



BOOK OF ABSTRACTS

AMAZONIA - INTEGRATED MANAGEMENT FOR SUSTAINABLE DEVELOPMENT

September 29 to October 04, 2013

**Universidade Federal do Oeste do Pará
Santarém – Pará State – Brazil**



EBERHARD KARLS
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Baden-Württemberg International



Universität Stuttgart



6° Simpósio Brasil-Alemanha

Desenvolvimento Sustentável



29. 09. - 04. 10.2013

6. Deutsch-Brasilianisches Symposium

Nachhaltige Entwicklung



Book of Abstracts

**Universidade Federal do Oeste do Pará – UFOPA
in collaboration with
Baden-Württembergisches Brasilien-Zentrum
der Universität Tübingen,
Baden-Württemberg International and
University of Stuttgart**

**Location:
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Federal University of Western Pará

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FORWORD

It's our great honor and pleasure to welcome you to **UNIVERSIDADE FEDERAL DO OESTE DO PARÁ – UFOPA** to attend the **6th BRAZILIAN-GERMAN SYMPOSIUM FOR BIODIVERSITY AND SUSTAINABILITY** being held between September 29th and October 4th 2013 in the city of Santarém, Pará, Brazil, in collaboration with **Baden-Württembergisches Brasilien-Zentrum of University of Tübingen, Baden-Württemberg International and University of Stuttgart** from the Federal Republic of Germany. Despite being a new university, **UFOPA** has conducted several meetings, symposia and regional workshops. Throughout the realization of this symposium, UFOPA seeks to demonstrate the need to include the Amazon region within an international forum of this magnitude, to discuss an issue as important as the biodiversity and sustainability at regional level. Moreover, it is impossible to talk and discuss the sustainability of ecosystems and biodiversity in the world, without including the Amazon region. For some famous naturalists in the Amazon, such as Bonpland, Darwin, Humboldt, Orellana, Roosevelt, Spix, Martius and others, the Amazon was a kind of wonderland with a biodiversity unparalleled anywhere else in the world. For our distinguished guests this event is an opportunity to share experiences from other parts of the world with us in the Amazon region looking forward to promote science and technology in benefit of a sustainable development and preservation of biodiversity.

Various lectures and papers will be presented drawing on themes of great interest for sustainable development and biodiversity. It is hoped that they are of great importance for all participants. Every abstract is summarized in this book and it will be distributed to all participants. An innovation added as part of this Symposium is the possibility of including a publication as proceedings of the meeting.

Furthermore, combined with the Symposium the *Project and Cooperation Forum*, an offer of **Baden-Württemberg International Agency for International Economic and Scientific Cooperation**, is organized and addressed to all registered participants of the Symposium. It will take place on Tuesday, 01 October 2013 and is held in English. This event is the ideal platform for professional exchange with national and international experts in multiple thematic subgroups. The Project and Cooperation Forum provides the opportunity to meet potential partners to develop joint project proposals to initiate new collaborations or deepen already existing partnerships.

At this point we want to thank our sponsors and collaborators, such as CAPES, CNPq, the State Government of Pará, the Municipality of Santarém, ALCOA, Cargill, for financial support, as well as our partners in the Federal Republic of Germany, the University of Tübingen, the University of Stuttgart, BMBF, and the Alexander von Humboldt Foundation.

We also recognize the importance of field trips and social programs among the many activities that will be offered for the participants. Finally we hope all expectation of the participants in gaining new research insights will be met within the program, as well as that the mutual interactions of all scientific fellows will forward binational cooperation. Our very dear Santarém, known as "Pearl of the Tapajós", with its hospitality and natural charm will bring all the best to our distinguished guests and participants of the Symposium.

Welcome to Santarém!
Willkommen zum Santarém!
Bemvindos a Santarém!

Prof. Dr. José Seixas Lourenço
Rector of UFOPA – President
6th SBA.2013

Prof. Dr. William G. Vale
General Secretary
6th SBA.2013



6. Deutsch-Brasilianisches Symposium **Nachhaltige Entwicklung**

LIST OF CONTENTS

PROGRAM OF THE SYMPOSIUM	11
MINI CONFERENCES	15
I. FOREST, AGRICULTURE AND FISHING	19
II. WATER AND SOLIDS RESIDUES	57
III. RENEWABLE RESOURCES AND CLIMATE	81
IV. MINERAL RESOURCES	99
V. SUSTAINABLE DEVELOPMENT AND ECONOMY	105
VI. HEALTH AND DEVELOPMENT	155
VII. BIODIVERSITY AND ECOLOGY	171
VIII. BINATIONAL PROGRAMS	199

PROGRAM OF THE SYMPOSIUM

29.09.2013 – Sunday

17:00 – 19:00 h	Registration
19:00 – 20:40 h	Opening ceremony
19:00 h	Prof. Dr. José Seixas Lourenço Welcoming speech of the UFOPA chancellor
19:20 h	Dr. Simone Schwanitz Director at the Ministry of Science, Research and the Arts Baden-Württemberg
19:40 h	Dr. Simão Jatene Gouverneur of the state Pará
20:00 h	Prof. Dr. Jorge Almeida Guimarães President of CAPES
20:20 h	Dirk Schüller German embassy Brasília
following	Ice breaker with the gitarist Sebastião Tapajós

