were taken with an auger according to MURACH (1984) on two sample sites both in march 2006 and march 2007. The fifteen measuring points on each site were randomly distributed and the sampling depths were 0-15, 15-30 and if possible 30-45 cm. Further samples are intended to be taken after logging, burning and tilling one of the sites, the other one remains untouched as a reference. The obtained soil cores were washed out above a sieve and the remaining roots were separated according to their diameters into fine roots < 2 mm and coarse roots > 2 mm and stored in alcohol (10%) until further treatment. The subsequent determination of the root lengths was done with the „ImageTool“ (UTHSCSA) software for image analysis.

On both tested sites more than 40,000 km/ha of fine roots have been found in 0-15 cm depth. In 15-30 cm depth there are still more than 10,000 km/ha fine roots and in 30-45 cm depth there are about 5,000 km fine roots per hectare. The acquisition of coarse roots yielded about 900 km/ha in the upper 15 cm of the soil, in 15-30 cm about 400 km/ha and in 30-45 cm depth almost 200 km/ha.

The samples taken so far have shown no significant difference neither between both sites nor between the two years. Hence it is warranted that the data of sample site two can be used as a reference for the sample site one after burning.

GRASS GEOGRAPHIC INFORMATION SYSTEM ASSESSMENT TO PREDICTION OF EROSION RISKS IN FOREST USE ROADS

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The forest road network is the principal support for the whole activity but, however, the forest use road have been one of main motive of soil erosion and the rivers filling up in cultivated forests, because it is answerable for the vegetable cover removed, soil movement and its compaction, making this roads very susceptible for the erosion caused by precipitation.

Until today, although the great technologic changes occurred in the forestation and the transport to the forest enterprise, there are few works that study the wood transport optimization, mainly, about erosion. Besides, the available tools have showed inefficient to the in specific situation out of local where were developed. Because its higher influence on roads soil lost than others factors of Universal Soil Lost Equaccion (USLE), the objective of this work was develop a criterion to erosion risks identification in forest use road based in LS topography factor, that consider only the ramps slope and length. As results, it got that use of the Geographic System Information (GIS) GRASS to the application of the offered criterion to identification of erosion risks in forests roads is a possible tool in the erosion prevention and control. Besides, as quantitative analyses as the qualitative one showed that ramps behaved as according to the indicated through the map created by GRASS with erosion risks identification in forest use road arranged through LS topography factor. About comparison between orthogonal and level curve forest roads networks through LS topography factor criterion, in the level curve roads networks, there is, potentially, lesser possibilities to occur erosion than in the orthogonal roads networks, what can be explained by lesser incident of long and/or sloped ramps in this roads networking building conception, wich respect relief features. In the ramp where there was the highest soil lost, 0,932 centímeters of soil during the ten month of the test (period with 896 milímeters of precipitation), it was estimeted an erosion around 130 ton. per hectare of road, value esteemed above of the tolerad index and wich emphasize the significance and and seriousness of the erosion risks in forest use roads.

THE ENVIRONMENTAL ACCOUNTING APPROACH BEEN APPLIED ON CASH FLOW ANALISIS - THE CASE OF CASSAVA CULTIVATION IN AMAZON REGION

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Keywords: Cassava cultivation, Environmental Valuation, Amazon Region.

The cash flow analysis aims to provide information on choosing or ranking the best investment alternatives. The evaluation criteria usually take into account only the economic values to seek the most profitable alternatives. But, nowadays, there is a new concern on the decision process on way that it must evaluate other values, such as environmental and social impacts resulted by project execution. On the other hand, it is quite complex to value environmental assets, due their non monetary nature and market lack for such goods. It is complicated to set prices or assign property rights to the obtained benefits, since they are enjoyed free in the market. Therefore, it is necessary to establish a minimum of environmental and social standards, which have to be maintained by the proposed alternatives. Thus, the research target can be summarized by the question “What happen with the economic performance of production projects after inclusion of environmental costs and benefits , using the EAM's model?". The Environmental Accounting Model (EAM) proposed by Barbosa Filho (2005), is based on the Contingent Valuation Method - CVM, on evaluation of environmental costs and benefits, on the way that it provides a more detailed view to decision managers about the investment alternatives. In accordance with the results, it can be concluded that cassava cultivation activity in Amazon region, in the specific case of observed production process, generates a considerable negative environmental impact and as a consequence high environmental costs then it is not economically interesting for the regional sustainable development, considering a view of medium term.

ALTERATIONS IN MICROBIOLOGICAL BIOMASS OF OXISSOLS UNDER APPLICATION OF SWINE RESIDUE

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In last the fifteen years much attention passed to be given to the disposal of residues generated for animals of form to cause the minimum impact on the environment being gotten a recycling of these residues. The discarding of these dejections in the soil appears as a possibility of to revive available energy, of this form, to transform into by-products through the recycling capacity of the soil, proportionate for the ample diversity of microbiological species. The research had as objective to evaluate alterations in the biomass of an OXISSOLS under application of liquid swine residue in different periods of application under the culture of coffee. The areas were divided in A3, A7 and A26 years of application of liquid residue of compared swine to the area of natural preservation, (A0). The samples had been collected the following depths: 0-0,05; 0,05-0,10; 0,20-0,40; 0,60-0,80 m. The total organic carbon was determined by the potassium dicromate method, and the microbiological biomass of the soil were determined using the microwaves, being necessary to reach an energy of 1,62x105 J, esteem microbiological carbon, similar carbon to gotten for the fumigation with chloroform for the procedures of extraction and the incubation. The application of the liquid swine residue promoted increase of organic carbon reaching the depth of 0,80 m and the microbiological biomass of the soil was influenced positively by the addition of the residue until the same depth, having improved the environment of the soil, had the presence of microorganism, being able to affect in the development of the root and consequence increase of volume of soil explored.

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INTERNATIONAL COOPERATION ON WILDLAND FIRE MANAGEMENT

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Keywords: *wildland fire, fire management, wildland fire networks*

Fire is one of the main destruction agents of forests and other vegetation types in all vegetation zones. Fire statistical data show an increase in the occurrences, affected areas and impacts in all continents. Among the factors associated to the increasing fire occurrences are the regional climate change, demographic developments, and related socio-economic aspects. Fire effects are not restricted to sites affected, but have transboundary and even global impacts, e.g. the impacts of fire emissions on human health and the composition and functioning of the global atmosphere, regardless of national borders. Taking into account the global significance of fire impacts it's necessary to promote the establishment of a global network aimed at improving national and international capabilities in fire management and to facilitate the international cooperation on forest fire management. Based on the achievements of the scientific cooperation between the University of Freiburg and the Forestry School of UFPR starting in the 1970s and the concept of the Global Wildland Fire Network (GWFN) operating under the auspices of the United Nations International Strategy for Disaster Reduction (UNISDR) a regional branch of the GFWN was established in South America in 2004 through the initiative and partnership between the Forestry School of UFPR and GFMC / University of Freiburg. Brazil, due to its territorial extension, its environmental diversity, the significance of fire impacts, is a prominent member of the South America network. The UFPR / GFMC partnership has produced other important results in the theme "Forest Fires" besides the establishment of the UNISDR Regional South America Wildland Fire Network. Currently, through this partnership, a graduate student is developing doctorate thesis in fire ecology in the UFPR with a stage at GFMC and University of Freiburg.

GLOBAL FIRE MONTORING CENTER AND CAPES

SITE QUALITY AND TREE GROWTH. A STUDY ON AN *ARAUCARIA ANGUSTIFOLIA* YOUNG PLANTATION IN SOUTH BRAZIL.

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Keywords: Araucaria angustifolia, site quality, growth

The present study takes part on the doctorate research of the author, in course in the Federal University of the Paraná, Brazil, in partnership with the Albert-Ludwig University of Freiburg, Germany. The main objective of the research is to study the rhythm of growth of the trees in different site conditions. The area of studies is situated in the Municipality of Tijucas do Sul, Paraná State, Brazil and composes about 20% of a plantation of *Araucaria angustifolia* with 200 hectares, promoted for the environmental project *Vivat Araucaria* (IFSE/PUCPR). Between June and July of 2006 it was lead a forest inventory of the areas planted in January and February of 2000, within 54 parcels of 20 x 20 meters, where all the trees had its heights and diameters measured. After this stage the data had been tabulated and the samples had been grouped in 5 dominant diameter classes, in which they had been selected and cut 19 trees for trunk analysis. These and ore 16 trees had their crowns measured, including branch projection distances and number and height of whorls. The disks had been cut in a distance of 10 cm below of each branch whorl, for further reconstitution of the growth of the trunk, the annual increment in height and diameter and of the annual formation of the whorls. Under each of these trees, the depth of the A horizon was measured and had been taken soil samples with a dutch auger (0 - 40 cm). These had been sent to the soil laboratory of the Pontifical Catholic University of Paraná for chemical analyses and determination of sand, silt and clay (%). The results of the inventory show to have significant differences in the growth of the trees between the different stands, with variations from 3,13 to 15,13 centimeteres between dominant diameters and from 2,7 to 8,7 meters between dominant heights. From this point the goal is to explain these variations and verify the influence of edaphic variables on tree growth.

CNPq / DAAD

IMPROVEMENT OF POTENTIAL RECYCLABLE SEPARATION

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Keywords: Waste paper, domestic waste, recyclables, separation, plastic packages

Public institutions like universities produce enormous quantities of domestic waste. According to German national law this waste has to be incinerated. However by separation in different fractions the amount of domestic waste can be reduced clearly by separate collection of all recyclable fractions. These fractions should be as large as possible regarding the quantity and as pure as possible regarding the quality. For recycling purposes most important are waste paper and the so called green-dot packages fractions.

To improve the quality of the separation of all fractions a uniform color-logo-code on all labels, compactors, waste containers, waste and recycle bins and bin-liners has been created. We offer separation systems in different sizes, the common systems were resized our removed by regarding the amount of the different fractions. In corridors, halls, bigger lecture rooms and break rooms we collect three fractions, domestic waste, waste paper and green-dot packages, in offices for example or near copiers we collect only waste paper.

To win cooperation with all employees informative posters on waste separation have been attached beyond most systems for separate waste collection. In addition there is a networking between different instances for example with the cleaning service and care takers in order to ensure quality assurance of separation. Annually instructions of the cleaning staff assist the successful implementation in all ranks.

The university switched from the service of the community to self-marketing of recycables in nine disposal centers in which a share of 90% is processed. According to German national law there are demanding directives on domestic waste incineration. That’s why domestic waste incineration is expensive, 200 € per ton. At this process, in the most optimistic case, only 30 percent of the energy can be used. Hence waste paper is too valuable to be incinerated. As most of the paper in Germany is imported from abroad, it makes sense to counteract the trend of littering waste paper by boosting the share waste paper for recycled as much as possible. In addition to that, reimbursement for waste paper is up to 29 € per ton, which obviously brings a clear economic advantage.

As a basic principle the potential of resources should be preserved. Everybody has to be conscious of responsible handling of resources. The success of all described measures can be controlled and related to former data by comparison of weighing logs. Each compactor can be related to a complex of buildings. The logs show that the locations which have been optimized and well equiped now have a better proportion of waste paper to domestic waste. Generally there can be noticed a tendency to decreasing domestic waste quantities per member.

FIELD INITIAL GROWTH EVALUATION OF *PINUS TAEDA* L. SEEDLINGS SUBMITTED TO DIFFERENT DOSAGES OF BACSOL®

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Keywords: Bacsol®, Pinus taeda, initial growth

This study had as objective to evaluate the initial growth of Pinus taeda seedlings in a field plantation and submitted to treatment with Bacsol®.. The experiment was installed and developed in Ivorá, RS, Brazil, located near the geographic coordinates 29o 30' 21,3" S and 53o 35' 25,7" W. The local weather is classified according to Köppen, as Cfa, and the soil belongs to Ciríaco Mapping Unit, being classified according to Streck (2002) as Chernossolo Argilúvico Férrico Típico. These soils are characterized by presenting medium contents of organic material, and also high chemical fertility and cation exchange capacity (CEC). The experiment installation consisted in the randomized allocation of 12 plots (18 m x 22 m), in randomized blocks delineation with 3 repetitions. In each plot 66 seedlings were planted in 3m x 2m spacing. The treatments were applied on the seedlings after the dilution of different product dosages in 10 liters of water, enough to water the 96 seedlings for the three repetitions of each treatment. The product influence on the seedlings was evaluated in the following dosages: Control (0 g/liter); T1 (5g/liter); T2 (10g/liter) and T3 (15g/liter). The obtained results of stem diameter (SD) and height evaluation, after one year, showed significant differences in the variable SD in the three treatments when compared to control, however it did not show difference between different dosages. This way, it is possible to assert that the minimum dosage, 5g/liter, is enough to demonstrate the optimum potential for seedlings growth hen using this product. The plants height did not show statistical differences with any dosages application, but all dosages were better compared to control, reaching average values of 52 cm against 47 cm in the treatment without Bacsol®. To statistically test the possibility to relate the treatments with some regression equation, polynomial regressions of 1o, 2o and 3o degrees were tested to SD variable, and it was found that linear equation was significant; SD = 1,032333 + 0,010133*[dosage (g/l)]. However, it was not possible to estimate the maximum technique efficiency (MTE), due to the impossibility of data adjustment until the regression curve inversion, which would just be possible with the estimative of the 2o or 3o regression degrees.

PHOSPHORUS DYNAMICS IN THE SEASONAL DECIDUOUS FOREST - COMPARATIVE ANALYSIS IN SUCESSIONAL SECONDARY PHASES IN RS, BRAZIL

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Keywords: forest nutrition, forest ecology, succession

The objective of this work was to evaluate the distribution of the available Phosphorus (P) in two seasonal secondary phases (medium status of regeneration (MS) 33 years old) and advanced status of regeneration (AS) 53 years old) of a Seasonal Deciduous Forest located in Santa Tereza, RS, Brazil. P was quantified in the soil (S) (Merlich I Extractor), in the litter on the soil (L) and in the biomass above (BAS) and below the soil (RB). In S, 3 mini-trenches up to 60 cm deep were opened in each sucessional phase, which were sampled in intervals of 10 cm. In order to quantify the stocks of P in S, the density of the soil was studied using copecky ring. In L, the samples were collected with the use of a square frame of 0.5 m of side, with 5 samples in each sucessional phase. In BAS, the samples were collected in three plots of 10 m x 10 m with irregular distribution in each area. The BAS was separated in fractions leaves, living branches, dead branches, wood and bark in the arboreal stratum; leaves and wood/branches in the bushes; herbaceous and lianas. In RB, the samples were collected to the depth of 60 cm in intervals of 10 cm. RB was segregated in coarse (CRB) (diameter>2mm) and fine (FRB) (d≥2mm). The P accumulated in S (0 to 60 cm of depth) was 24.6 and 25.3 kg ha-1 in MS and AS, respectively. The layers that accumulated more nutrients were 30-40 cm in MS and 0-10 and 20-30 in AS. In MS, the quantity of P in the superficial depth (0-10 cm) was intermediate of 4.2 kg ha-1. In L, the quantity of P was 3.6 (MS) and 4.9 (AS) kg ha-1. In FRB, it was 4.8 (MS) and 2.0 (AS) kg ha-1. In CRB, the quantity of P was 15.0 (MC) and 27.2 (AC) kg ha-1. In BAS, P accumulated 67.2 (MS) and 94.0 (AS) kg ha-1. The fractions of the arboreal stratum, in MS accumulated P in the priority order, in kg ha-1: wood (21.3) > living branches (18.0) > lianas (13.0) > bark (5.6) > leaves (3.9) > wood/branches of bushes (3.3) > herbaceous (1.3) > leaves of bushes and dead branches (0.4 each). In AS, the priority of accumulation of P was, in kg ha-1, living branches (42.3)> wood (27.3)> lianas (7.0)> bark (6.8)> leaves (5.4)> dead branches (1.8) > wood/branches of bushes (1.7) > herbaceous (1.2)> leaves of bushes (1.2). In percentage terms, the accumulation of P was predominant in the BAS, with 58.3% in MS and 61.3% in AS. The second compartment to accumulate more P was S in MS (21.4%) and CRB in AS (17.7%). The third accumulative compartment of P was, in MS, CRB (13.0%) and, in AS, S, with 16.5%. The compartments that accumulated less P were in MS and AS, which presented FRB (4.2% and 1.3%) and L (3.1% and 3.2%), respectively. Inside of the dynamics of P in the two studied areas, it is clear the bioaccumulation of P in BAS, being S and CRB as secondary accumulations. L and FRB are smaller and transitory accumulations, which return P of the biomass to the soil. In activities of forest management, some care s should be been with relationship to the retreat of components of the biomass, in way to not to compromise the future sustainability.