30.09.2013 – Monday

08:00 – 12:00 h	Sustainable Forestry	
08:00-08:30	Opening speech	
08:00	Dr. Simone Schwanitz Director at the Ministry of Science, Research and the Arts Baden-Württemberg	
08:10	Artur Petkau Hochschule für Forstwirtschaft Rottenburg	Sustainability and 300 years of sustainable forest management – from 1713 to 2013
08:40	Max Steinbrenner	
09:10	Marcelo Santos Melo Serviço Florestal Brasileiro, Brasília	Manejo florestal no norte do Brasil: atualidade e perspectivas
09:40	Discussion	
09:50 – 10:15 h	Coffee break	
10:15	Moriz Vohrer The Gold Standard Foundation, Freiburg	Uma metodologia de melhores práticas e de um rótulo elevado de qualidade de crédito de carbono, tanto para Kyoto quanto para mercados voluntários
10:45	Sergio Pimentel Viera Cooperativa Mista da Flona Tapajós	Community forest management in the Tapajos National Forest
11:15	Maria Rosenildes Santos	Non-timber forest products: from forest to the consumer

11:45	Discussion	
12:00 – 13:40 h	Lunch	
13:40 – 15:30 h	Land use	
13:40	Karin Naase Universität Marburg	Fractional conservation: socio-environmental dynamics in the National Forest of Tapajós (FLONA) in the lower Amazon, Brazil
14:00	Maria Angélica Miglino Universidade de São Paulo	The importance of Amazon animal biodiversity for human welfare
14:20	Benno Pokorny Universität Freiburg	From action to actors: the need for reorienting development policies in response to the global challenges of climate change, food security and poverty
14:40	Manoel Malheiros Tourinho Universidade Federal Rural da Amazônia	Agricultural sustainable floodplain management in Amazon
15:00	Discussion	
15:15 – 16:00 h	Coffee break	
16:00 – 18:00 h	Talks - Mini conferences	
18:00 – 19:00 h	Postersession	
19:30 – 22:00 h	Cultural evening event	

01.10.2013 – Tuesday

parallel 8 - 16 h - Forum for cooperation

08:00 – 08:40 h	Mineral resources and mining industry	
08:00	Representative of ALCOA	Apresentação do Plano de Recuperação de Áreas Degradadas através do método de nucleação pela engenheira florestal da Mina de Juruti responsável pela execução das atividade
08:20	Gilmar Siqueira Universidade Federal do Pará, Belém	Mercury in the Amazon: human influence or natural geological pattern
08:40 – 10:30 h	Climate and renewable energies	
08:40	Ulrich Glasmacher Universität Heidelberg	Climate Change: Geological and social Properties
09:10	Andreas Gerber Hochschule Biberach	Energy Efficiency and Renewables for Communities - Approach and Results
09:40	Gustavo Melo Universidade Federal de Pernambuco, Recife	Climate change: Proposals of the Innovate Project

10:10	Stefan Hohnwald Universität Göttingen	Project "CarBioCial": Carbon-optimized land management strategies for southern Amazonia
10:40	Discussion	
10:55 – 11:30 h	Coffee break	
11:30 – 12:45 h	Water, sewage water and waste	
11:30	Daniela Neuffer Universität Stuttgart	Sustainable water supply and waste water treatment as a contribution to environmental protection
11:50	Jörg Metzger Universität Stuttgart	Micropollutants with hormonal activity in the water cycle
12:10	Uwe Menzel Universität Stuttgart	Binational research projects and education programs in environmental engineering in Brazil
12:30	Discussion	
12:45 – 14:00 h	Lunch	
14:00 – 15:15 h	Ecology and biodiversity	
14:00	Thomas Hilger Universität Hohenheim	Seeds of Change: Plant Genetic Resources and People's Livelihoods
14:20	Ana Maria Jansen Franken FIOCRUZ	The complexity of the transmission cycle of the Trypanosoma cruzi in Amazon basin
14:40	Gonzalo Enriques Universidade Federal do Pará, Belém	New habitat for technological innovation for sustainable use of the biodiversity of the Amazon, Brazil
15:00	Discussion	
15:15 – 16:00 h	Coffee break	
16:00	Round table: Sustainable mining industry	
17:00	Round table: Binational programs in the framework of the town twinning agreement of Santarém and Rhein-Sieg-Kreis	
18:00 – 19:00 h	Postersession	
19:30 – 23:00 h	Churrasco of buffalo with live music	

02.10.2013 – Wednesday

08:00 – 10:00 h	Economy and regional development	
08:00	Reiner Jäger Hochschule Karlsruhe	GNSS/MEMS-based LowCost Multisensor Systems for Out- and Indoor Navigation and Georeferencing
08:30	Mario Schmidt Hochschule Pforzheim	Sustainability, global responsibility and ecological industrial policy – perspectives for international cooperation
09:00	Gerd Kohlhepp Universität Tübingen	Brazilian-German scientific co-operation in tropical ecology, human impact on forests and sustainable regional development

09:30	Discussion	
09:45 – 10:00 h	Coffee break	
10:00	Representative of CARGILL	Cargill Agrícola S.A.'s Dry Bulk Port Terminal at Santarém (PA) and its role in the region's sustainable development
10:30	Fritz Klauser Universität Leipzig	Knowledge and skills of business professionals in the energy and water industries
11:00	Discussion	
11:15 – 12:15 h	Postersession	
12:15 – 13:30 h	Lunch	
13:30 – 15:30 h	Binational programs	
13:30	Marius Huinink Projekt "Deutschlandjahr 2013-2014", São Paulo	Germany + Brazil 2013-2014
13:45	Márcio Weichert Deutsches Wissenschafts- und Innovationshaus São Paulo	German House of Science and Innovation in São Paulo
14:00	Annegret Trettin Baden-Württemberg International, Stuttgart	Study and Research in Baden-Württemberg
14:15	Thomas Inhetvin Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Brasília	Land use planning and regional development in Amazonia
14:30	Uli Schroeder Caldas Hochschule für Forstwirtschaft Rottenburg	Sustainable forest management in an associative way, in rural Southern Brazil
14:45	Discussion	
15:00 – 15:30 h	Coffee break	
15:30 – 17:30 h	Talks - Mini conferences	
17:30 – 18:00 h	Last opportunity: Postersession	
18:00 – 18:30 h	Conclusion and presentation of poster awards	
19:30 – 22:00 h	Final ceremony	

03.10.2013 – Thursday - Excursion

all day	National Park "Floresta Nacional do Tapajós" (FLONA)
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04.10.2013 – Friday - Excursion

all day	The historical caoutchouc city of Belterra and Alter do Chão
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05.10.2013 – Saturday - Excursion

all day	Boat trip on the Amazonas and Tapajos to the "Encontro das Águas" (meeting of the waters)
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Mini conferences

T1 Forestry - Land use - Fishery

Ademir R. Ruschel	Structure, dynamics, and composition of a primary forest 28 years after logging at the Tapajós National Forest, Brazil
Cristiane Krug	New insights in the pollination of guarana tree: basic knowledge for pollinators conservation
Franciane Aguiar Santana	Creation of stingless bees front dimensions of sustainable development in the amazon
João Paulo Silva	Use of species <i>Phanera splendens</i> (Kunth) Vaz (jabutiladder) to the use of fibers in paper craft market in the metropolitan region of Belém, Pará State, Brazil..
Joielan Xipaiá dos Santos	Economic feasibility of a model compound agroforestry wood species of high commercial value established in the municipality Medicilandia – Pará State
Vitória Roberta da Silva Ferreira	Utilization of industrial residues of Amazon wood for charcoal production to the pig iron industries
Luciene Campos de Lima	Characterization of artisanal fishing in Lake Juá, Santarém, State of Pará Brazil
Manoel Tavares de Paula	The influence of planting spacing on wood anatomical dimensions of <i>Schizolobium amazonicum</i> huber ex ducke
Nascimento, M. C. P.	Characterization of ornamental fisheries loricariidae downstream hydroelectric of river curuáuna, santarém,parabrazil.
Rommel Noce	Cost of business forest management in the amazon region

T2 Water - Sewage water - Waste

Klaus Fischer	Recycling of fluorescent lamps
Gustavo Neves Silva	Utilization of rainwater in public schools of Belém, Pará state
Martin E. Maier	Synthesis of new biolubricants and conversion of glycerol to organic compounds

Valdemir Antonio Rodrigues	
Lea Böhme	Comparison of different biodegradation tests for bioplastics
Vinhota Silva	Spatial distribution of infection occurrence by trypanosoma sp. In catfishes ornamental captured in curuauna downstream river, santarém / para.
T3 Climate - Renewable energies	
Helmut Hoffmann	Climate protection worldwide – a new approach for international cooperation
Rainer Wiechers	Biomass operated data computing centers A chance to balance energy infrastructure?
Martin Reiser	Greenhouse gases from landfills – New ways in Quantification and Reduction
Daniela Oestreich	Do ceramics store palaeoclimate change? Ceramic petrology and geochemistry of Paracas and Late Intermediate Period, Southern Peru
T4 Mineral resources - Mining industry	
Claudio Sclair	Mineral exploration in the western state of Para, Brazil
Lucianana Freire	Environmental planning in patrimony speleological: study of the dynamics in the landscape of the Speleological Province Altamiraltaituba, Pará state – Brazil
T5 Economy and regional development	
Ana de Souza	Macuxi and wapichana indigenous peoples from Boa Vista/RR: a social economics analysis
Alex Schinko	Proposals for sustainable development in Amazonia
Elisabeti Muto	Working conditions in recyclable material cooperatives of São Paulo Municipality, São Paulo state
Gerold Hafner	Resources management at the example of construction industry – improving resource efficiency and exploitation of materials, stored in waste and anthropogenic stock
Jarsen Guimaraes	Sustainable development: an analysis of GDP in green perspective
Joao da Silva	Local Productive Arrangements of Ecological Bricks as critical to economic and environmental sustainability in the Amazon
Maria David	Sociodemographic characteristics and vulnerabilities of the Amazon region: the case of Calha do Purus subregion
Milena de Andrade	Flood mapping through interdisciplinary methods as an instrument for urban and regional planning in Amazon
Jochen Dürr	Amazonian value chains and regional development: the case of the Lower TocantinsRiver.
Nayra Trindade	The timber sector and the extractivist reserve Verde para sempre: challenges for sustainability In the municipality of Porto de Moz, Para, Brazil
Shaji Thomas	Implication of Agroextractive Settlement Project (PAE) in the participatory governance of common natural resources in Amazon Floodplain