Fundação de Amparo à Pesquisa do Rio Grande do Sul (FAPERGS)

THE SECOND BRAZILIAN PROGRAMME FOR ENVIRONMENT AND THE SWINE PROJECT IN SANTA CATARINA STATE: TOWARDS A SUSTAINABLE DEVELOPMENT?

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Keywords: animal production, water quality, sustainable development

In Santa Catarina State, along the last decades, there was a great increasing in the animal production considered, nowadays, an activity of enormous importance in the economic scenario, containing about 80 thousands swine producers concentrated in the west region (80%) with an average of 16 hectares/producer. Around 13 thousands of them are integrated to some agro industries (private or co-operative) located near the farming areas, and the rest are acting like independent producers. The swine production in Santa Catarina is the biggest in the country, performing 29,6% of the national totality. The system of swine production conventionally practiced is the confining in coach houses, which concentrates a bigger number of animals. The water is used to clean the residues, as well as to transport them out of the coach houses; increasing, significantly, the offer of organic matter in the effluents. Therefore, the water pollution caused by the swine practice in intensive systems of production became an environmental question of unsustainable to Santa Catarina State. This paper analyses the Swine Project to Santa Catarina State, which is part of the II National Programme of Environment in order to make a profound discussion concerning the sustainability of the swine production as well as the quality of the water resources looking at the sustainable development and the sustainability. It is intended to offer better orientation to the technicians, who work together with the swine producers, not only about technical methodologies, but also concerning the social science, showing how the producers understand the water uses in his propriety and the personal and environmental welfare. Moreover, the accomplishment of the public legislation about the utilization and the conservation of the environment and about the legalization of new swine properties are pointed out too. As one of the final conclusions, the Swine Project that was once idealized as a model of animal production linked to the sustainable development just brought some answers to the problem of water pollution in this first phase. Unfortunately, the sustainability remained away to be understood by all the actors involved in the process.

INDIGENOUS URBANISM: THE CONSTRUCTION OF A DIFFERENTIATED HEALTH IN A NEW ENVIRONMET

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Keywords: Ticuna indians, environmental degradation, waste, differentiated health

The indigenous population of Alto Solimões (AM), composed by the Ticuna ethnicities Cocama, Kambeba and Kaixana, is estimated to have over 45 thousand people and occupy around 196 villages. The process of populational concentration in the Indigenous Lands has increased during the 70's due to the itervention of multiple religious works, the search for education and the demands for basic services (schools, medical outposts, water, light) subsequent to the demarcation process. Since the year 2000, 11 Strategic Outposts have been implemented for indigenous health care purposes. All this suport remained restricted to the villages located in the banks of the Solimões River, creating a significant increment on populacional relocation without the proper evaluation of its impact over the environment and the population's health.

The aim of this work is to characterize a situation of environmental degradation at the great indigenous villages of the Alto Solimões, consequence of a unattended urbanization process, wich has been overimposed to the traditional rithym of space occupation.

The nine biggest villages sume up to 15.387 individuals, Ticuna ethnics in its majority, representing over 40 % of the entire indigenous population. It has been observed in these communities inadequate sanitary equipments and water suply services also under no quality control whatsoever; open air water suplies within the range of houses and roads; a significant increase in the solid waste (garbage) due to a change in the nutritional patterns and the introduction os new comsumption goods (plastic packages, bateries, bottles, etc). Despite the clear signs of attention with homes and its immediate yards, the sustainable agricultural models, the handling of the capoeiras and the mobilization of the “ajuris”, great part of the population is still not responsive to new issues, dependant on outside actions and without sustainability, mirrored on the executed models of the nearby municipal urban centers that haven't been quiet succesful.

It is necessary to think on ways of participation in the constrution and implementation of intervention proposals that represent how the individuals organize themselves. The agregation of the indigenous way of social and political organization with the participation and social control proposals is the only way to promote health in differentiated manners.

SOCIO-ENVIRONMENTAL AND SUSTAINABILITY ASSESSMENT FOR REGIONAL DEVELOPMENT IN ANGRA DOS REIS, RJ – BRAZIL

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This study presents a socio-environmental impact assessment of the adoption of technology innovations in the Pectens In Vitro Fertilization Laboratory at Instituto de Ecodesenvolvimento da Baía de Ilha Grande (IEDBIG), in Angra dos Reis - RJ, Brazil. The adaptation and application of a method focused on agribusiness productive enterprises – the Eco-cert. Rural System - was performed and considered 24 socio-environmental indicators, for the regional development. The assessment system comprises a set of integrated spreadsheets for accounting the technological innovation impacts from the production activities. To fulfil the system framework requirements, field visits at the Institute and interview with the Executive Director were carried out. The system's spreadsheets automatically calculated impact indices, in a scale ranging between ±15, for seven essential aspects and 24 indicators, were as follows: Use of Inputs and Resources (-2.09), Environmental Quality (3.54), Costumer Respect (5.05), Employment (4.40), Revenue (2.17), Health (3.63), and Management and Administration (1.02). The general socio-environmental performance index (5.04) for the pectens production activities indicated an important contribution of technological innovations for the sustainability of Pectens Laboratory's Production. These results attest the good performance of the proposed system for the evaluation of technology management, agribusiness activity's, regional development, and for sustainability performance assessment for pectens production. The author included also some recommendations related with the management and sustainability for the studied Institute.

ECONOMIC AND ENVIRONMENTAL ASPECTS OF SOLAR COLLECTOR'S USE IN PARTIAL SUBSTITUTION OF FUEL OIL IN ORDER TO HEATING WATER

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Keywords: solar energy, economic viability, global warming

Since the Industrial Revolution, when fast and deep growing initiate in many human activities, especially in science and technology, which's improve the development of products, equipment, and population's quality of life. But to get these comforts, there is a huge and continued energy demand that has been supplied by non renewable sources. It is know that the fossil fuels using generate undesirable residues, i.e. combustion gases, and environment impacts, as acid rain (affecting forests and water resources), and very worldwide impacts as greenhouse effect (increasing the global temperature). Besides this, fossil sources can be depleted in few decades, depriving the future generation from these resources, resulting in a global energy crisis. The use of renewable energy is necessary to reduce environmental impacts and to face the energy challenges. In this context, this work presents an economical analysis and shows pollutant gases emission mitigation, when low cost solar collectors are employed in partial substitution of fuel oil used by the boilers, with the purpose of heating water to swimming pools of the Physical Education Center - Federal University of Santa Maria. The total collector's area is 182 m^2 and the inlet and outlet water temperature had been established as 29 and 36ºC, respectively. Knowing solar radiation and collectors' efficiency it is possible to quantify the net useful solar energy. The calculations show a fuel oil economy of 13,174 kg, representing 24% of the yearly total consumption. The construction investment and installation of the direct solar collectors are US$ 6,444.81*, and the estimated useful life is 5 years. The Internal Rate of Return is 29.59% and the Net Present Value, US$ 10,266.23*. Concerning to the environmental impacts, the emission reduction of CO_2, CH_4, CO e N_2O contributes with mitigation of 41.22 tCO_2eq/year (equivalent CO_2 tones), besides NO_x and SO_2 emission reduction, who cause acid rain. In this case, the use of solar energy is economically interesting and, over all, contributes to the improvement of the environment. Best results can be achieved by increasing the collectors' area or reducing the thermal losses.

(*) U$ 1,00 = R$ 2,02

ECONOMIC AND ENVIRONMENTAL ASPECTS OF BIOMASS RESIDUES USAGE – RICE HUSK – IN A MICRO THERMO POWER PLANT.

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Keywords: biomass, economic viability, thermoelectrical generation, global warming

Besides the importance of self power generation and the search of alternatives to the environmental impacts reduction, it was implanted at Doeler Alimentos Ltda, located in São Pedro do Sul, an Micro Thermal Power Plant (MTP) that operates using rice husks as fuel. This project was financed by CNPq (National Council on Technological and Scientific Development) and had support of UFSM (Federal University of Santa Maria) and PTZ Bioenergy. The MCP net power installed is 350 KVA (280 kW), and a small share of it is applied to surplus the MTP and the remaining energy to the rice mill operation. The great amount of rice husks used by MTP were landfilled, having a long period of decomposition, about five years, generation great amount of methane (CH_4). Another important factor is the contribution for national energy matrix change, considering that the electric energy used by Doeler, supplied by Interconnected National System (INS), is generated from fossil fuels, as natural gas and, specifically in the south region, the coal. The installed MTP supplies, in part, the energy from INS, contributing with mitigation of greenhouse gases emission (CO_2). The decrease in CO_2 emission and the methane mitigation, calculated as a conservative form, represents an annual emission reduction of 4,612 tCO_2eq (equivalent tones of CO_2). The economic analyses were made in two ways, considering that the initial investment was U$154,934.00. In the first case, the sell of carbon credits is not took into account and the results were: Intern Rate of Return (IRR) of 16.80% and a payback of 5,5 years. In the second case, considering U$7,00/$tCO_2eq$ the value of carbon credits traded, the results were: IRR of 63,38% and a payback of 2,6 years. This shows the importance of making use of moderns technologies to generate electricity from biomass, as an important element for turn small power plants viable (< 1MW), and the opening of new economical perspectives for the sustainable development due to renewable energy resources valorization and of null carbon emission.

SANITARY LANDFILLS IN BRAZIL: LEACHATE STRENGTH DATA

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Keywords: Landfill leachate, warm climates, MSW.

Today, landfilling is the main choice for final disposal of municipal solid wastes in Brazil. It is still the most cost-effective alternative, allows safe confinement of the residues and optimize land use (when compared with open dumps). However, sanitary landfills still pose environmental risks, which are associated with gas and leachate emissions. Landfill gas can be converted into carbon credits, but the same does not apply to leachate. Leachate treatment always means an increase of costs to landfill operators. Beside costs, there are only few examples of leachate treatment plants that meet the legal requirements for effluent disposal. This may be because of the choice of inappropriate technologies or inadequate sizing of the treatment units. In the literature, one finds many information about the characteristics of leachate from temperate countries, that may not apply to our conditions. In order to make local information available for engineers and landfill operators, we reviewed the data from 24 actual sanitary landfills in Brazil. This data set covers most of the climate diversity, since it includes information from 9 states, from north to south. The constituents included in this analysis are BOD, COD, TOC, pH, alkalinity, conductivity, TKN, ammonia nitrogen, phosphorus, solids, chloride, sulfate, sodium, potassium, calcium, magnesium, iron, cadmium, cobalt, copper, chromium, manganese, mercury, nickel, zinc, aluminum and lead. For each constituent it is presented not only the maximum range, but the frequency distribution, showing the values most likely found in real operation. Mean values are useless, since they give no information on variability. Comparisons are made between Brazilian and international landfill leachate data, and between leachate and domestic sewage data.

CNPq

APPLICATION OF GIS AND MULTICRITERIA EVALUATION IN TERRITORIAL PLANNING OF PROTECTED AREAS

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Keywords: phytosociology; interpolation; geoprocessing

The present work aimed at developing a proposal for the land management of the Forest Reserve Embrapa/Epagri of Caçador-SC, integrating in a systematic manner social, legal, economic, and environmental criteria, besides the expectations of the landowners. The Multicriteria Evaluation (MCE) technique was applied in order to assign uses to the territory. Ancillary data included a previously elaborated Geographical Information System containing several layers like land use, hydrography, vegetation and elevation. A forest inventory was carried out using stratified random sampling. Fifty-two sample plots were proportionally distributed over 13 classes that combined slope and aspect. In order to evaluate the composition, the horizontal and vertical structure of the forest, plant samples were collected for the species identification. All the trees with GBH above 31.5 cm (or 10 cm of DBH), were measured and total heights were estimated. Information on sociological position, tree form and health condition was also collected. For the forest productivity estimation, 5 increment cores per plot were collected, encompassing all diameter range. A phytosociological analysis contributed for the definition of the current state of the forest and for the understanding of its dynamics. For Multicriteria Evaluation the following criteria (limitants and factors) were chosen: Areas of Permanent Preservation, Areas of Restricted Use, Areas of Crops Research and Production, Areas of High Singularity, Research with Permanent Plots, Slope, Edge Effect, Annual Periodic Increment, Wood Quality, Floristic Groups and Proximity to Roads. Some of the factors were spatialized with the support of interpolation techniques. Seed points were represented by the inventory plots and their respective values for a certain factor. The floristic groups, for instance, were interpolated for the whole area using spline functions. The Annual Periodic Increment was interpolated by means of Thiessen polygons. The objectives compatibility matrix allowed defining which objectives would have to be assigned to a specific area. The following classes were obtained for the map of land management of the RFEE: limitants (325 ha); preservation (136 ha); wood production (507 ha); non-wood forest production (181 ha); and recreation (42 ha). The methodology – developed on the basis of geoprocessing techniques, phytosociology and multivariate analysis – can be applied as a guide for land management of other areas with different types of use and distinct ownership.

GENETIC VARIATION IN WOOD ANATOMY OF *PINUS TAEADA*

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Keywords: Pinus taeda, genetics, wood anatomy, cell structure, tree-ring analysis.

Pinus taeda is the most frequently planted forest tree species in southern Brazil, where the species currently occupies more than 1.8 million ha with one of the highest productivity rates world-wide (more than 30 m^3 of wood ha^{-1} $year^{-1}$). Because of its economic importance, several breeding programs were established in the region. However, the low wood density, due to the large portion of early wood per tree-ring, is limiting the use of *P. taeda* as a high quality saw - and structural timber. Its genetic improvement for this trait is one of the alternatives to be considered. The exploration of the genetic variability depends on the knowledge of the genetic variation of growth patterns at cell level. This paper compares the wood anatomy of three families with different diameter growth (large, medium and small) at cell level, from a progeny test plot that was planted in 1997 at Campo do Tenente Municipality, at Paraná State, Brazil (26° 01' 59.1'' South, 49° 36' 27.7'' West, altitude approx. 800 m asl) by the Paraná Federal University and Placas do Paraná, a Brazilian private forest company. The three families (F22: large-; F58: medium-; F21: small-diameter at breast height, DBH) were selected from a population of 60 families at an age of eight years (half of the harvesting age). Three trees of each family were cut and stem discs were collected at breast height. The anatomic wood structure analysis was carried out at the Tree-Ring Laboratory of the Institute for Forest Growth, University Freiburg, Germany. The families were compared by the following cell-parameters: a) radial cell diameter; b) radial cell wall thickness and lumen width; c) number of cells and; d) ratio of early wood, middle wood and late wood. In contrast to the middle and late wood, the extension of early wood differed conspicuously between the families, in the tree rings grown during the growing seasons 2003, 2004 and 2005. The family with the largest DBH (F22) showed the largest cells with the largest lumen. Furthermore, this family also produced the largest number of cells and the highest early wood ratio. The family with medium DBH (F58) showed smaller cells than the family with the smallest DBH (F21), nevertheless its radial growth was higher because F58 produced more cells during the growing season than F21. F58 also presented the thickest cell walls and the highest percentage of late wood. Altogether F58 shows the most homogenous development in number of cells, tree-ring width, cell diameter, accumulated lumen and accumulated cell wall diameter.

PHYSIOLOGY AND BIOCHEMISTRY OF ANAEROBIC BIODEGRADATION OF ISOPROPANOL AND ACETONE

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Isopropanol and acetone are produced at rates exceeding 106 tons/yr and are used mainly as solvents and for further applications in the chemical, pharmaceutical, and cosmetic industry (Harris, 1991; Saito et al, 1994). Isopropanol and acetone can be sources of organic contamination in wastewaters because of their high solubility in water and their large-scale production. Several aerobic bacteria such as *Rhodococcus rhodochrous* and *Xanthobacter autotrophicus* and the phototrophic bacterium *Rhodobacter capsulatus* are capable of utilizing acetone as growth substrate (Ensign et al, 1996; Ensign et al, 1997; Ensign et al, 2002). Some of these bacteria also oxidize isopropanol (Clarke and Ensign, 1999). In this case acetone is activate by a carboxylation reaction which is coupled to hydrolysis of ATP to AMP plus 2 inorganic phosphate. This reaction expends two ATP equivalents to produce acetoacetate (Ensign et al, 1998). Acetone-degrading fermenting organisms live on an extremely small energy budget (less than one ATP equivalent per reaction run in total; Platen and Schink, 1987; Schink, 1997) which necessitates that these organisms use a different way of substrate activation. In the present work the anaerobic biodegradation of isopropanol and acetone by a pure culture of Paracoccus sp. and by a syntrophic methanogenic coculture (KN Ipr) from the Constance municipal sewage treatment plant was studied. First experiments indicate that Paracoccus sp. was able to convert isopropanol to acetone. Anaerobic degradation of isopropanol and acetone was measured in dense cell suspensions of a syntrophic methanogenic coculture (KN Ipr). Isopropanol or acetone was added at 10 to 15 mM concentration and was degraded to methane after 72 hours. Acetone activation by syntrophic methanogenic bacteria requires a new type of carboxylation reaction which can operate with less than one ATP equivalent. It is assumed that this carboxylation is catalysed by a membrane-bound enzyme system which receives the carboxylation energy through an ion translocation reaction, probably translocation of Na+-ions. Such a mechanism could operate analogous to carboxylation-dependent Na+-ion translocations in the fermentation of dicarboxylic acids. The results support the hypothesis that acetone degradation by these bacteria depends on Na+ and CO2 in a new type of substrate activation.

AG-Schink & Graduiertenkollegs Baden-Württemberg

GEOECOLOGICAL STUDIES OF *FAXINAL* SETTLEMENTS WITHIN THE ARAUCARIA FORESTS OF PARANÁ (SOUTH BRAZIL)

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The research focus lies on the geoecological comparison of rural *Faxinal* settlements on the different geologic basement formed by the highlands of Paraná. Surveying geomorphology and vegetation cover, but mainly concentrating on soil studies, an ecological sustainability assessment is implemented. Applied methods comprise remote sensing, GIS modelling, mapping of vegetation, relief and soil as well as chemical and physical soil analysis. Based on the assumption of different soil properties on quartz-rich gneiss, argillaceous schist or alkaline basalt, the three research areas are compared by their geo-ecological environment in reference to their individual social-economic background. *Faxinais* (pl. of *Faxinal*) are community based systems of mixed cultivation and wood pasture in the Araucaria forests that have principally served for self-supply of the early colonists up to recent descendants. Generally, all houses are located close to water courses in valley bottoms and lower slope positions. From there, the vegetation merges uphill from grass land to dense forest towards the limit of the pasture. Trenches or wire fences border the inner *Faxinal* and allow an extensive livestock husbandry. Minor agricultural plots are attached on upper slopes and hilltops outside the boundary marking the outer *Faxinal*. Today's economic necessities and social transitions provoke the disintegration of the *Faxinal* system in all its characters, amongst others leading to the deterioration of its ecological state. The outer *Faxinal* is threatened by large-scale industrial farming cultivating tobacco or soya beans, the inner area of extensive wood pasture decreases due to land sales and individual management of property sections. Consequently is the degradation of the quasi-natural vegetation of the Araucaria forest related to the loss of biodiversity, soil depletion and erosion as well as water pollution and shortage. Therefore, characteristic toposequences referable to soil catena and vegetative association under the influence of certain land use will be derived for every research area. On the basis of their comparison with each other, the project's objective is serving to assess the degradation process and to request a prospective action plan mitigating impacts on the human-ecosystem *Faxinal*.

THE REDUCED IMPACT LOGGING IN THE MANAGEMENT OF PUBLIC FOREST IN ACRE STATE, BRAZIL

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Keywords: RIL, Public Forests Management and Forest Certification.

The Acre state is located in the Amazonian region, in the western end of Brazil, doing border with the states of Amazonas and Rondônia and the countries Peru and Bolivia. The occupation of this area is directly associated to the use of forest products, being the rubber cycle and the rubber soldier symbols of the main occupation occurred in the region. Nowadays, the state is characterized by disposing of extensive areas with forest covering, as well as agricultural activities with low profitability. Inside of this panorama and with the objective of obtaining better life quality for the local population through the sustained development, the state of Acre, in partnership with international organizations as the Interamerican Bank of Development (BID) and International Tropical Timber Organization (ITTO), it is creating politics that has as base the use of the forests as catalyst agent of this development process and improvement of population's life quality.

The Public Forest of Antimary (FEA) is the first and the only one certified public area to provide products with origin guarantee attested by FSC. Many actions were developed to provide quality, ecological careful, economic profitability and social support to the forest management in this area. Since 2003 were logged around 25,000 m³ and in the year 2006 was 2,500 m³ of certified timber by reduced impact logging from FEA logged.

The FEA had about 47,000 ha and is recognized as the most studied “Unidade de Conservação” (Protected Area) in Amazonia. It had a relevant strategic paper inside of the construction of a new moment of forest section in Acre State, as well as in Amazonia, subsidizing the formulation of several proposes of development and forest arrangement.

Word University Service and Agência Brasil Alemanha

STATE FOREST OF ANTIMARY, MODEL OF CERTIFICATION FSC FOR STATE FOREST

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Keywords: FSC, Antimary, Amazonian, Certification

The area of the State Forest of Antimary includes 65.965,84 ha, located in the State of Acre, in the Amazonian Forest of Brazil. The exploration of the chestnut, *Bertholletia excelsa* and of the eraser, *Hevea brasiliensis* are the main sources of income of the resident families in the forest. The Plan of Handling of Multiple Use of State Forest of Antimary is made possible by a financing of ITTO, with association of the Brazilian Government. The implementation of the foreseen activities seeks to reach the general objective of the project: to motivate and to promote the long term development of forests of the Amazonian, as part of a politics of integrated use of the earth in the area, and defining the State of Acre as model. This development will be based on the forest management of resources for a maintainable production with purpose of elevating the living standard of rural population, collaborating with the prosperity of the State and elevating the wealth of the area, through the revaluation of the tropical forest. It is relevant to observe the technical, economical, social and environmental aspects, in way to harmonize the general objective of the project with the general strategies manifested by Governments, being introduced the forest certification as one of the tools of the civil association to promote the maintainable handling. However in the Amazonian area, the forest certification is in phase of its base consolidation, existing some problems that are being revised. Among them the lack of information of the communities can be mentioned about certification, their rights in the relationship with the certified company, fragility of the social movements to articulate, little participation in the processes of public hearings, social indicators do not are able to measure all social impacts, the professionals of certified companies have little ability to work with the communities, lacks of dynamism and agility of the social camera. To minimize those problems the government created an immediate action plan, until it was studied a better form of resolution of the same ones. Some proposed studies are: to establish criteria of compulsory nature of explanation of the communities of the public consultation; subsequent to the forest certification, explanation on the one that the company should accomplish; action more active of FSC in this process; to create a database of key entities in local level, state, national to do the articulation and to guarantee of a larger participation in the public hearing and in the whole process of forest certification; to refine the social indicators, to review the criteria of the process, monitoring and fiscalization besides of the relationship of social cost/earnings of communities, increase the time for accomplishment of the field evaluations between certifier and communities, develop mechanisms of dynamism of the social camera to give more agility, enlarge his composition and paper.

EVALUATION OF THE IMPACT OF AQUACULTURES ON THE WATER QUALITY OF THE RESERVOIRS OF THE SÃO FRANCISCO RIVER

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Keywords: Aquaculture, São Francisco, reservoirs, water pollution

The idea to build enormous aquacultures in the reservoirs of the São Francisco River comes in line with a worldwide growing demand for fish and the hope to create significant employment in the traditionally poor interior of the North East of Brazil. Main fish species is Tilapia, cultured in net cages. The impacts of aquacultures on the water quality are severe and nowadays processes of eutrophication occur in the São Francisco's reservoirs.

The emissions of aquacultures contain dissolved nutrients (nitrogen and phosphorus), which can cause eutrophication, and suspended solids (fish feed rests, faeces) together with associated micro organisms and create oxygen demands and sediment accumulation in the surrounding environment. Moreover, the residues of anthropogenic chemicals used in the production process (e. g. antibiotics, disinfectants, heavy metals in feeds, etc.) are also present in emissions.

Environmental impact of net cage systems is quantified and the carrying capacity of the reservoirs is discussed.

DAAD

SUSTAINABILITY IN THE AUTOMOTIVE INDUSTRY

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Germany is one of the most important automotive producer countries and among the international economical partners of Brazil, Germany is one of the most relevant. Significant amount of German companies are installed in Brazil, many of them are from the automotive sector and automotive supplier sector. Information about environmental and social aspects of some German plants of the automotive industry is available in printed reports or as files to download in the companies websites. Initial consultations to the available information of these companies have showed that the reports of the German plants are relatively detailed and wide.

About the environmental and social performance of the Brazilian plants are the data rare, both in the German and in the Brazilian websites of these companies.

This work aims to show the first results of a detailed analysis of sustainability reports from the principal companies of the automotive industry that have plants in Germany and in Brazil. It will be showed the weak and the best features observed and the first conclusions that can be derived from them.

REGIONAL DEVELOPMENT - THE WICKER IN CAMPO MAGRO, PR, BRAZIL

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Keywords: Regional development, alternative income, wicker production.

The regional sustainable development is one of today's biggest global concerns. In regions where the industrialization is precarious, because of lack of interest of investors, or because its localization or access, or because it is located in area of environmental protection, this concern becomes more evident. The city of Campo Magro has 275.466km^2 and is located in an environmental protection area, containing in his territorial area the subsoil water of Verde River and the subsoil water of the Passaúna River.

The city of Campo Magro was colonized by Italian immigrants dedicated to the agriculture, specially to the viticulture; from the beginning the city received the implementation of the wicker culture, product used for the confection of baskets for the harvest of grapes and of protection of wine's bottles; later, the hand craft improved for the confection of other objects such as production of baskets, decorative ornaments and furniture. Even though the usage of the wicker product increased between the craft men, the regional culture went in decline to the point of stopping and the commercial cultivation wasn't practiced any longer.

As of today, the wicker craft men do not possess land for cultivation. On the other side, the local farmers dedicated to potato, corn, beans and other farm produce, have been receiving low income, generating non sustainable situation due to the usage of pesticides in the farming, besides of having periods with spare labor and lands without productive usage.

The climate conditions of the region are satisfactory for the wicker production, recognizing the possibility of producing raw material to be used the local demand and replace the usage of the synthetic fiber and nature fiber exploitation. This project aims to preserve the local areas of environmental protection, regenerating the natural forest, increase the farmer's income with the culture of wicker and reducing the usage of chemical products harmful to the environment.

The wicker produced in the city of Campo Magro, as raw material for the craft men, is very expected by the consumers. The perspective of the competitive advantage as far as price and production of more sensible variety to the hand craft usage certify the position of the product in the local market.

COBRAL: CENTRE OF GERMAN-BRAZILIAN ACADEMIC COOPERATION OF THE UNIVERSITY OF APPLIED SCIENCES IN MANNHEIM

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Keywords: academic exchange, sustainable development focused projects, intercultural competencies, UNESCO, UN decade of education for sustainable development

Global students and academic staff members mobility seems to play a more and more important role in the educational world in front of a globalized economical scenery. With respect to a sustainable development of the global human society the academic exchange between faculties of the northern and the southern hemisphere should be more in focus than the traditional student exchange routes between continental Europe and the Anglo-Saxon countries. In order to facilitate academic exchange and to promote interdisciplinary projets on the field of sustainable developement the University of Applied Sciences of Mannheim[*] has established COBRAL (Centro de Cooperação Acadêmica Brasil Alemanha) as an institutional centre of German Brazilian academic cooperation.

COBRAL assists students, who want to spent one semester at one of six Brazilian partner institutions - or those Brazilian students who wish to come to Mannheim - organizes preparative or integrative programmes and facilitates the contacts between academic staff members and searches for possible joint research and development project-cooperation, with a focus on (social or technological) sustainable development.

These activities of COBRAL fit in with the efforts of the institution to enhance intercultural competencies as well and were awarded by UNESCO as official project of the “UN decade of education for sustainable development” in February 2007.

GIS-BASED SITE PLANNING FOR SEMI-DECENTRALIZED WATER AND WASTEWATER MANAGEMENT

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Fraunhofer IGB Stuttgart

Comparing water and waste water infrastructure in industrialized and developing countries, we find two situations: On one hand there is a well implemented, centralized system of drinking water supply, sewers and wastewater treatment plants, which to a large extent already require restoration measures. On the other hand low percentages of the population are barely connected to drinking water supply, even less to a sanitation system. Scarcity of natural water resources in many tropical and subtropical regions comes along. In both cases high capital investments for water infrastructure are becoming more important. The conventional centralized end-of-pipe system has to be reviewed and modified due to its ecological and economic consequences. Therefore Fraunhofer IGB searches for sustainable and integrated semi-decentralized water management concepts that allow for closing natural cycles of water, nutrients and energy.

The resources and demands of these compounds can be considered as spatial factors of a potential supply area, since they are influenced by both natural conditions such as climate, hydrology and hydrogeology and social conditions such as land use, housing structure and population density. The idea of this project is to analyse and quantify the spatial factors of a certain region in a GIS (Geographic Information System) and define decentralized resource potentials, taking into account options for water reuse, energy production and nutrient recycling. Thus resources and demands can be balanced e.g. by evaluating distance dependent costs in the GIS. Then a multicriterial decision analysis shall help to find the best options for sites and catchments of waste water treatment plants in the potential supply area. As test regions both urban and rural areas in Baden-Wuerttemberg, Germany, and in the Piracicaba river basin, São Paulo state, Brazil, are considered. The aim is to design a planning instrument for water infrastructure applicable to differently developed regions in the world.

EFFECTS OF WEATHER AND GENETICS ON INTRA-ANNUAL STEM GROWTH OF *EUCALYPTUS BENTHAMII* MAIDEN ET CAMBAGE

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Keywords: Eucalyptus benthamii, genetics, growth, dendrometer.

Eucalyptus benthamii Maiden et Cambage is being considered one of the most suitable eucalypt species for the establishment of fast growing plantation forests in frost prone areas of southern Brazil. This species is also performing well in Argentina, South Africa and China. *E. benthamii* naturally occurs in three populations in a small area located west of Sydney, Australia. Seeds collected in this region, were used to establish progeny tests in Santa Catarina State, Brazil. The field tests were planted in September 2002 following a randomized block design. Genetic differences at family level were detected for survival rate, tree height, diameter at breast height, volume and stem form, evaluated at the age of three years. This paper discusses the daily courses of stem radial displacement measured by electronic point dendrometers and how these are affected by changes in air temperature, relative air humidity, and soil water potential.

During sunny days tree stems show a distinct diurnal rhythm of expansion during the night and contraction during the day time. Diameter growth mainly occurs during cloudy days. In the period 31/10/-05/12/2006 daily average radial growth rate was ~2.5µm and ~3.3µm for the slowest and fastest growing family respectively. The average “radial growth path” is 18, *i.e.* in order to grow one unit in diameter the tree stems oscillate 18 units between radial expansion and contraction. On sunny days stem radial displacement is significantly related to changes in air humidity (+) and temperature (-), on cloudy days to changes in soil moisture potential (-).

ProBral - DAAD and CAPES

HORMONES IN THE ENVIRONMENT – QUANTITATION OF THE TOTAL ESTROGEN ACTIVITY OF WASTE WATER SAMPLES WITH A BIOASSAY

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Key words: estrogen-active compounds; organic pollutants; E-Screen assay; waste water treatment; elimination efficiency

Effluents of sewage treatment plants have been shown to be important sources of natural and organic trace compounds which due to their persistence enter the receiving waters and thus have a potential to interfere with the aquatic ecosystem. At present concern especially is focused on the potential pollution of surface and ground water with estrogen-active compounds. Even concentrations in the ng/L range were shown to induce biological effects. Some of these hormones and hormone-active substances for example are able to provoke reproductive disturbances in fish and other species.

So far only few *in vitro* assays suitable for the determination and screening of the total estrogen activity of environmental samples exist. In the present study the 'E-Screen-assay', a proliferation test based on the human estrogen receptor-positive breast cancer cell line MCF-7, was used for examining waste water samples. One aim of the study was to obtain sound data for reproducibility, measurement uncertainty and sensitivity of this bioassay. Secondly, the assay was used to determine the input/output balance of the total estrogen activity (which can be considered as summary parameter) in waste water samples of the municipal sewage treatment plant of Stuttgart-Büsnau, Baden-Württemberg, Germany (10.000 population equivalents). The efficiencies of the different steps of purification (e.g. mechanical/biological treatment) of the plant were compared.