T6 Health and Environment - Ecotourism

Dayane de Siqueira Gonçalves	Environmental education and sustainability in areas of mangrove
Yanna Lira Machado	Ecotourism and sustainability in the National Park of Chapada das Mesas – MA, Brazil
Andson Ferreira	Socioeconomic impacts arising from implementation of bauxite exploration project in city Juriti, west of Pará

T7 Ecology and biodiversity

Markus Heidak	Anthropogenically and lithogenically affected element contents of soil and vegetation samples from the Laurel forest in Tenerife (Canary Islands, Spain)
Christoph Gehring	Ecology of the babassu palm and interactions with surrounding vegetation and soil in degraded NEperiphery of Amazonia, Maranhão State
Moritz Heinle	Calcifying phytoplankton in a changing ocean. The effect of temperature and light on coccolithophores – an integrated laboratory and modelling study

I. FOREST, AGRICULTURE AND FISHING

Wood technological potential of *Genipa americana* L. (jenipapeiro), for reforestation in the State of Pará - Brazil

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From Rubiaceae family, the species *Genipa americana* L, also popularly known as jenipapeiro, jenipapo, genipapeiro, genipapo among other names, is a plant native to tropical America occurring from Mexico to Brazil. The species seems to develop best in areas with rainfall between 1,200 mm and 4,000 mm and annual average temperatures between 18° C and 28° C. Has a dioic reproductive system, with the occurrence of apomixis, fruiting from the 3rd year of age. The berry type fruit is large, fleshy, with sweet pulp widely used in agriculture industry for the manufacture of wines, alcohols, liqueurs and pigments. Due to its rapid growth and adaptation to different types of environments (genetic plasticity), the *Genipa americana* L. has great potential for use in industrial timber reforestation, as well as for recovery anthropic areas, such as suppression forestry mining, Legal Reserve Area (LRA) and Permanent Preservation Area (PPA) among other. In seeking to contribute to the elaboration of a Productive Forest System for the state of Pará, this study aims to technological characterization of *Genipa americana* L. wood seeking its proper industrialization, and thus, determine its potential to compete commercially and economically with woods of pine and eucalyptus, which are exotic species that have adapted easily in southern and southeastern Brazil, and native species paricá and pine-paraná that have certain limitations for be restricted only to manufacturing blades and offset and a slow growth, respectively. In the first year of research were shown the results of basic density, shrinkage resistance and plant, from this it can be concluded, preliminarily, that the wood of *Genipa americana* L. has great potential to be used as a replacement of timber species for reforestation currently marketed.

Keywords: wood technological characterization, *Genipa americana*, Pará state, technology, wood

Use of *Phanera splendens* (Kunth) Vaz (jabuti-ladder)'s species to the fibers use in paper craft market in the metropolitan region of Belém, Pará State, Brazil

João Paulo Silva¹, Stefany de Castro Rocha¹, Carla Michelle Matos Gome¹, Rosa Helena Ribeiro dos Santos¹

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Woody vines are commonly known as vines or lianas. The species *Phanera splendens* (Kunth) Vaz (Leguminosae) presents some vernacular names as: jabuti-ladder and ladder-of-monkey. Knowing that the economic potential in industry level is highly relevant, lianas are used as ornament and products for the Brazilian handcraft production. In this research, the production of handmade paper was made from the species *Phanera splendens* (Kunth) Vaz that seeks to prove the feasibility in the use of the same in the paper industry. For the production of handmade paper, baking processes takes 24 hours, shredding through maceration using concrete, manual pressing cylinder with marble and drying to the sun exposure. Therefore, the *P. splendens* have values that match a great degree of connection between the fibers, they are ideal units for the production of handmade paper. Therefore, the smaller the size of the fibers, greater is the link between the fibers, averaging 0.40; classified as grade II fiber to the index of Runkel, which has average between 0.25 and 0.50 percentage which are excellent for papermaking. Resulting in a consistent, flexible, malleable material and different from other roles.