The EEQ (estradiol equivalents) values determined in untreated raw sewage were between 12.6 and 72.7 ng/L (median 23.3 ng/L), whereas the value for the final effluent was generally less than 3 ng/L (median 1.6 ng/L). Mechanical wastewater treatment did not lead to any significant elimination. Biological treatment showed the highest efficiency in reducing estrogenicity (average removal rates generally greater than 90 %) with slight differences between the three independent biological treatment facilities existing on the plant. Further analysis of 24 h composite samples of influent and effluent over a period of eight days indicated a quite constant overall efficiency of the plant (average removal rate 92.2 %).

In summary, the high reproducibility, sensitivity and robustness of the E-screen assay as a tool to determine the total estrogen activity in environmental samples could be shown. As a practical example the assay was used to determine the effiencies of elimination of estrogen activity in the different steps of a sewage treatment plant.

EXPERIENCES FROM MULTIDISCIPLINARY FRAGMENTATION RESEARCH WITHIN THE BRAZILIAN–GERMAN COOPERATION PROGRAM - SCIENCE AND TECHNOLOGY FOR THE MATA ATLANTICA

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Keywords: Landscape ecology, Land use planning for conservation, Scientists and managers: bridging the gap

In Brazil, especially the Atlantic forest region, has been suffering the elimination and fragmentation of forested areas, land degradation and the extinction of species due to the expansion of agricultural lands and urbanisation processes. A multidisciplinary Brazilian-German scientific cooperation program "Science and Technology for the Mata Atlântica" has been established for a funding period of at least 7 years in order to provide a scientific basis and new tools for regional conservation management. The results of various studies at the Atlantic plateau of São Paulo on the effects of fragmentation and landscape configurations on vegetation structure, biodiversity patterns and population characteristics of birds, small mammals and amphibians are processed in different modelling approaches and are considered for the refinement and validation of new methods for the selection of priority sites for conservation. Our experiences show that international scientific cooperation programs may contribute essentially to the development of scientific based conservation planning providing a sound base and new decision tools for management. For an effective implementation of the results in applied conservation co-operations with NGOs and conservation administration have been established to facilitate capacity building, environmental education and the improvement of socioeconomic perspectives and land tenure of the local human population.

PROFICIENCY TESTING IN ANALYTICAL CHEMISTRY - CURRENT PRACTICE AND FUTURE DIRECTIONS

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Proficiency testing (PT) of analytical laboratories is one of the key measures for external quality assurance. For laboratories accredited according to ISO/IEC 17025 participation in PT schemes is obligatory. In the regulated area of water analysis (groundwater, wastewater and drinking water) in Germany PT schemes have been installed since 20 years, ensuring the quality of the water laboratories. Although the PT schemes are on the way to get extensively harmonized due to the development of international standards (ISO 13528, ISO 17043) there is still a need for improvement. Examples are the use of the internet for data transfer and the improvement of statistical procedures and software for the PT management. Last but not least the criteria for the assessment of results still need to be harmonized.

LAGOÃO DO OURO STREAM WATER QUALITY MONITORING, SANTA MARIA – RS, BRAZIL

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Keywords: water, urbanization, quality

This study had as objective to monitor the water quality along the course from Lagoao do Ouro Stream, inside the urban perimeter, tributary from the Vacacaí-mirim river, in Santa Maria – RS, between 03/2006 and 07/2006. To analyze this water, 5 sampling points were established along the Stream, being: 1° point in the source, at Residencial Novo Horizonte, 2° point in the beggining from Núcleo Habitacional Fernando Ferrari, 3° point in the end of Núcleo Habitacional Fernando Ferrari, 4° point nearby Rodolfo Behr Avenue (Santa Tereza Village) and the 5° point at Roraima Avenue, UFSM Campus entrance. After the collection, the samples were sent to the Forest Ecology Laboratory, from the Forest Science Department, at Rural Sciences Center to analysis of pH, amounts of Ca^{2+}, Mg^{2+}, NH_4^-, NO_2^-, NO_3^-, SO_4^{2-}, HPO_4^- and electrical conductivity. The pH values varied from 7.05 to 8.16, due to the domestic sewer ousting, containing fat, soaps, etc., and the electrical conductivity varied from 140.7 to 561 µS/cm. The content of Ca varied from 8.61 to 9.64 mg L^{-1}, and for Mg, the average content was 2.96 mg L^{-1}. The high contents of these nutrients in the water from the tributary, is mainly, due to the intense soy cultivation, with the soil preparation in total area, desagregating it and taking the nutrients inside water. The average ammonia content (NH_4^-) was 5.87 mg L^{-1}, this high value is caused by the cloacal sewer ousting in the Strem. For nitrite, the average content was 0.12 mg L^{-1}. The behavior of this element in water was punctually, happening in April (Point 2) and July (Points 2, 3 and 4), it is attributed to the presence of denitrificant bacteria, like *Pseudomonas putida* and *Pseudomonas stutezeri*, and it also associated to cloacal sewer oustings with urine from people which are infected by bacteria from the genus *Escherichia, Klebsiella, Enterobacter* and *Pseudomonas*, that in high amount in the urinary system convert the nitrate in nitrite. The average value for nitrate was 0.24 mg L^{-1}. This can be attributed to the intense development of microorganisms in the water, mainly heterotrophic bacteria, that show an average development of 6.5 x 10^4 UFC/ml. The chlorine showed an average value of 21.38 mg L^{-1}. This value is considered low, mainly because the pollutant sources are residentials. The phosphate had an average value of 0.92 mg L^{-1}, that can cause an uncontrolled phytoplancton development, causing severe damage to aquatic fauna. The average content of sulphate in waters was 14.74 mg L^{-1}. This value, probably, can be associated to degradation and leachate formation in the trash thrown along the Stream.

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MICRONUTRIENTS CONCENTRATION IN DECIDUOUS NEEDLES FROM *Pinus taeda* L., IN RIO GRANDE DO SUL, BRAZIL.

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Keywords: Micronutrients, *sustainability, Pinus taeda.*

Due to the importance of litter permanence on the soil to maintain the forest production sustainability, a significative amount of some nutrients return to the soil, and they could be absorved by the plants. The micronutrients concentration in deciduous needles from a 6 years Pinus taeda L. stand were evaluated, in Cambará do Sul county, RS, Brazil. The soil has a predominant eveness A horizon, with dark color, low saturation of bases and high contents of exchangeable Aluminium. The stand stablishment was done in winter period (1999), with a 3 m x 2 m spacing and without any fertilization. In similar site conditions, 3 plots (48 m x 50 m) were allocated, each one with 5 litter collectors ($1m^2$). All the material was collected monthly between April, 2005 and March, 2006. After each collection, the material was sent to the Forest Ecology Laboratory from the Federal University of Santa Maria, where was dried in an oven (75°C) until constant weight, weighed, milled and analysed for the concentrations of micronutrients (B, Cu, Fe, Mn and Zn). Among the different micronutrients, Manganese (1.307,69 mg kg^{-1}), was the one that showed highest annual concentration, followed by the Iron (208,03 mg kg^{-1}), Zinc (27,70 mg kg^{-1}), Boron (15,92 mg kg^{-1}) and Cupper (4,13 mg kg^{-1}). The higher concentrations of Mn and Fe are due to the high concentrations of these elements in the soil, causing toxidity to some species. But pinus plants, adapted to this condition, can have a good growth, that can be even better when fertilization and pH correction are done. Considering that the litter produced during the studied period was 4.724,3 kg ha^{-1}, the amount of micronutrients returned to the soil, in g ha^{-1} was: 6.106,46 of Mn; 963,18 of Fe; 125,6 of Zn; 75,00 of B and 16,98 of Cu. These values indicate that the permanence of this material on the stand soil is basic to maintain the forest site productivity for future rotations.

ECOLOGICAL ASPECTS OF FIRE IN THE CERRADO STATE PARK (PR), BRAZIL

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Keywords: fire ecology, fire effects, biodiversity conservation

The Cerrado is the second largest Brazilian biome. It is rich in biodiversity and extremely threatened, factors that included it in the list of hotspots, concept that establishes the most crucial areas for conservation all over the world. Fire is a frequent disturbance in the Cerrado and the comprehension of its actions and consequences over the vegetal and animal communities is fundamental for the establishment of an adequate management in protecting areas. The Cerrado State Park represents the southern limit of this Brazilian biome geographic distribution, being the last remaining well-preserved area of this ecosystem in the State of Paraná. The Cerrado State Park has a total area of 430 ha, and is located in the eastern center of Paraná. As the proper name of the unit suggests, it places itself in classic area of cerrado vegetation, represented by its distincts physiognomies. The Park shelters 40 species of mammals, 270 of birds, 45 of reptiles and 22 of amphibians. Both, the ecological role of fire and its effects are unknown in the Cerrado State Park. Fire without control could produce a devastating effect in this area. However, its exclusion without considering its possible ecological functions can culminate in such a way with the changing of the vegetation physiognomies, as well as the accumulation of biomass fuel, making the effects of a wildfire even more detrimental. The main objective of this work is to characterize the ecological role of fire in the Cerrado State Park, by an evaluation of the environment, correlating information on the biotic environment and the fire dynamics, aiming the biological diversity conservation. To reach this objective the fire regime is being characterize, the vegetation inflammability and the fuel material characteristics are being analyzed, the fire impact on the fauna is being determined and the fire risk map of the unit is being elaborated. Results of this research will make possible to insert elements related with the fire dynamics for the biological diversity conservation in the management plans of the conservation units.

CAPES & CNPq

NEW ENGINE COMBUSTION CONCEPTS FOR SUSTAINABLE DEVELOPMENT

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Keywords: new combustion concepts, homogeneous combustion, HCCI, CAI

The limited fossil fuel resources as well as the increasing global demand for energy, accompanied by the demand for emission and greenhouse gases reduction, affects strongly the requirements for future mobility. The internal combustion engine is still the most efficient technology to convert a fossil fuel into work, taking into account the trade-off of thermal efficiency to production cost. New combustion concepts for passenger vehicle engines allow for significant efficiency gains in combination with low emissions compared to today's Diesel and gasoline engines. Additionally, these new combustion concepts combined with smart engine control units are also able to run with Bio-fuels making them even more attractive.

The gasoline Homogeneous Charge Compression Ignition (HCCI) also termed Controlled Auto-Ignition (CAI) engine allows for significant efficiency gains in combination with extremely low NO_x-emissions when compared to conventional spark ignited combustion concepts. Extending CAI to lean mixtures renders low carbon monoxide and hydrocarbon emissions. The option to combine a lean operating direct injection engine with a simple exhaust gas after treatment system (three way catalyst) adds to the attractiveness of CAI.

The main challenge associated with CAI is the lack of spark ignition to phase combustion. In lieu of spark ignition the combustion phasing is achieved by precise control of the thermodynamic state of cylinder charge prior to compression stroke. Variable valve actuation in combination with gasoline direct injection are ideal levers to address this control problem.

On the Diesel engine, HCCI makes the engine run soot- and NO_x-free, what improves significantly air quality at the same time achieving even better fuel efficiency.

The internal combustion engine still promises significant fuel and emission improvements for a sustainable future.

PERFORMANCE OF THE BIOLOGICAL WATER QUALITY INDEX (BWQI), DEVELOPED IN 2004 FOR SOUTHERN BRAZILIAN RIVERS

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With reference to the use of biological methods for environmental monitoring, the Water Council Direction of the European Community recognized, in 1991, the potential use of bio monitoring techniques, adopting them as a key method to be used in water quality evaluation programs in Europe. In southern Brazil, the Biological Water Quality Index (BWQI), proposed in 2004 by Lobo and co-workers, appears as an alternative tool for environmental monitoring. This index combines the information about the relative abundance for each species, their saprobic values to organic pollution and indicative values to eutrophication. In order to determine the efficiency of BWQI, a comparative study with the main biological indices using diatom communities, developed mainly in Europe, was made. Thus, during the period of March 2003 to February 2004, monthly samples were collected in seven sampling sites, distributed into the upper, medium and low reaches of the Pardinho and Pardo rivers, RS, Brazil, totalizing 81 samples, which were cleaned using sulphuric and hydrochloric acid and mounted in Naphrax. In each sample, at least 600 valves were identified and counted. The biological indices calculated were: BWQI (Biological Water Quality Index, Lobo et al., 2004), PSI (Pollution Sensitive Index, CEMAGREF, 1982), TDI (Trophic Diatom Index, Kelly & Whiton, 1995), ROTT (Rott Index, Rott et al., 1997), BDI (Biological Diatom Index, Lenoir & Coste, 1995), SHE (Steinberg & Schiefele Index, Steinberg & Schiefele, 1988-91), SLA (Sladecek Index, Sladecek, 1986), DESCY (Descy Index, Descy, 1979), DAIpo (Diatom Assessment to Organic Pollution Index, Watanabe et al., 1990), CEE (CEE Index, Descy & Coste, 1989), EPI-D (Eutrophication–Pollution Index, Dell'Uomo, 1996), LMA (Leclercq & Maquet Index, Leclercq & Maquet, 1987), IDAP (Artois-Picardie Diatom Index, Prygiel et al., 1988), %PT (% of Pollution Tolerant Species, Kelly, 1988). The OMNIDIA version 4.2 software (Lecointe, 1993), was used for calculation of the indices, with the data base up-to-date in 2005. The PSI showed the best coefficient of correlation with the BWQI ($r = - 0.9222$, $P < 0.0001$), however the correlation between the TDI and the BWQI was also significant ($r = - 0.9048$, $P < 0.0001$). These results certified that the BWQI becomes an efficient tool for environmental monitoring in southern Brazilian rivers, particularly when compared with the PSI and TDI indices, considering references in European water quality monitoring programs.

FLUORIDE EXCESS REMOVAL FROM GROUNDWATERS USING ACTIVATED BONE CHARCOAL. A CONTRIBUTION FOR THE SUSTAINABLE DEVELOPMENT

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A High fluoride concentration in the water of artesian wells located in the Vale do Rio Pardo Region, Rio Grande do Sul State, Brazil, has been detected, being inadequate for human drinking purposes. In this way, the principal aim of this study was to develop a filtration system for the fluoride excess removal from groundwater, using activated bone charcoal, evaluating the physical, chemical and biological properties of the raw and treated water. The filtration system was constructed using different volumes of activated bone charcoal, fitted into a PVC tube and working with a discharge of 180  20 L h-1. The lifetime of this system was established into six months, according to the resolution number 518, from the Brazilian Ministry of Health, that limit the water fluoride concentration up to 1,5 mg L-1, indicating the stationary phase saturation. The results of the water quality monitoring indicated an increase in the concentration of some anions in the treated water, such us carbonates, phosphates, sodium, potassium, magnesium and sulfates, however, no problems were detected for human drinking. Regarding to the biological properties, no microbiological contamination neither toxicity of the treated water was observed. A technical manual for assembly, operation and maintenance of this filtration system was elaborated, in order to contribute to the Brazilian sustainable development socializing this technology for human water drinking purposes.

HISTORICAL LAND USE CHANGE IN BRAZILIAN AMAZON AND IT'S ROLE IN GLOBAL CLIMATE CHANGES

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The recent IPCC assessment report publication announces our planet is in jeopardy. The climate changes that were thought to be a possible problem in the future is now a real, immediate and statistically recognized problem that is deeply affected by human activities. Using available data of the scientific literature, in this study we discus the problem of the Amazon conservation and its relationship with the global warming. The main gas that is considered responsible for the augment of the green house effect is the CO_2. Before the industrial outbreak, the atmospheric concentration of this gas was about 280 ppm, but after it, in 2005, it increased to 379 ppm. However, a significant part of the CO_2 derived from human activities arises from diffuse sources that are difficult to measure. Scientists estimate that 25% of the total emissions are due to land use change. When analyzing other gases that are also responsible for the augment of the green house effect, the land use changes have an even more significant role. Historically, there are estimates that deforestation solely is responsible for 48% of the CH_4 and 33% of the N_2O emissions. In this context, the Amazon forest conservation has a fundamental role on the maintenance of the planet's climate conditions. Only in the Brazilian Amazon, there are more than 4 million km^2 of continuous forest, which has a storage of approximately 210 tons of carbon per hectare. According to current deforestation rates, the conversion of land use in the Amazon is responsible for approximately 3% of the global emission produced yearly. A great acceleration of the landscape transformations in the Amazon has been taking place over the last forty years. The total area of forest converted to other land uses overcomes 680.000 km^2, which is more than the sum of German and Polish territories together. Nevertheless, if compared with industrialized countries, Brazil's historical contribution to global warming is considerably less important. In addition to very low emissions from the burning of fossil fuels because Brazil's main energy source comes from renewable resources, this country is the one which has preserved its forest best, considering its whole territory. This scenario provides Brazil with a unique opportunity to develop and apply new management techniques to attempt to reach the sustainability of the region combining forest conservation with the country's economical development and the climate stability of the planet.