Keywords: Lianas; Fibers; Paper craft

The influence of planting spacing on wood anatomical dimensions of *Schizolobium amazonicum* huber ex ducke

*Manoel Tavares de Paula*¹ ; *Jéfyne Campos Carréra*²; *Ana Claudia Gama Batista*²

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Schizolobium amazonicum Huber ex Ducke species, known commercially as Parica, is a fast-growing species, which has been widely used in lumber, mainly in the industries of panels. Parica has been widely used in commercial plantations, but is gaining space in Agroforestry and reforestation of degraded areas, highlighting its ecological and economical potential. Studies are being developed in order to improve use and the product quality, and to optimize production using less planted area. The Anatomy of wood has a direct relationship with the quality of the wood, as well as the good development of the plant will depend on the efficiency of their anatomical characters. Analyzing planted areas six trees were selected, three 1.5 x 1.5 m spacing and other three 2.5 x 2.5 m spacing, where retreated samples at 1.30 m, level to DBH (diameter at breast height), with the purpose of analyzing the changes in anatomical structures caused by the change in the planting spacing. Were took test specimens from these samples, which were examined with help of wood anatomy, macro and microscopic analysis. According to the results obtained, it might be concluded that the frequency of the vessels and the height of the rays were influenced by planting spacing, with no significant variations in vessel diameter and width of the rays.

Keywords: Paricá, Wood anatomy, Product quality, Planting Spacing.

Dendrochronology of *Qualea dinizii* Ducke

Sousa, L. K. V. S¹; Cardoso, C.C.¹; Roig, F.A.²; Tomazello, M.³; Chagas, M.P.³; Moutinho, V. H. P.¹

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The wide range of tropical species and the potential for dendrochronology indicates a need for more research about still unknown species. The *Qualea dinizii* belongs to the family Vochysiaceae and is classified as deciduous and can be found throughout the northern region of Brazil, especially in domain areas of the Amazon region. The species has been characterized technologically, with the intended use for the manufacture of finished materials, crates and woodworking. The *Qualea* was used for this study in order to analyze the climate data collection area with chronological indexes to prove their dendrochronological ability. The collection area is located in the Km 83-BR-163 in the Project Ambe within the Tapajós National Forest, between the coordinates S 02° 53'08, 0" and W 054° 55'16, 7". It was used three discs removed from the 1.80 m tall order considering the base top, these were mechanically sanded with a sandpaper with granulometry from 80 to 600. The growth rings were marked on the discs, three rays per disc, and then measured the width with the aid of Image Pro Plus 4.5., the sequence results were subjected to programs and Cofecha Arstan. The values of monthly precipitation and temperature were obtained from the National Institute of Meteorology - INMET. Correlation analysis of rainfall data from the collection area and chronological indexes were used both to demonstrate the annual nature as to document the seasonality and strength response of this species to climate. The *Qualea dinizii* showed distinct growth rings by the presence of marginal parenchyma of different widths, the estimated mean age was 105 years to the samples analyzed. The growth rate was slow initially, increasing thereafter. The sensitivity shown average annual growth was 0.414 and 0.425 considering average correlation 50 with an interval of 25 years. The species showed sensitivity to environmental factors, with the highest correlation with precipitation proving, his dendrochronological fitness.

Keywords: growth rings, tropical species, temperature, precipitation.

Diagnosis of seizure of timber counties in west Para

Ribeiro, L. A. S¹; Sousa, L. K. V. S¹; Schaedler, H. A. R.³; Nascimento, R. P.¹; Ferreira, S. C. P.¹; Aranha, R. C.²; Torres, A. H.²

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The legal Amazon still suffers from high levels of predatory extraction of wood. The environmental enforcement by agencies such as IBAMA (Brazilian Institute of Environment and Renewable Natural Resources) at the federal and SEMA (Secretary of State for the Environment) at the state level, in order to restrain this practice, has grown in recent years, resulting in thousands of cubic meters of wood stocked every year with little destination of this total. Within this context, the aim of this study was to detect through triage of administrative processes, the volumes of logs and lumber and species of wood seized in 13 municipalities in the western Para by federal supervisory body between the years 1997-2012, well as the total percentage of wood for this period. The survey was performed in various industries in the seat of the executive management of the federal supervisory body in Santarem. It was analyzed 831 administrative cases of which 115 corresponded to the period between 1997 and 2004 and 716 between 2005 and 2012. The total wood seized in the first period in logs and lumber was respectively 9.763,86 and 1.100,59 m³, totaling 10.864, 45 m³, with a percentage of average total destination of 16,4%. The apprehensions occurred between 2005 and 2012, amounted to considerably, and may be explained by the greater number of cases triaged, as well as for gradual increase in environmental enforcement. The total value of confiscated timber was approximately 137.026,6 m³, with 96.975, 72 m³ at logs and 39.965,13 m³ at lumber, with average percentage donation of only 11, 7%. It is concluded that despite the increase over recent years in monitoring the undoing, of wood is still incipient.