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REGIONAL DEVELOPMENT: AN EXPERIENCE THROUGH THE TECHNOLOGICAL MODERNIZATION POLE OF VALE DO RIO PARDO, RS, BRAZIL

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The science and the technology are associated to the existence of processes of constant improvement, aiming to reach quality, productivity and competitiveness in excellence applications. In this sense, it is known that the Universities have their fundamental role creating partnership relationships among the several organs of the society. Based on that, UNISC - University of Santa Cruz do Sul, in partnership with the Government of the State of Rio Grande do Sul, through the Secretary of the Science and Technology, created, in 1993, the Pole of Technological Modernization of the Vale do Rio Pardo - PMT/VRP, which has as its purpose the fomentation to the maintainable regional development, through the execution of research projects and extension and of the services of scientific and/or technological nature rendered, being the interface between the community's demands and the academic environment.

The PMT/VRP, along its 14 years of existence, has been reinforcing its image of catalytic agent of Science and Technology, being considered the accomplishment of approximately 220 research and extension projects in its three priority areas of performance, which are, Food, Environment and Materials. In the Food Area activities are developed in processes of production of foods; development and quality control of products; and agricultural diversification. In environment, activities are executed in administration for the cleanest production and clean technologies; effluents treatment; treatment of provisioning water; waste treatment; control of the air pollution; recovery of degraded areas; and environmental monitoring. In the area of materials, activities are emphasized in processes of production of materials; thermoplastic recycling; development and quality control; and studies involving blends and polymeric composites. Many of those researches solidified with passing of the years due to relevant partnerships with companies, municipal city halls, associations, cooperatives and financing organs.

Therefore, PMT/VRP is configured as indispensable element in the area of Vale do Rio Pardo - place where it is inserted - because it contributes in the definition of strategies and local priorities, in syntony with a science and technology Estate politics. In other words, it is constituted as an exemplary model for other areas, even out of the State of Rio Grande do Sul, as an interactive mechanism among the public section, the private section and University, that thinks and acts on behalf of the regional development.

ADJUSTING ALLOMETRIC FUNCTIONS FOR BIOMASS DETERMINATION OF *MIMOSA SCRABELLA* BENTH (BRACATINGA) IN SOUTHERN BRAZIL

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Mimosa scrabella Benth (bracatinga) is a tree species with pioneer character, occurring naturally in large parts of the native forest formations in Southern Brazil. Belonging to the family of the *Mimosaceae* the species is able to grow on rather degraded soils without fertilizing and therefore it is widely planted by small farmers with the goal of fuel wood production. In newer times the species was detected by wood industry as being interesting for higher value utilizations such as furniture and veneer production. Another interesting option for small farmers and rural populations to increase their income is to participate in carbon storage projects implemented in the mechanisms of the Kyoto protocol, allowing the negotiation with carbon credits. For this purpose it is important to know more about the biomass accumulation of the species.

The overall objective of the study was to adjust allometric functions to estimate biomass production of bractainga. The study area is located close to the city União da Vitória, at the border of the states Paraná and Santa Catarina. For the study a number of 30 trees were selected and felled. At the standing tree diameter at breast height (dbh) and tree height were measured. The felled trees were subdivided in 5 components, as there were: stem, living branches, dead branches, foliage and roots. The components were divided in the field and the fresh weight measured with a balance, afterwards the moisture content was analysed in the laboratory. For adjusting the equations for estimating dry biomass content of the 5 components the independent variables dbh, height, quadratic terms of these variables and also interactions between both were tested. For the different components models for estimating dry weight with high precision could be found, showing these coefficients of determination from 0.85 to 0.95 and standard errors between 17 and 34%. The outcomes of the study in a further step were used to determine carbon content of the species bracatinga.

LOCAL CULTURE AND ENVIROMENTAL URBAN SUSTAINABLE

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Keywords: Local culture, information and environmental sustainable

This work shows a study relating to the environmental and landscape considerations, showing some aspects of the many local cultures on the sea front at San Francisco, Charitas and Jurujuba in the city of Niterói, which is in the Metropolitan Region of Rio de Janeiro, Brazil. Niterói is located on Guanabara Bay, in the south of the State of Rio de Janeiro, opposite the city of Rio de Janeiro, the capital of the State. Rio de Janeiro and Niterói are connected through the Rio/Niterói bridge (the correct name is Presidente Costa e Silva bridge) and it is fourteen kilometers long.The quality of life in Niterói is highly rated (third place among 5.600 other cities in Brazil), according to UN.

Cosgrove and Tuan's thought records inserted in this work, referring to the relevant fundamental local codes, represent a link between the authors' proposals and the communities' cultures of the region under scrutiny.

These records aim to demonstrate the importance of the contribution of these codes contained in the local culture with regard to the urban achievements, as well as to support an important tool for the urban drawing," the cognitive perception process", that carries the understanding of our inter-relations with the environment, a practice that collaborates with efficiency to carry out the "environmental sustainability of the planet Earth" - as well as the preservation of life.

This study refers to the areas immediately contiguous to the coast that contain several attributes, offering one of the wealthier and more important sets of the natural ecosystems, whose preservation depends on the countless vital animal and vegetative cycles. These regions are hugely attractive and are being invaded on a large world scale and being affected in several temporal and space dimensions.

Concluding, an inserted outline illustrates the work content essence.

BIOLOGICAL ACTIVE COMPOUNDS FROM BRAZILIAN TRADITIONAL MEDICINAL PLANTS

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The “Farmacopeia Brasilieira” contains 42 medicinal plants which have been extensively described and which have a good scientific basis. However, more than 100 medicinal plants are already constituents in customary drugs and a much higer number has been used in the Brazilian folk medicine. This documents the high importance and reputation of drugs from plants in Brazil. Unfortunately, the effective compounds responsible for the biological effect are often unknown, but for a safe use it is necessary to increase the knowledge on their effects and side effects by intensive phytochemical and biological-pharmacological studies.

This task is undertaken in a cooperative network consisting of institutes from the Universidade Federal de Santa Maria in Brasil as well as from the Eberhard Karls Universiät Tübingen and Albert-Ludwigs-Universität Freiburg. The project has started in January 2007 and is financially supported by the goverment of Baden-Württemberg. At first this consortium is concentrating on Brazilian plants which are known for their antiinflammatory, antitumoral or antimicrobial effects to find out their active compounds and their mode of action. The scientific work will be done by Brazilian PhD students in Germany. First results will be presented in this symposium. Altogether, this project will contribute to increase the knowledge on Brazilian traditional plants and to build up or extend the postgraduate course of studies at the Universidade Federal de Santa Maria.

DETERMINATION OF ORGANIC CONTAMINANTS IN COMPOST AND DIGESTATE IN BADEN-WUERTTEMBERG, GERMANY

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A monitoring study was performed to get information about various organic trace pollutants in the output material of composting plants in Baden-Wuerttemberg. The compound classes selected were polychlorinated biphenyls (PCB), polycyclic aromatic hydrocarbons (PAH), polybrominated flame retardants and the endocrine disrupting nonylphenols. The concentrations of PAH were in the range of 1200-3500 µg/kg d.w., the concentrations of PCB were between 20 and 35 µg/kg d.w. For both classes of substances as a tendency lower concentrations could be found in green compost. Seasonal variations were observed for PAH, nonylphenols and DDE, a degradation product of DDT.

WATER MANAGEMENT IN DEVELOPMENT AREA

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Keywords: semi - decentralized wastewater management, rainwater, anaerobic treatment, recycling of nutrients

In a development area in Knittlingen, Fraunhofer IGB is showing what the future of water management might look like – in the context of the research project DEUS 21 (Decentralized Urban Infrastructure Systems) promoted by the German Federal Ministry of Education and Research (BMBF).

Following the ceremonial opening of the development area “Am Römerweg” in June 2004, work began with the establishment of the sewerage system and street plan. This was followed by the construction in autumn 2005 of a “water house” containing technology developed at Fraunhofer IGB. In the basement there is a vacuum plant, which since December 2005 has pumped off the waste water generated by the houses on the site. The pipes needed for this are appreciably thinner than conventional waste water pipes.

The rainwater from the neighborhood is collected in underground cisterns situated next to the water treatment plant. The rainwater is purified by ultrafiltration into soft “washing water” of drinking water quality, which is then fed back to the houses separate from the normal drinking water supply. The purification system is currently undergoing extensive testing, to ensure residents are not put at any risk.

Household waste water – together with comminuted biowaste, which is pumped in by vacuum – is treated in the water house in a semi-decentralized system. In contrast to conventional practice, since September 2006 the waste water has been directly purified by anaerobic microorganisms, with the generation of biogas and less sewage sludge compared to aerobic processes. The degradation of organic compounds present in the waste water does not even require thermoregulation. A rotating disk filter holds the biomass in the system and ensures a clear outflow, from which the nutrients nitrogen and phosphorus are reclaimed as fertilizer. This is accomplished by the combination of a natural ion exchanger and air stripping.

Over the coming years, valuable experience gathered at Knittlingen should enable the worldwide introduction of the DEUS 21 system as a model for the future.

CARBON STORAGE IN WOOD: FROM THE TREE TO DIFFERENT WOOD PRODUCTS USING *MIMOSA SCABRELLA* (BRACATINGA) AS AN EXAMPLE

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Keywords: carbon storage, solidwood products, bracatinga

Carbon storage potential of trees is seen as a possibility for reducing negative effects of CO_2 accumulation in the atmosphere, one of the reasons for global climate changes. For many tree species there are only a few data available for following the carbon fluxes of the whole forest-wood-chain. The study aims to use detailed information available about the species *Mimosa scabrella* (bracatinga), native to Southern Brazil, to analyse the carbon balance from the tree, over the different stages of processing, up to the final utilizations of the wood.

In a previous study carbon stored in the biomass of different compartments of this tree species have been analysed and equations to estimate carbon storage were developed. These models allow us to calculate the carbon balance for the production of the “raw material”, i.e., the tree growth. In a second step the tree is subdivided in different compartments according to their specific utilizations: stems for solidwood products, bark for energy purposes or remaining in the stand for nutrient retribution, wood of the upper tree compartments with diameters lower than 15 cm for fuelwood or particle board industry and finally twigs and litter that remain in the stand. For each step calculations about carbon stored in the wooden compartments of the trees are done. In the processing of stemwood for higher value utilizations significant wood quantities go to other utilizations, such as sawdust from sawing, sawnwood presenting defects or wane or cut log ends. Generally this material is used for combustion for energy production or further transformation of the derived timber industry, such as particle or fibre boards. The same might be true for wooden biomass of smaller dimension. Using average values of the industrial processes and material flow, carbon balances for bracatinga wood can be estimated with good precision, starting from the tree biomass produced, over the slash remaining in the stands up to the different wood products in the following wood transformation processes. The outcomes of the study allow first simulations about carbon stored in the biomass during tree growth and how much of it remains at the end in the wood based products sold at the markets.

CAPES - PROBRAL

THE WATER QUALITY MONITORING OF THE GARCIA HYDROGRAPHIC BASIN, BLUMENAU, SANTA CATARINA, BRAZIL

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Keywords: monitoring; water classification; parameters

The research encloses Garcia river, situated in Blumenau/SC, one of the main tributaries and sources of the Itajaí-Açu River, which presents innumerable ambient alterations, mainly due to the industrial development and the sped up process of urbanization. The work mentions the water monitoring of physicists, chemistries and biological parameters, made from 2002 to 2006 monthly, with 4 water collection points, which had been chosen considering the degree of ambient interference of the activities installed in these areas, and the place of water capitation for public supplying.

Amongst the eighteen analyzed parameters, five had been selected for the study, being: pH, turbidez, dissolved oxygen (OD), demand oxygen biochemist (DBO5) and fecal coliformes. According to CONAMA (Nacional Environmment Council) 357/2005 Resolution, we observed that the turbidez, pH and OD parameters had confirmed the framing established in Portaria GAPLAN/SC 024/1979, or either, first class for point 01 and third class for the others points, considering the correlation of the analysis results gotten from monitoring of each one of the collect points during the period. The more critical parameters values were DBO5 and fecal coliformes, and had reached until forth class, as the same Resolution.

Adopting an ampler analysis, ahead of the proven divergence the framing between Portaria GAPLAN/SC 024/1979 and the CONAMA 357/2005 Resolution, some parameters compromise the general framing of the hydrographic basin of Garcia. The raised values of DBO5 and fecal coliformes demonstrate the pollution indices caused, amongst others things, for the ousting of urban residues of domestic and industrial origin, culminating with the basin degradation and thus increasing the water quality problems, mainly for inexistent sewer collecting net for the sewer anaerobic treatment station (ETE) and the inefficiency of the individual systems. The analytical diagnosis of the basin water evidences: the inadequate use of the ground and the effect of the launching of effluent in the water body; its use limitations; and still its auto-purification potential. Ahead of the current condition, we need a planning for recovery this hydrographic basin and a study evaluating its reframing in accordance with Brazilian Resolutions.

ENVIRONMENTAL ZONING OF MARINGA COUNTY-PR, USING GEOGRAPHIC INFORMATION SYSTEM

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The purpose of this research was to develop an environmental zoning for Maringa County, Parana State – Brazil. The methodology used a digital database as a basement for a computerized system in order to make updates easier and faster. Analyzing steepness chart, soil type, geology and agriculture uses data, Maringa County was divided in five environmental units being them: unit I soil LR and geology JKsg, with steepness lower than 8%; unit II soils R and geology JKsg, with steepness higher than 8%; unit III soils LE on Arenito Caiua, with steepness varying from 5% to 12%; unit IV soil LR and TR on Qt, with steepness lower than 5% and unit V soils LR and TR on JKsg, with steepness lower than 5%. Unit II has restrict soil aptitude (3 ab), majoring agricultural usage; unit III has regular aptitude (2 bc), with pasture usage; unit IV has good aptitude for agricultural usage (1' ABC and 1'aBC) and unit V has good aptitude for agricultural usage (1' ABC and 1' aBC) mainly for pasture and agronomic crops. It was verified although for all units few riparian zones.

CAPES

ASSESSING PLANT DIVERSITY IN NATIVE FORESTS, WITH THE HELP OF AEROPHOTOGRAPHY – PRELIMINARY RESULTS

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The need for developing faster and efficient methodologies for the analysis of forest mosaics led to the use of aerial mapping. Nevertheless, this technique alone is less precise when a detailed analysis is needed. The union of processes of aerial mapping and forest inventory may permit a more detailed analysis of the forest area studied, without loosing the agility needed. This paper describes preliminary results of a forest structure made in two seasonal semideciduous tropical forest fragments with the help of aerophotogrametry, with the objective of assessing biodiversity indicator indexes for these fragments. The study areas are located in the central region of the State of São Paulo, Brazil, in a forest production farm, with approximately 100ha. The initial diagnosis was made using coloured aerial photographs. The field sampling was made by stablishing edge-interior transects in both fragments. An aerophotogrametry analysis with landmark of succession periods has become fulfilled. For the analysis of plant community the phytossociologycal parameters have been calculated for all trees taller than 1.30 m, beside diversity indexes (Shannon-Wiener, Simpson and Pielou's Evenness, using the Software Mata nativa.