Keywords: extraction, timber, undoing.

Esterification of cupuaçu fatty waste catalyzed by sulfated zirconia composite / activated carbon.

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The synthesis of methyl esters (biodiesel) starting from the hydroesterification of cupuaçu fatty waste was employed to evaluate the catalytic activity of sulfated zirconia supported on activated carbon (AC) composites. The fatty waste was obtained from the extraction of cupuaçu seed butter, and regarded this work as feedstock for biodiesel production via hydroesterification reaction, due the presentation of high content of fatty acids with acid value exceeding 139.00 mg KOH/g. The solid superacidic of sulfated zirconia was prepared by two routes, one employing solvent called conventional method (abbreviated as ZrOS) and one without solvent (precipitation) called solvent-free method (abbreviated as ZrS). The synthesized catalysts were characterized by X-ray diffraction (XRD), infrared spectroscopy (IR), thermogravimetry (TG) and scanning electron microscopy (SEM). Hydrolysis of cupuaçu fatty waste was performed in Parr reactor model 5500, using a molar ratio equal to 1:20 (fatty waste: water) at 200 °C for two hours. The esterification tests were processed in reflux system at 120 °C with a reaction time of two hours using 5% (w/w) of catalyst and molar ratio fat:methanol 1:6. Best catalytic activity was observed for the catalysts containing ZrOS obtained by the conventional method, reaching yields above 93%, highlighting the composite ZrOS/CA, with a 94.53% conversion to methyl esters. While the performance of catalysts ZrS and its respective composite ZrS/CA, showed much lower yields, in the range 21-38%. It has also been a study of leaching of sulfate groups catalysts. Minor sulphate leaching occurred in the presence of ZrS supported on carbon catalyst (ZrS/ CA) and also with the use of ZrS alone, with 0.36% and 1.50%, respectively. Already the catalyst derived from ZrOS, showed high leaching sulfate group, reaching values of 2.66% and 3.65% for the compound (ZrOS / CA) and ZrOS, respectively. The lowest leaching of ZrS in relation to ZrOS indicates that the methods of preparation influence on the stability of sulphate groups. Furthermore, the reduction in leaching for the impregnated materials suggests that the interaction between the active phase and the support assists in stabilizing the sulfate group.

Keywords: cupuaçu fatty waste, sulfated zirconia, esterification.

Plant species richness of urban and peri-urban homegardens and its significance for household food supply in Santarém (Pará State, Brazil)

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Understanding the importance of homegardens in the production of food, medicine and other useful products for human beings is indispensable. The study was conducted with an objective of investigating the plant species richness in urban and peri-urban homegardens and their contribution for household food supply in Santarém, in the west of Pará State, Brazilian Amazon. The present study was intended to fill the gap in knowledge and come up with lists of plant communities and their scientific name. Twenty-five homegardens were randomly selected for data collection. Data were collected using homegarden tour and semi-structured interviews. Some information was also gathered by group discussion with the farmers and the information was analyzed by using descriptive statistics. 87 plant species and 47 families were recorded with an average of 14 plant species per homegarden. Were recorded in the study area, 167 (49.3%) species of trees, 118 (34.7%) herbs, 49 (14.5%) shrubs and 5 (1.5%) liana species. Of the total plant species, 63% were food producing species (fruits, vegetables and pulses) 22.2% medicinal species and 14.8% utility species. Lamiaceae had the highest number of species, followed by the families Araceae, Rubiaceae and Rutaceae. *Coriandrum sativum* L. and *Allium fistulosum* L. were among the cash earning plants frequently found in homegardens. The average size of homegarden was 502m². The study revealed that 96% of the produce was used for self-consumption and 4% was sold in the local markets. In general, homegarden products are mainly used as supplemental food in households and few sold on local markets. It can be concluded that homegardens of the study area are rich in biodiversity. The present study showed the existing status of homegardens and local knowledge contribution to the farming systems in conservation of the biological diversity. We conclude that although homegardens contribute only a small part of total income, they are particularly important because of low labor input for management and locational advantage. The homegardens and its management can be improved by proper management practices, more research, cooperatives and extension services.

Keywords: Homegarden, management practices, local knowledge and diversity

Structure, dynamics, and composition of a primary forest 28 years after logging at the Tapajós National Forest, Brazil