CAPES

RESTORING NATIVE VEGETATION TO SECURE FIREWOOD, SOIL AND WATER

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Keywords: Reforestation, Firewood, Water Protection

Firewood is the basic form of energy for cooking for the greatest part of the rural population in the semi-arid region of Northeast-Brazil. An inquiry of IDER in a rural community near Itapipoca in the State of Ceará shows the critical situation, when 83% answered that there are degraded areas in their community, 84% extract firewood two or more times each week, and 50% have to collect firewood in more distant places than before. The wood species used for firewood are native pioneer plants which indicates, that the original forest has already been destroyed, leaving the clear-cut areas with pioneer vegetation that is not able to restore the original woods, because it is always cut down again before reaching the climax phase. The ecologic cooking-stove project of IDER includes not only installing more efficient cook stoves in rural homes, thus reducing the consumption of firewood about 40%, but also aims to restore the native woods in the rural communities. A reforestation project must be adapted to the local situation of soil, climate and native vegetation, but one of the most important aspects to lead to success is that the local population has to accept and support the idea of reforestation. If this is not the case, there is the risk that the areas in recuperation are used inadequately, e.g. as pasture for cattle, sheep and goats, thus destroying any effort of reforestation. To be accepted, a reforestation project should respect the local costumes, be simple, cheap, and involve the local people, offering products or environmental services of their interest. Planting fruit-trees on the area that is to be restored helps in the conservation of the area, for fruit-trees are accepted and protected by the local population. Restoring the native vegetation also protects the soil from erosion, especially on inclined areas, and protects the ground water, leading to more water in the local fonts and protecting them of drying out during the dry season. This means resolving a basic problem of the semi-arid region, where the fonts and rivers often fall dry completely during the dry season, especially where the vegetation of the water basin has been degraded. These positive environmental effects develop slowly, and often are not noticed immediately by the local population. Therefore, a reforestation project should include activities to stimulate the local population to observe these positive effects, thus increasing their conscience of the importance and value of the woods and of their responsibility to protect and restore them.

IDER and GVEP

REDUCED IMPACT LOGGING IN THE AMAZON: IMPACT OF DIFFERENT HARVESTING SYSTEMS

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Keywords: rainforest management, reduced impact logging, skidding operations

In Brazil we have a twofold situation of the claims made to the tropical rainforests in the Amazon region: on one hand people who live in the region want to make use of the land where they live, on the other hand it is a declared aim to maintain and preserve these natural forests and all the environmental benefits we obtain from it. However, reality shows us a high level of deforestation during the last two decades, transforming rainforests in other landuses as agriculture or cattle-breeding. One way to reduce ongoing deforestation would be to utilize the forest itself as a resource to generate income. Therefore it is necessary to manage the ecosystem in a proper, i.e. a sustainable way.

Sustainable forest management includes “reduced impact logging” (RIL), which means that all harvesting operations have to be conducted with lowest impact to the ecosystem as possible, since th tropical rainforests in Brazil are ecosystems which are very sensitve to any disturbance or human intervention. In Brazil there already exist some FSC-certified companies which manage their forests according to high level standards considering existing knowledge about sustainable forest management in tropical rainforests. However, there exists several different standards for logging operations that might be applied and recognized as beeing of low impact. The present study compared two generally recognized systems of RIL for its impact. The main objective was to compare a system of systematic opening of skid trails combined with cable hauling (tractor with a whinch) with one that was based on driving directly to each felled tree and hauling it with a skidder. The systems were analyzed and compared by digitalizing all available data and process them with help of a GIS-system. Skidding capacity and area driven over of both systems were compared and analyzed according to their economical and ecological impact.

PROMOTING SUSTAINABILITY THROUGH SOCIAL COMMUNICATION IN THE ORGANIC FOOD PRODUCTION UNIVERSE

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Besides health concept and quality of life, which are behind the organic system production, this system is a defense mechanism for the environment and for the revitalization of family agriculture. Nowadays, the issues about transgenic food and/or the ones grown in traditional manner, at the expense of our natural resources, which are not renewed, are in the mass media. This is the reason we believe that the practice of a differential journalism with its coherence and compromise to the sustainability of our planet makes the difference.

In Goias, we have a clear example of the possibilities offered by social communication's responsible actions. We are developing a positive experience of working with producers and consumers of organic food, through a project based on ethic and on social responsibility, which involves the members of the Association for the Organic Agriculture Development (ADAO-GO).

ADAO-GO acts primarily in the metropolitan region of Goiânia. It has the environment to defend the productive capacity of the soil as a goal, searching for an ecologic natural balanced, fighting against the use of agrotoxic and artificial fertilizers, and most of all changing the relation between consumers and producers.

The project intends to give visibility for the actions developed by ADAO-GO, as well as to propose, through communicative tools, ways of approaching producers and consumers, aiming a fair and balanced trade, resulting in a conscious consume.

IMPLEMENTATION OF A SOLID RESIDUE MANAGEMENT IN AN INK FACTORY

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Keywords: Residue – Management – Ink Factory

The industries and their productive processes are responsible for significant environmental pollution. Among those, there are the ink industries, whose products have considerable importance in the protection of surfaces for covering processes. This sector, as well as others, it uses resources and generates residues. The aim of the work is implant solid residues management system in an ink factory. The analysis of the process was carried through aiming at the characterization and quantification of the generated residues, demonstrating that 81.86% of the generated residue correspond to the metal, 7.9% of ink, 6.42% of resin, 2.02% of solvent, 1.41% of paper and 0.39% of plastic. During this work actions have been done for the segregation, reduction, reutilization, recycling and the definition of the final adequate destination of the residues, as well as the orientation and training of the collaborators. Besides the improvement of the environmental quality of the company, the administration of the solid residues permitted the acquisition of revenues with their commercialization for recycling, the development of a new product produced from the internal recycling of 90% of the residue of synthetic ink and their derived, attendance of a new consumer market, the improvement of the relationship between the company and its customers, as well as the awareness and the involvement of the collaborators with the environmental question. In the end of the work it was concluded that the studied company was able to reduce its environmental impacts and to become more competitive with regard to the market when considering the environmental variable in their decisions.

EXPERIMENTS AND MODELS TO INVESTIGATE THE INFLUENCE OF CLOUDS ON THE PHOTOCHEMICAL DEGRADATION OF METAMITRON IN AQUEOUS SOLUTION

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Keywords: metamitron, photolysis, clouds, STAR model

Photolysis of pesticides is one of the key parameters to assess their lifetime in the environment. To calculate lifetimes of organic compounds with respect to photolysis in the environment two main parameters are measured in the laboratory: a usually assumed wavelength independent quantum yield and the UV-spectrum. If light intensities are known besides these two parameters the rate constant and therefore photolysis lifetime of a compound is defined. However, only a few measurements for pesticides are known comparing calculated rate constants with measurements in the environment.

For polar pesticides with high water solubility the aqueous phase can be assumed to be homogeneous and quantum yields and UV-spectra can be used as obtained in the laboratory. However, often highly variable sun-light intensities circumvent a detailed calculation of rate constants. This is especially true considering the influence of clouds, usually decreasing photolysis-rate constants. Hence, for pesticides progressive summer values for clear sky scenarios are used to calculate lifetimes and effects of clouds are neglected.

We present on the poster measurement campaigns in 2006 and 2007 investigating the photolysis of the pesticide metamitron in aqueous solution as a typical polar pesticide and as model actinometer at two highly different locations in Germany (Lüneburg, 53.25 ^{o}N, 10.45 ^{o}E) and Brazil (Santa Maria, 29.68 ^{o}S, 53.80 ^{o}W). Besides meteorological data experimental results from these campaigns were used

- to compare lifetimes in the laboratory with lifetimes obtained in the environment
- to investigate the influence of clouds on the photolysis lifetime of metamitron
- to compare and to explain experiments with a model (STAR)
- to present a possible approach to include the influence of clouds and therefore to calculate for the first time the true photolysis of a polar pesticide within a seasonal cycle

Acknowledgement

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DETERMINATION OF POLYBROMINATED DIPHENYL ETHERS AND POLYCHLORINATED BIPHENYLS IN BREAM, ZEBRA MUSSEL AND SEDIMENT FROM LAKE CONSTANCE

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Keywords: polybrominated diphenyl ethers (PBDE), polychlorinated biphenyls (PCB), bioaccumulation, fish, mussel, sediment

Polyhalogenated aromatic hydrocarbons such as polybrominated diphenyl ethers (PBDEs) and polychlorinated biphenyls (PCBs) are persistent organic pollutants with a tendency for bioaccumulation dependent on their individual lipophilicity. Mixtures of PBDE have been used as flame retardants. In the EU PentaBDE and OctaBDE have recently been banned, but DecaBDE is still being used. PBDEs can enter the environment during manufacture, recycling of wastes and leaching from disposal sites. Because of their persistence and low solubility in water they undergo long-range atmospheric transport. PBDEs and particularly PCBs may exhibit toxicity to wildlife and humans through various mechanisms including neurobehavioral development and thyroid hormone levels. Despite a ban in Germany in the year 1989 PCBs still can be found especially in the sediments of big lakes. Recent examinations have shown that the concentrations of PBDEs are increasing in upper layers of the sediment.

In the present study 40 bream (*Abramis brama*) from Lake Constance, more than 1000 Zebra mussels (*Dreissena polymorpha*) and sediment from three areas of the lake were sampled from October to December 2006 and analysed by GC/MS for 11 PBDE and 77 PCB congeners. The aim was to obtain information on the present load, to compare the results with regard to the age of the fish and to get information about potential selective up-take and metabolism. The results show that the concentration of the analysed PCBs is far below the maximum limit (Schadstoff-Höchmengen Verordnung, Germany 1988) for freshwater fish. The median concentration of the six PCB 28, 52, 101, 138, 153, 180 in sediment was 14 µg/kg, in Zebra Mussel 27 µg/kg, in the filet of Bream 126 µg/kg, and in the liver of bream 890 µg/kg dry weight. The median concentration of 11 selected PBDEs in the sediment was 0.4 µg/kg, in Zebra mussel 5.0 µg/kg, in the filet of bream 8.9 µg/kg and in the liver of bream 77 µg/kg dry weight. Our investigation shows interesting results regarding congener specific bioaccumulation of PCB and PBDE, especially for BDE-100 and BDE-154. In addition, a correlation with the composition of technical mixtures could be revealed.

SUSTAINABILITY, CONSERVATION, AND REGIONAL DEVELOPMENT OF ATLANTIC FOREST REMNANTS – BRAZILIAN-GERMAN COOPERATION

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Keywords: Habitat fragmentation, vegetation structure, landscape structure, regeneration, plant-animal interactions

The main objective of this joint project is to elucidate the functional bases of the dynamics of forest fragments and to evaluate the sustainability and conservation status of rainforest fragments of different sizes by use of biological indicators in the northern Atlantic rainforest zone of Pernambuco state. The research area is the sugarcane plantation São José S/A in the municipality of Igarassu, 50 km north of Recife.

The main goal is approached on different scales. On the landscape scale, maps of the study area are processed using a geographical information system (GIS) and high-resolution satellite images. Connectivity indices, edge and core areas, and treefall gap frequencies are calculated this way to qualify the single fragments within the landscape context. Quantitative floristic inventories are conducted on the community scale for selected fragments of different sizes. Since these inventories were also conducted during the project's first phase, growth, mortality and recruitment can be calculated for the different fragments beside their α- and ß-diversity. Seedfall traps and microbiology parameters of the soils offer the possibility to understand the different seedling patterns in the different fragment size classes and different successional stages. The reproductive success of selected tree and understory species is studied on population level with respect to the fragments' size. The important stages of the plants' reproduction cycle, e.g., flowering, pollination, primary and secondary dispersal, germination and seedling establishment, are studied quantitatively. The plant-animal-interactions are evaluated from the plants' as well as the animals' point of view. Furthermore, the use of the flora by local people is under observation.

Working groups of the following four institutions are involved in this Brazilian-German scientific cooperation:
Universidade Federal Rural de Pernambuco (UFRPE), Brazil,
Universidade Federal de Pernambuco (UFPE), Brazil,
Empresa Pernambucana de Pesquisa Agropecuária (IPA), Brazil,
Universität Ulm, Germany.

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DENDROCHRONOLOGY OF SPECIES FROM BRAZILIAN ARAUCARIAN FORESTS

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Keywords: growth rings, precipitation, temperature, forest dynamics

The Araucarian Forest is one of the most threatened physiognomies from Atlantic Forest domain. It is estimated that only 0.7% of primary forest remains from original, highly fragmented. One of the limiting factors for sustainable use of these resources is the lack of knowledge of primary productivity, growth and the dynamics (natural regeneration, growth and mortality). A usual method used in temperate species is the interpretation and measurement of growth rings. In tropical and subtropical regions studies with growth rings are becoming more frequent, generating essential information to the understanding of the dynamics of tree species. In the present work the dendrochronological potential of six species of the Araucarian Forest is analyzed, all of them occurring in a humid subtropical climate. The trunks of 20 trees were collected in Candoi, PR, from an area that belongs to ELEJOR, Centrais Elétricas do Rio Jordão, from the following species: *Araucaria angustifolia, Clethra scabra, Cedrela lilloi, Ocotea porosa, Podocarpus lambertii* and *Sebastiania commersoniana* (3 to 6, from each species). The trunks were sawed, and a sample was taken from the center board, from bark to bark, crossing the pith, for macroscopic analysis. These samples were dried and polished, making possible the recognition and measurement of growth rings. Preliminary results show trees diameter varying from 14 to 40 cm, with age of 46 years, and 6.3 mm annual diameter increment, in average. The historical climatic data series were provided by SIMEPAR. The local data collection was initiated only in 1997. However, for a preliminary comparison, it was used a data series from Quedas do Iguaçu, PR. Although 150 km far from the studying site, it is also in the same humid subtropical region. It was considered the annual growth period from May 1st to April 30th as the module for the region. A strong tendency of correlation between growth and temperature was observed. There is also a tendency of positive correlation when comparing growth and the number of days with temperature above the local maximum average (18ºC) and precipitation of this period.

HEALTH ASSISTANCE RESIDUES: HOW TO CALCULATE IT CORRECTLY?

Institution: Municipal Town Hall of Santa Maria-RS-Brazil

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Keywords: residues management, health assistance

The Santa Maria Health Assistance Municipal Office renders services of public health, without payment, in 36 units, distributed in a net, in the town, with 277.000 inhabitants.

To keep the principles and the viability of the Brazilian Sistema Unico de Saude which are the universality of access, the free payment, the universality and integrality of assistance, as manager, we have the responsibility to improve the quality and reduce the costs and the environmental impact of our activity.

Aiming to organize the residues selection process, and reduce costs with the company which collects it, we have analyzed small, medium and large units of basic health , the municipal first-aid unit, the municipal drugstore, the popular drugstore and the centre of specialties, where there are the services of radiology and laboratory of clinic analysis.

Some interviews with the workers were done, as well as the evaluation of separation of each kind of residue and its respective containers and lectures with the SES Expert.

The black plastic bag is used for common residues and the white one for the contaminative.

It was observed that in all units there were no black plastic bags for the common residues, there were lots of 50 liters white bags, given by the company which processes the contaminative residues and that these are charged by liter. The perforating ones were suitably packed in all units.

The previous analysis showed that 30% of residues paid as contaminative were common ones and the residues weighing of one day, in each unit showed that the 50 liters bags, in fact, contained 20 to 30 kg of residues.

We concluded that it was worth for the company but for the Health Assistance Municipal Office it was a loss.

The corrective and educative measures are being implemented in the studied units and they will be extended to the others up to the end of 2007. The contract with the company is being revised, as well.

PROGRAM OF MAINTENANCE MANAGEMENT OF HOSPITAL EQUIPMENTS FROM HOSPITAL UNIVERSITARIO DE SANTA MARIA (HUSM)

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Keywords: Techno monitoring, hospital equipments, health assistance

Due to the advancement of methods of diagnosis and treatment, the hospitals have a great number of high technology and complexity equipments which demand permanent preventive and corrective maintenance programs.

These maintenance programs require data processing and communication to be executed and to give the users a better accompanying of the processes.

Up to 2006 all the HUSM Maintenance and Engineering were filled by hand. The routine of preventive maintenance was supervised by the user of the equipment.

Aiming to make the service agile and qualifying it, the HUSM Hospital Technology Support Group (GATH) developed software of management. All the equipments and accessories were identified with bar code labels and registered with the following information: manufacturer, seller company, date of purchasing, warranty period, training given to the team, section of use and maintenance contract.

When requiring the service, the user access the system, via internet, gives the bar code number, which enables the immediate identification of the equipment and/or accessory to a later description of the mentioned problem. After analysis, via Intranet, this request becomes an order of service to be executed.

The software allows the accompanying of the evolution of the repairing process and has 132 possibilities of report and index, making easier the analysis of processes by the Maintenance and Engineering Service.

The previous result showed a 60% reduction of repeated requests. These are monitored via Intranet with an average two accesses up to the repairing is done. The telephone calls to require and accompany the processes were reduced in 80%.

Besides the economy, the agility and user's satisfaction, the recorded data of each equipment with its corrective and preventive maintenance will allow the improvement of the purchasing processes.