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This study reports changes on diversity and biomass of a forest in the Eastern Amazon 28 years after a controlled logging at the Tapajós National Forest, Pará state, Brazil. The study site is located at the Km 67 along the BR 163 (Santarém-Cuiabá) highway. All logging activities took place in 1979 under two intensity levels: T1 (24 ha), where all trees ≥ 55 cm in dbh were removed and; T2 (39 ha), where all trees ≥ 45 cm in dbh were removed. It was logged an average of 20 trees or 72 m³ of timber /ha. In 1981, 18 permanent plots (PP) of 50 m x 50 m were set in both logged areas. Additional permanent plots were installed in undisturbed areas as a control (C), 18 in a 30 ha area (C1), and 12 in a 35 ha plot (C2). Post-logging structure, dynamics, and composition analyses in all treatments were based on assessments taken in 1981, 1987, 1997, and 2007, or 2, 8, 18, and 28 years after the disturbance. For such analyses all individuals ≥ 5 cm in dbh were monitored. The number of species was lower in the logged areas, but differences were more pronounced when compared directly the logged and control sites in nearby areas (T1 = 211 and C1 = 266; T2 = 205 and C2 = 229). In 28 years the logged forest was resilient enough to present values similar to those observed before logging, the difference in number of species between T1 and T2 was only 2.8%. Regarding diversity, Shannon-Wiener index for logged plots ranged from 3.9 to 4.5, while the control ones ranged from 4.2 to 4.7. The two control areas showed a great floristic similarity according to Jaccard and Morisita & Horn indexes. The diameter structure of logged plots in the lower classes ($5.0 \text{ cm} \leq \text{dbh} \leq 24.9 \text{ cm}$) showed a higher density 8 years after logging, which decreased towards the remaining measurements. On the other hand, logged plots showed a higher density in diameter classes between $25.0 \text{ cm} \leq \text{dbh} \leq 64.9 \text{ cm}$, but not for individuals $\geq 65 \text{ cm}$ in dbh. These results show that under a well-protected condition (plots inside a conservation area) forests present a high resilience, given the fast recovering in terms of species diversity, diameter structure, and individual abundance. Such dynamics was more remarkable in the lower diameter classes while logging impacts were stronger in bigger tree classes, which density of individuals was still not recovered by 28 years. It is necessary a longer period to reach back to the pre-logging forest conditions. However, in terms of forest yield, considering strictly tree biomass the logged forest had a larger stock of trees with smaller diameters, which will contribute to recover the lost biomass due to logging in a relatively short time.

Keywords: harvesting, Amazon, species diversity, recovery biomass, resilience.

**Wood's physical and anatomical characteristics
of the native Amazonian species *Euxylophora paraensis* Huber**

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The Amazon stands out as the largest tropical rainforest in the world, with the largest biodiversity, where there are over 2500 species of trees. The *Euxylophora paraensis* Huber is native from the Amazon forest and belong to the Rutaceae family, generally known as pau-amarelo or amarelão, is widely used in construction in form of rafters, joists, beams, and also for the manufacture of doors and portals. The data gathered are importance for the species characterization, especially when the species is related to the Amazon forest, which the bibliography is almost scarce or nonexistent. The aim of this research is to characterize the wood's physical and anatomical of the *Euxylophora paraensis* Huber, from two different batches, in order improve the understanding of this species and consequently establish appropriate destinations to its end use. Some samples were collected in two lumberyards from Marabá, in the state of Pará. The proof-bodies were prepared according to the recommendations of the Brazilian Association of Technical Standards, and also the analyzes of density and shrinkage (indirect method). To characterize macroscopic anatomical surface polishing like a cross with a number of sandpaper with up to 1200 grain/cm². For microscopic analysis a sliding microtome were used for making histologic slides in the three planes of the wood core (transverse, longitudinal, radial and tangential longitudinal), which were taken with a stereoscopic microscope using transmitted light and capture software images. The bulk density (apparent anhydrous) will be presented as average (minimum-maximum). The anatomical descriptions are in accordance with International Association of Wood Anatomists. The wood has differences between heartwood and sapwood distinctive with yellow color and sharp brightness. Xylem vessels with diffuse and simple perforation plates, alternate vessel-rayscores and vessel-ray with distinct edges to intervessels similar in size and shape. Fibers with thick walls not chambered. Scanty vessel-ray parenchyma with 3-8 cells per parenchyma band. Rays with 1-3 series, wide, with procumbent cells. The species analyzed in the second tank had higher basic density [0,72 (0,69-0,73) g/cm³], anhydrous density [0,81 (0,77-0,80) g/cm³] volumetric shrinkage [10,84 (10,24-11,48)%] and linear shrinkage in three ways - (i) longitudinal [0,44 (0,44-0,06) %], (ii) tangential [4,3 (3,83 to 4,95)%] and (iii) radial [5,46 (3,51 to 8,37)%]. According to the data gathered, it determinate that the timber has an average density, low shrinkage, favoring their use in construction.

Keywords: wood anatomy, native Amazon and shrinkage.