ANVISA – AGÊNCIA NACIONAL DE VIGILÂNCIA SANITÁRIA

(NATIONAL HEALTH SURVEILLANCE AGENCY)

ANALYSIS MORFOMETRIC OF THE MICRO WATERSHED OF RIVER TAMANDUÁ - SÃO PAULO - BRASIL

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Keywords: microwatershed, morfometria, classrooms of declivity, conservation

The hidrográfica micro watershed is an alive cell of the nature, with important hidrological and ecological functions in the sustainable development. The headboard with important springs of the Tamanduá river, bes situated in the reverse of the Cuesta de Botucatu, region that composes the water-bearing Guarani. In such a way, it constitutes an appropriate environment for the planning, morfométrica characterization, I diagnosis and evaluation of the potential of the ambient services and the conditions of conservation generated by the use and handling of the natural resources. The objectives of this work are the morfométrica characterization of the microbasin with its classrooms of declivity, esteem the area of permanent preservation (APP) and to make inferences of the morfometria with the conservation conditions. The micro watershed is between the geographic coordinates: 23º 06' 15 " S 23º 08' 16 "' 55 " S and 48º 30' 30 " W 48º 32 W of Grw. In the georeferenciamento of the Letter of Brazil (IBGE, 1973), leaf SF-22-Z-D-II-2, scales 1:50.000, used GIS IDRISI RELEASE TWO, digitalizados in CartaLinx software. The measures had been made in the Autocad 2002 and Potoshop 5.5. The dimensional parameters had been: area (A) of the micro watershed, perimeter (P), greater length (C); bigger width (L); length of the main river (Cp); total length of the net (Cr). Referring the composition and standard of the draining net: number of segments of rivers of 1a order; bifurcation reason; frequency of rivers; draining density; extension of the superficial passage of torrents; texture reason. With regard to the relief: average declivity; relief reason; form factor. The results show that the micro watershed of the Tamanduá river is of 3ª order (w) and presents 10, 03 and 01 segments of rivers of 1ª, 2ª and 3ª order. Area with 5,09 km^2; perimeter of 11,06 km; density of draining of 2,17 km/km^2; area of permanent preservation of 0,69 km^2; total length of rivers with 11,02 km; frequency of 1,97 rivers rios/km^2; total length of the quotas with 54,51 km; greater and minor 640 altitude of 930 and m; altimetric amplitude of 290 m; equal average declivity 21.43%; factor of form of 0,25; reason of texture of 0,90; reason of 1,37 bifurcation; relief reason of 0,06; average distance of 230,74 m covered for torrents before finding a canal permanent. It concludes that the density of draining of 2,17 km/km^2, considered average and the micro watershed is of 3ª ramification order. The high declivities on average of 21,43%, allow to infer minor infiltration and greater superficial draining of the water of rains. The biggest area of micro watershed 45.01%, meets in the classroom of 20 - 45% of declivity, with relief strong wavy. The area of permanent preservation (APP) with ciliar vegetation in entorno of the draining is of 0,6904 km^2, with 13,57% of the total area, what it confers important ambient services and balance to the ripário ecosystem.

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GREEN CITIES: FORESTS IN MICRO WATERSHED URBAN

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Keywords: urban micro watershed, forest, water, biodiversity and global heating

The used physical spaces in the expansion of the cities cause impactantes transformations in the environment, due to absence of planning and antropofísicos factors created with the constructions and waterproofing of the ground. The negative transformations can be mitigated in the adoption of vegetal covering in the urban micro watershed. The objectives of this proposal are: the formation of forests of biodiversity and urban forests to attenuate the local and global heating; conservation of “green islands” and its ambient services of interest of the collective; the improvement of the local ambient conditions and the Planet; e quality of life of the communities. How to make? To consider the secretariats and ministries of the environment, under the coordination of the ONU, to the deep creation of a world-wide one for the formation of urban forests. Incentive to the secretariats of the cities to the implantation of ecological spaces and sidewalk with permeável material to the water of rains, forming local of recharge of the freático sheet, beyond other alternatives to brighten up the impact of urban floods. In the Campus of the UNESP, Botucatu, was implanted biodiversity forest, in 2006, with objective of research, academic extension and ambient education to the urban communities, serving of model to the proposals to stimulate the implantation of forests of biodiversity in all possible the public and private areas urban, as: degraded areas, university delinquents to the rivers, avenues and highways, squares, parks, campuses, at last green islands of interest of the collective as areas of permanent preservation and urban legal reserve. In the private areas the resetting of the legal reserve is disciplined in art. 44 of the Forest Code, with alterations introduced for MP 2,166-67/2001 (MONTILHA, 2004). Around the cities, to stimulate the implantation of urban forest as protection of biodiversity, against the local heating. To preserve the urban microbasins as tools of the sustainable development and protection of the biosfera for intermediary of tax incentives in the urban tributes. The forests act directly in the reduction of the temperature of the microclimate. They form “green islands”, play ambient services of common interest to the collective, as: the scene of the green landscape that harmonizes the relations of the man with the environment; it attenuates the thermal conditions in the green interface between the ways urban and agricultural; it shelters and it protects avifauna; it contributes in the carbon kidnapping, the redistribution and infiltration of the water of rains. In such a way, it can attenuate the impact of the water lack, floods and the local and global heating.

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ECOLOGICAL CHARACTERISATION OF STEEP TERRAIN FORESTS IN THE ENCOSTA ATLÂNTICA

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In 2006 two students of the University of Applied Forest Sciences, Rottenburg, both rock climbers, carried out ecological plant and soil research in steep terrain forests in the Encosta Atlântica in the Pró-Mata research area. It is probable that no human being has ever been in these steep terrains before. Some aspects and results of their research will be demonstrated on the poster.

ENVIRONMENTAL LAW STATE

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The present paper aims to discuss the possibility of materializing an Environmental Law State, which has the ideal of a fundamental duty of environmental protection and the necessity of partnership between the Public Power and the community. This research demonstrates that an Environmental State can only be turned into a reality if there is an ethic of partnership within society. Although it is believed that a conscientious approach to the environment, as well as a partnership between the State and the community needs to occur at a rapid rate, such changes can not alleviate the occurrence of catastrophes considering the 'unsustainable' way of human living. To further discuss this, this paper has been separated into three chapters. In the first chapter, the environmental crisis and the evolution of the State has been discussed, including the passing of the liberal, social and democratic right States, to aid in better understanding the concepts and characteristics of the Environmental Law State. The second chapter concerns the fundamental duty of environmental protection, illustrating that following the democratic right State, man kind left the duties behind and started only to ask about the rights. This issue demonstrates the difficulties that man kind faces in accepting their duties, even though they are fundamental to the Federal Brazilian Constitution and in infraconstitutional laws. The last chapter intends to analyse some partnerships that have already occurred because some laws have been written to integrate community participation into public decisions. This will enable the reader to think about the possibility of a new model of State and society.

BENTHIC FORAMINIFERA AS BIO-INDICATORS OF MARINE POLLUTION IN A HISTORICAL DUMP-SITE AREA, LÜBECK BAY, WESTERN BALTIC SEA

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Keywords: foraminifera, marine pollution, bio-indicator, baltic sea, heavy metals

Benthic foraminifera are sensitive tracers of environmental changes and have a great potential to monitor the anthropogenic impact in the shallow water regime. Here, we explore their response to the deposition and dispersal of strongly metal-polluted industrial waste that forms a substantial fraction of the local sediment. Samples were analysed for their content of heavy metals and organic contaminants. In this study two sediment cores (multi-corer) from a former dumping site in Lübeck Bay were examined. The samples originate from a waterdepth of ca. 20 m and consist of organic rich mud deposits. The zoobenthos (63 µm - 2 mm) was investigated (also with SEM and EDAX) both in the 40-50 years old contaminated sediment layer and in the over- and underlying layers. The main objective of this study was to analyse the benthic foraminiferal associations, especially how they react to the contaminants in the sediments and to what extent certain species of benthic foraminifera are suitable as bioindicators for pollutants. Furthermore, magnetic susceptibility was measured. Extensive geochemical analyses of the contaminated layer with increased contents of heavy metals and PAHs were previously published. These analyses document that the sediments from the area under discussion represent the most severe heavy metal contamination (hot-spot) of the southwestern Baltic Sea. The number of individuals shows strong variability depending on the core depth and grain size. The abundance of organisms between both cores varies more than one order of magnitude. The reason for this is probably due to large differences in the intensity of sediment contamination. The maximum abundance of organisms in both cores is situated outside the contaminated horizon. Furthermore, alterations of the calcareous foraminifera are much more frequent in the contaminated layer. The greatest number of altered tests of calcareous forminifera are found together with the maximum concentration of PAHs that are well known for their mutagenic and carcinogenic behaviour. The information provided in the present study allow the establishment of an ecological model, which regards the behaviour of foraminifera in polluted coastal areas of the Baltic Sea as well as their potential as pollution indicators. Gathering combined geochemical and geophysical data allows the evaluation of the eco-toxicity of pollutants within sedimentary succesions.

IFG and IOW

MORFOMETRIC OF MICROWATERSHED AGUA PALMEIRINHA

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Keywords: microwatershed, morfometric, GRASS.

The study morfometric of the microwatershed and its characterization of the area are important tools of diagnosis of the susceptibility to environmental degradation. The morfometric data was obtained from a eucalyptus plantation area in Lençóis Paulista, São Paulo State, Brazil, located among the geographical points 7480716 (N), 710297 (E) to 7475709 (N), 709871 (E); 7478591 (N), 708779 (E) to 7478526 (N), 711810 (E). The microwatershed includes 8,13 km² of total area, consisting of 74,30% of eucalyptus forest for wood production, 1,47% of unpaved forest highways and 24,23% of forest in areas of permanent preservation. The area has a perimeter of 12,51 km, factor in way of 0,35 and it was classified of 2nd order (Strahler, 1957). The elevation of the micro watershed varied from 610 to 735 meters, with medium elevation of 672,5 m. The total length of the level curves was of 107,42 km. The total length of the drainage network was of 5,91 km, with a frequency of 0,49 rivers/km². The drainage density was classified as drop (France, 1968), because it presented only 0,73 km of river for area km². The medium declivity was of 6,6%, the relief of the microwatershed was classified as soft wavy, according to EMBRAPA (1999). This way the microwatershed makes possible the agricultural exploration, mainly the production of cultures of long cycle, since conservationist practices are used in relation to the use and handling of the soil. The variables morfometrics, mainly declivity and drainage density, indicate that the current use is adapted and it presents low susceptibility to environmental degradation.

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SOIL LOSS ALONG FOREST ROADS NOT COVERED BY PAVEMENT

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Keywords: forest roads, soil loss, erosion

The aim of this work was calculate soil loss along forest roads not covered by any pavement. The experiment was carried out at an eucalyptus forest area located in Lençóis Paulista, São Paulo, Brazil, which is between Latitude 22°47'37.86"S and 22º48'29.74"S, and between Longitude 48°58'56.39"W and 48°49'28.16"W. Eight sections of roads were chosen totalling 1,240 meters in length with horizontal longitudinal surface variations (decline or rise) alternating between 0 to 15%. Transversal lines in the road direction were established in each 20 meters along each road space defining road soil loss. To each same imaginary transversal line was stretched a line of nylon connecting the original height of soil surface. The road bed depth was measured from the vertical distance of this line till the soil surface; those measures were taken in each 10 centimetres. The roads evaluated were builded between 31 and 34 years ago, but these periods hadn't correlation with soil loss. On roads with 7 meters of width an addition of soil loss was verified together the progress of declivity. An average of the roads with declivity under 3% showed a soil loss of 466,52 m³/km.year, roads with declivity between 3 and 5,9% lost 545,58 m³ /km.year, roads with declivity between 6 and 8,9% lost 753,31 m³/km.year, roads with declivity between 9 and 11,9% lost 807,14 m³/km.year and roads with declivity over 12% lost 1.052,28m³/km.year.

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SHORT-ROTATION FORESTRY WITH PINES IN BRAZIL

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Keywords: pine, plantations, management regimes, growth and yield, forest products

In the Brazilian forestry sector plantations play a major role in comparison to the low productive native forests. Forest plantations contribute to more than 60 % of the Brazilian wood production. In addition to hardwood species of the genus *Eucalyptus*, a variety of pines form the most important softwood basis for Brazilian plantation forestry with approximately 2 millions of ha. The main species are *Pinus taeda, P. elliottii, P. caribaea* and *P. oocarpa*. Experiments are ongoing with *P. maximinoi* and even some new performed hybrids are tested. *P. taeda* tolerates frosts but no hydric deficit, it is well suited to South Brazilian sites on higher elevations, showing the highest productivity of all pine species. *P. elliottii* , however, sustains moderate water deficit thus being more appropriate for transition zones to Brazilian savannas. *P. caribaea* and *P. oocarpa* are tropical pines which are well suited for the humid northern and drier north-eastern part of Brazil. The prevailing production goal in pine management in Brazil is sawn wood and pulpwood but increasingly stands are managed to produce timber for other uses such as particleboard (MDF), blockboard, laminated veneer lumber and laminated beams. Moreover, non-wood forest products such as resin can generate additional revenues. Management regimes of fast growing pines are characterized by rotation lengths of 15 to 25 years and 2 to 4 thinnings until the final cut. Yield estimations vary from 5 to 25 m^3 per ha and year. Genetic improvement programmes are used to optimize yield. The most important management system is clearcutting and reforestation by planting. On a small scale more complex silvicultural systems are being introduced, such as two-storied forests with pine in the overstorey and valuable native tree species in the understorey.

There is evidence that the supply of pinewood in Brazil does not meet the increasing demand for the next decade due to a strong economic growth and increasing wood consumption (so-called ‘apagão florestal’) in combination with insufficient afforestation activity.

Due to the outlined circumstances in the Brazilian plantation forestry sector the main perspectives of pine management in Brazil are:

1) Further optimization of yield due to genetic improvement,

2) Trend towards the production of high quality timber and towards more complex silvicultural systems, including thinning and pruning regimes.

BRAZILIAN AND GERMAN COOPERATION – IMPACTS ON FOREST SCIENCE

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Keywords: cooperation, forest sector, teaching and research

The cooperation between these two institutions has existed since 1963 when the Forestry Engineering Course of Curitiba was created (former National Forest School).

To create the National Forest School, the Federal University of Paraná received the FAO's (Food and Agriculture Organization of the United Nations) support, having as its project coordinator the German forest economist Professor Dr. Gerhard Speidel. Later on Professor Dr. Gerhard Speidel was called to take over the direction of the Forest Management and Economy Institute of Freiburg University where he made a remarkable performance in order to accomplish the cooperation between the two universities and to provide the qualification of Brazilians in Germany.

The cooperation's first activities were done from 1971 to 1981 when many Brazilians had the opportunity to take their PhD mainly at the Forestry Science Faculty in Freiburg University. At the same time, some German professors and young scientists were sent to Curitiba, to work in specific areas of the course and to join the laboratories' infrastructure, study plan structure, evaluation, teaching and researching.

During the cooperation, significant advances were achieved as for instance, integration between research and forestry and lumber science practice.

After finalizing PhD in Germany, the Brazilians that returned to Curitiba took over the teaching and researching activities, which were being done by the German scientists.

The cooperation purpose was fully achieved. The Forestry engineering course became an outstanding center, which has contributed through its programs to generate human resources and cooperatives with other similar courses in Brazil and in some other neighboring countries as well. The permanent and intensive cooperation between scientists from these two institutions has guaranteed the interchange in the last years. The cooperation persisted many years without a continuous financing, which is due to its strong social and scientific relationship. From 2000 on the cooperation was again officialized as a so-called "second phase". Nowadays it has been possible to carry out research projects, orientation and co-orientation in the under graduation and graduation courses due to the excellent laboratory infrastructure and study plans in both countries.

The coordinators in Curitiba and Freiburg recognize excellent perspectives through the UNIBRAL and PROBAL programs, which will enable to continue this relationship in researching and teaching.

DAAD and CAPES

UNIBRAL COOPERATION

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Keywords: UNIBRAL, student exchange, Brazil, Germany

The UNIBRAL cooperation programme in Forest Science between Curitiba/Brazil and Freiburg/Germany has been running very successfully from 2002 to 2005 and we are very pleased to be able to continue this student exchange in 2007 since there are always a lot of interested students asking for a possibility to study in Brazil with such a stipend (financed by the German Academic Exchange Service (DAAD) and its Brazilian partner organisation CAPES).

Up to now about 25 students participated in the project and spent one or two semesters at the partner organization. They had thoroughly prepared themselves for this adventure and taken language courses at home in order to be able to survive and profit from the lectures abroad. Most of them managed very well to cope with student and everyday life and got quickly used to living in a foreign country. They enthusiastically reported about their stay as a very fruitful time permitting them to broaden their mind and to get to know different ways of thinking – not only in technical or scientific aspects. The same is true for Brazilian students who adapted themselves very quickly to German conditions and were well integrated. All of them would not want to miss this exciting time and willingly spoke about all the benefits which this stay will have on their future development. UNIBRAL-students are keeping contacts and even continue their international experience for instance as students in the European Master of Forestry programme.

Although UNIBRAL is focused on student exchange, it has of course to be prepared, accompanied and evaluated by professors and scientific collaborators. Therefore post-docs and professors are also involved in the exchange and travel abroad in order to promote the intensive cooperation between both faculties, to maintain the existing partnership and to adapt the exchange programme to the new bachelor/ master studies in Freiburg. Their exchange improves the quality of teaching on both sides and stimulates joint research. All of them are eager to cultivate our good relations.

UNIBRAL DAAD and CA

FEEDSTOCK RECYCLING OF WASTE PLASTICS BY LOW TEMPERATURE CONVERSION

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Keywords: waste plastics, LTC, catalyst, Y-zeolite, WEEE

In recent years polymeric materials show increasing utilization. They are found as casing of electronic appliances, automotive and packaging plastics as well as raw material of choice for bottles and tubes. Sustainable manufacturing processes reuse plastics scrap which is free of impurities in the same manner as virgin plastics is used. With other plastic wastes several products with less demanding performance characteristics (park benches, bags) may be produced. However, there are several restrictions. The European Union Directive on the Restriction of certain Hazardous Substances (RoHS Directive) bans further utilization of specified chemicals in electrical and electronic devices. Among others, flame retardants such as polybrominated diphenyl ethers (PBDEs) are no longer allowed to be put in circulation. The Directive of Waste from Electrical and Electronic Equipment (WEEE) deals with recovery, sorting and treatment of non-compliant products. In this context investigations on polymer catalytic cracking to produce hydrocarbon based fuels were initiated. Substrates are homopolymers such as polyethylenes (PE) and polypropylenes (PP) as well as blended polymers, e.g. acetyl butadiene styrene (ABS) and polypropylene (PP). Dealuminated Y-zeolite (Wessalith, Si/Al>100) and catalysts based on equilibrium FCC-zeolite catalyst (Grace) with high macro- and microporous surface area (>700m^2/g) were used in a batch reactor. Plastics scrap catalyst are heated to reaction temperature (400–550°C) under exclusion of oxygene. Organic vapours formed are carried by nitrogen through a catalytic bed in the upper part of the reactor (fixed bed at 400-550°C). Catalyst activity decreases with degradation time. Catalysts are regenerated in presence of oxygene at 600°C. Yields of liquid hydrocarbons as high as 84% could be achieved from PP and 73% from PE at 400°C. Mixture of ABS and PP gave a yield of 60% at 550°C. Kinematic viscosities (40°C) of liquid hydrocarbons range from 0.8 mm²/s to 2.0 mm²/s, depending on substrate and reaction parameters. Net calorific value (NCV) of oil from PP is 42.5 MJ/kg, NCV of oil from PE is 43.1 MJ/kg. Hydrocarbons produced where characterized by FTIR, NMR and GC-MS. For comparison: NCV(fuel oil) = 43 MJ/kg. Chromatographic patterns of liquid hydrocarbons are similar to diesel respectively fuel oil. Infrared spectra (FTIR) of oil from PE and PP show significant signals around 3,000 cm^{-1} due to typical groups for hydrocarbons (-CH, -CH_2, -CH_3). Signals around 3,350 cm^{-1}, which are significant for –NH –OH-groups cannot be found as well as signals in region of 1,700 cm^{-1}, characterizing carbonyl groups in case of oil from PP. ^{1}H-NMR, ^{13}C-NMR and ^{13}C-Dept-NMR aliphatic protons pravail. Based on these results in laboratory scale a pilot-scale cracking reactor with continuous feeding will be designed.

SOLID PRODUCT OF LOW TEMPERATURE CONVERSION AS FERTILIZER

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Keywords: fertilizer, LTC, biogenic, sewage sludge, meat and bone meal

Low Temperature Conversion (LTC) of biomass from microbial, animal resp. vegetable biomass is conducted under exclusion of oxygene in presence of in-situ-catalysts at temperatures of 380 to 450°C. Main product of Low Temperature Conversion are liquid, mainly (≈95%) aliphatic hydrocarbons (LTC-Oil), emerging through separation of oxygen, nitrogen and sulfur from complex organic compounds, in particular fats and proteins. These compounds are converted and driven out by heating in presence of in-situ catalysts, and are subsequently condensed together with evolving reaction water. Low molecular hydrocarbons such as propane, butane, as well as permanent gases (CO_2, CO, NH_3) are leaving the LTC reactor in gaseous condition. Remaining substance is a carbon-containing solid product. Biomass phosphorus content is found here (10 – 27% P_2O_5), but also undesired heavy metals (dependant on substrate). The latter is restricts the usability of solid product as fertilizer. The poster shows the results of a pot experiment with LTC solid residues from four sewage sludge samples and one meat and bone meal sample, stemming from different low temperature conversion experiments. The five provenances were tested in a low (1g P_2O_5/pot) and a high (3 g P_2O_5/pot) application rate each in comparison to corresponding mineral fertilization (N, P, K, Mg, S), conducted with Deutsches Weidelgras with 4 crops. All fertilizers were mixed in the soil in advance. Because of high demand of the gras species an additional K-fertilization was applied in all variants (as well in the “not fertilized” variant). Measured on mineral fertilization a worse effect is shown for all LTC-solids, nevertheless comparable to other organic fertilizers. In the lower application rate the relative effect was better than in the high application rate. In the latter case an increased aftereffect is expected with longer vegetation time. Under the macro nutrients especially the high S contents of growth is worth mentioning, exceeding equal contents of mineral fertilization considerably. The P contents were reaching of 65 to 95 percent of comparable fertilization with triplesuperphosphate (TSP). A critical point for utilization as a substitute for fertilizers is the heavy metal content of the solid products. All five provenances were exceeding limit values of the German Biological Waste Directive concerning copper- and zinc concentrations significantly, the four samples derived from sewage sludge, additionally were showing cadmium- and partly lead resp. nickel concentrations. Chrome an mercury were unproblematic. Before applicate the solid product routinely as fertiliser, it will be unavoidable to lower the heavy metal content by either severe selection of solid product or reduction by downstream processes.

BRAZIL: DECENTRALIZED WATER- AND WASTEWATER MANAGEMENT - ADAPTATION OF PROCESSES TO SUBTROPICAL COUNTRIES

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Keyword: decentralized wastewater management, optimization of treatment plants, production of biogas, digestion of organic waste

South American countries have an enormous need of well functioning wastewater treatment systems, particularly in the densely populated regions. In many cases sewer systems already exist, but the implementation of treatment plants is missing, which in the majority of cases is caused by financial problems. Consequently, at the present time, just 10 percent of wastewater in the major South-American cities is treated. This results in pollution of lakes and rivers, and limitations on water supply. As an alternative to large, expensive, centralized treatment plants, decentralized solutions are being considered in many cases.

Cooperation project in the basin of the river Piracicaba

In Piracicaba, a city with a population of 320,000 in São Paulo State, Brazil, about 35 percent of the people are connected to wastewater treatment systems. The city is pursuing ambitious plans, and aims to have all its inhabitants hooked up to treatment plants in a few years. Most of the existing treatment plants are relatively small and are situated in the urban area. The principles used are suited for rural regions, e.g. lagoas, wetlands, septic tanks. This resulted in a number of problems, the solutions to which are being sought in cooperation with the Fraunhofer IGB.

In the city of Americana, located about 40 km from Piracicaba, more than 75 percent of the population is connected to two treatment plants. But the efficiency is low and there are some problems to be fixed in the future.

A cooperation project between the Brazilian and the German partners is partly financed by the German Ministry for Education and Research (BMBF).

It consists of several tasks as

• development of adapted techniques: decentralized processes for urban areas

• evaluation and optimization of existing treatment plants

• construction and operation of a pilot plant for wastewater treatment

• construction and operation of a pilot plant for digestion of organic waste

The partners involved in this project are UNIMEP, SEMAE Piracicaba, DAE Americana, MAXX GmbH, Fraunhofer IGB. In this paper the current results of the cooperation project will be presented.

ACHIEVING SUSTAINABLE USE OF ENERGY IN AN ACADEMIC OFFICE ENVIRONMENT BY MEANS OF MIXED-TYPE INTERVENTIONS

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Keywords: efficient use of energy, psychologically motivated interventions

Energy waste is one of the driving forces of climate change. In addition, the expenses for resources like electricity, energy for heating/cooling, and water are increasing, challenging many public institutions, including the University of Freiburg. However, the efficient use of energy has to be accomplished without imposing strict restrictions on employees or lowering the level of convenience in the offices too far. For selected buildings of the University of Freiburg, the "Working Group Sustainable University" addresses this problem. As a bonus, project participants are allowed to make free use of 100% of the money they save compared to the 2003-05 mean values.

In this paper, we focus on one of the pilot institutions, the Institute for Psychology, which has made considerable effort to reduce energy consumption. However, this is still work in progress.

In our project, several approaches have been used and proven to be successful: At the outset, a model of energy consumption was established. This model served to identify areas which consume a lot of electrical power; and it also helped to identify and assess the effects of interventions with the help of simulations. The IT infrastructure turned out to be one of the most prominent areas to save energy as it accounted for approx. 60 % of the institute's total electrical power consumption prior to our intervention. Today, only some 10 PCs are operated around the clock which represents a reduction by 90 %. It should also be noted that power consumption is an important factor to consider in the acquisition of new technical equipment. For example, by taking into account power consumption a cheap PC or printer may turn into an expensive one after some months. Further, adjusting the timers and preset profiles of the technical equipment resulted in considerable savings, e.g. by switching off the lecture hall heating during term breaks. Changing the behavior of the people using the buildings was another major focus of the project. Numerous types of interventions (e.g. emails, WWW, hints, FAQs, prompts, posters, multi-media) with the aim to inform users about energy saving options were implemented and evaluated. The project is heavily supported by the staff and students. For example, removing the PCs from power after shutting them down, in order to avoid standby power consumption, is now common practice.

As a preliminary result of our interventions at the Institute for Psychology, we were able to reduce electrical power consumption by approx. 25%. Even taking into account the high temperatures during the last winter, a saving of 30% of energy for heating was achieved.

ANALYSIS OF THE FOREST FRAGMENTATION IN THE BUFFER ZONE OF CONSERVATION UNIT IN RIO GRANDE DO SUL STATE (BRAZIL)

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Keywords: Forest, biodiversity, fragmentation, Indian area, Brazil

The landscape fragmentation is one of the main causes the forest is becoming isolated into separate fragments. This is causing difficulty in transferring genetic material within flora and fauna species. The area being studied is located in the Northwest Region in the Rio Grande do Sul State, border with Argentina and the Santa Catarina State. Images were obtained from the satellite CBERS in 2004 and were processed with Idrisi, getting the classes of the soil use: forest, anthropic and water. The interest area includes the Forested State Turvo Park (FSTP), the Indian reservation of Guarita, Nonoai/Várzea, Serrinha and Votouro and also Vicente Dutra and Iraí. The areas required an additional Buffer Zone (BZ) of 10 kilometers. The total area included is 609,600 ha, which 153,290 ha (25.15%) cover with forest. From this area it was excluded the FSTP and the Indian reservation resulting an area of 516,323 ha where it was carried out an analysis of landscape fragmentation using Fragstats. There exist anthropic activity on 402,154 ha or 77.85% of the area and 104,864 ha (20.31%) of forest. 33,675 ha (6.52%) from the total area of BZ are permanent preservation areas (PPAs). Only 3,188 ha (9.46%) of these areas agree with the legislation. Considering that legislation stipulate a minimum 20% of legal reserve, besides the PPAs, it was verified a deficit of about 30,000 ha of forest. In the studied area there exist 73,928 stains, totaling fourteen (14) stains per 100 ha, evidencing the landscape fragmentation. From these stains, 60,613 (82%) are forest fragments, being 12 fragments per 100 ha. A higher number of fragments seem to be important, however, many fragments signify a reduction in their sizes, not having ecological support. The medium size of forest fragments is 1.7 ha. When 50 meters of border are considered, it leaves less than 25% of the interior region, being border more than 75% of the total area of fragments, of the 60,613 forest, 14,408 show fragments. From the 60,613 forest fragments, 14,408 show areas of the interior, the rest consist of border. The average area of the interior of the fragments, when considering all the forest fragments, is 0.39 ha and, when considering only the fragments that show interior area, is 1.64 ha. The results show the need of a politic of supporting use from BZ because the forest fragmentation show that flora and fauna species are being isolated and this may brings irreversible harms to the regional biodiversity.

SEMI-DECENTRALIZED MEMBRANE BIOREACTOR PLANT HEIDELBERG NEUROTT

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Obvious drawbacks of conventional sewer systems and huge centralized WWTPs have initiated the development of sustainable and profitable alternatives. The installation developed at the Fraunhofer IGB, Stuttgart and constructed in the village Heidelberg-Neurott for the first time demonstrates an advanced type of wastewater treatment plants based on membrane filtration.

The membrane bioreactor plant of Heidelberg-Neurott features, firstly, the first large-scale application of the rotating disk filter. The rotating disk filter developed at the Fraunhofer IGB is a dynamic membrane filter consisting of a stack of rotating membrane disks. The membrane material is preferably ceramic as it guarantees high endurance due to chemical resistance and high specific filtrate fluxes. The membrane bioreactor plant of Heidelberg-Neurott was built in summer 2005 and was set in operation in september (see Figure 1).

Secondly, the preliminary sedimentation as well as final sedimentation are substituted by a microfiltration membrane. Thus, preliminary filtration serves to separate the raw wastewater into two different flows. A solid-free and carbon-poor filtrate is channelled into the biological purification stage for further nutrient removal and ready for reuse as service water or irrigation. The particle-rich bleed is collected and transported into a digester for the production of energy. The process scheme of the membrane bioreactor plant Heidelberg-Neurott installed in the former equipment house of the local fire brigade is depicted in Figure 2.

Thirdly, the plant features compact construction and is designed for automatic operation with little maintenance. The basis of compact construction is the separation of stormwater and domestic sewage.

Results demonstrating the extremely high effluent water quality of the membrane bioreactor plant of Heidelberg-Neurott including COD, Ammonia, Nitrate and Phosphorous are presented. Profitability and technical efficiency of the rotating disk filter is depicted.

High–tech systems for urban wastewater treatment will have a significant impact on future urban sanitation. Semi-decentralised systems are combining the advantages of central WWTPs concerning their technical standard and decentralised systems concerning their sustainability and flexibility. The demonstration project in Heidelberg-Neurott treating domestic sewage shows its suitability for urban sanitation due to its compactness, high filtration fluxes and effluent water quality.

BROMELIAD FAUNAS IN THE ATLANTIC FOREST – MODELS FOR STUDYING DIVERSITY, INTERACTIONS AND ECOSYSTEM PROCESSES

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The diversity of the bromeliad associated fauna and the interactions between animals and plants have been studied in a joint research project in southern Brazil since 2003 as part of the Brazilian-German program “Science and technology for the Atlantic rainforest”. Plants of the family Bromeliaceae constitute a characteristic and abundant element of Neotropical forests. These plants are linked to a huge number of animal species by a wide variety of relationships. The associated fauna comprises numerous invertebrates – mainly insects – but also some vertebrates, namely frogs and birds. Animals use bromeliads as breeding sites, feed on plants parts or floral resources or hunt for prey between its leaves. Here we summarize the most interesting results from the first project phase and describe our ongoing research in the second project phase. Our findings demonstrate the important role of bromeliads in maintaining local biodiversity and ecosystem processes. In the second project phase we will analyze the importance of bromeliads in sustaining flower visitors and pollination, a key ecosystem service in tropical forestry and agriculture. Furthermore, the suitability of bromeliad faunas as bioindicators of forest quality will be tested.

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