New insights in the pollination of guarana tree: basic knowledge for pollinators conservation

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The guarana (*Paullinia cupana* var. *sorbilis* (Mart.) Ducke) is an important and traditional crop in the Amazon region, being a monoecious plant, with male and female flowers on same plant in different branches with spatial and temporal alternating. Although several studies have been conducted focusing the study of potential pollinators and floral biology of guarana, there is still a wide lack of knowledge regarding the pollination biology of this important native species. In regard to floral visitors, there is a gap of observations between 2 am - at the beginning of anthesis, and 6 am - the time when the observations started in previous studies. According to some studies the most effective pollinator's species are the stingless bees. In order to evaluate the presence of floral visitors during the time not yet observed, related to the beginning of anthesis, four preliminary samples were carried out between 2 and 8 am in two different experimental fields of Embrapa in Amazonas state, in Manaus (26 and 09/27/2011) and Maués (28 and 29/10/2011). In these two sites were observed the species *Megalopta* sp. (Halictidae) e *Ptiloglossa* sp. (Colletidae), both of nocturnal / crepuscular behavior, visiting in abundance the guarana flowers. Other four samples were made (04, 12, 19 and 26 of September/2012) between 2 and 9 am to quantify the nocturnal, crepuscular and diurnal visitors, as well as to identify them. 1.333 bees were recorded, from them 4% were nocturnal (find between 3 and 5 am), 8% were crepuscular (find between 4 and 6 am) and 88% were diurnal visitor (after 5.30 am). The nocturnal bee visitors comprehend 4 bee species: *Megalopta aeneicollis* Friese, 1926, *Megalopta amoena* (Spinola, 1853), *Megalopta sodalist* (Vachal, 1904), *Megalopta* sp.; the crepuscular visitor corresponds only to one kind of bee, *Ptiloglossa* sp. and the diurnal bee species comprehend more than 20 species, almost all of them stingless bee. New research efforts are needed to clarify the pollination biology of guarana, including the effective pollinators and the contribution of bees to the fruit set, specially the nocturnal and crepuscular species. It is also important to understand more about the environmental services of bees for this genuine product cultivated in the Amazonian region.

Keywords: *Paullinia*, stingless bees, *Megalopta*, *Ptiloglossa*.

Tuberculosis in buffaloes in the lower Amazon region: a silent threat

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Bovine tuberculosis is an important zoonosis in many parts of the world and despite of economic importance also causes strong environmental impacts. In the international literature there are several reports involving buffalo as a reservoir of *Mycobacterium bovis*. In the Lower Amazon region of Pará state, tuberculosis in buffaloes has been considered a public health problem as well as has caused serious harm to farmers, including the desistence of buffalo's farming activities. The present study aimed to determine the prevalence of tuberculosis in the Lower Amazon region, Pará state, Brazil. The examinations were performed through a compared based intradermal tests, using a tuberculin (Purified Protein Derivative – PPD) bovine and avian according to PNCEBT-MAPA-BRASIL. The survey was done in 23 farms, totaling 776 animals, where the prevalence of positive animals for tuberculosis was 20.48% (159/776), ranging from 27.77% (10/36) and 20.13% (149/740) among males and females, respectively. The high prevalence of positive animals demonstrates that tuberculosis is a common disease in the region, and requires application of effective measures and public health management that aim to control and eradicate the disease. Furthermore it seems that the absence of government agencies responsible for animal health and public compounds the problem that ends to increase as time passes.

Keywords: Brazil, Buffalo, Lower Amazon, Tuberculosis

Characterization of artisanal fishing in Lake Juá, Santarém, State of Pará - Brazil

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The lake Jua, located in the periurban area, 6,613 m distant from the city of Santarém, Pará, a lake is widely used by communities, not only of its surroundings as for people from more distant locations, using fishing as much as food and source of income for their families. This implies increasing fishermen who compete in the areas of the lake to the practice of fishing by using different methods for catching fish. This research aimed to identify the instruments used in the capture of fish in the lake of Jua. To do so, it is a literature to support the research, which was characterized as descriptive, empirical and field. Where we applied a questionnaire consisting 50 questions mixed (open and closed) imprint socioeconomic applied to fishermen who practice the activity in that lake. This work was developed during the year 2009, which intensified with the fieldwork in the period from 25 July to 25 September 2009. For the interviews set up a sample of 14% (n = 55) taking an universe of 382 fishermen registered in Core Base Maracana representative body of fishermen engaged in the activity in the area of Jua. What, therefore, is linked to Colony fishermen Z-20. The results showed that fishermen use to catch fish different fishing tackle, from the more generalist such as gillnets and cast nets as well as experts to hand line, the rod and Garatéia, the latter presented with higher frequency of use the lake area. Which showed the use of paraphernalia rudimentary, uncommon to other existing methods, confirming the predominance of strictly artisanal fishermen that have fishing as their main source of income.

Keywords : Artisanal fishing, fisherman, fishing tackle, Lake Jua, Santarém

Quantification of biomass and nutrients of harvesting residues of a stand of *Eucalyptus saligna*

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Quantifying biomass and nutrient stocks in any forest ecosystem is crucial to knowing nutrient dynamics in different compartments within the ecosystem. This allows to identify evidences of possible impacts caused by some silvicultural techniques, such as harvesting residues. Moreover, knowing the aspects of biomass compartmentalization in rapid growth plantations and the rate of nutrient exports provides data to support decisions to adopt the type of management for each of these ecosystems, as well as to adequate conservation techniques and nutrient replacement. Therefore, the objective of this study was to quantify biomass and nutrient stocks in the crop residues of *Eucalyptus saligna*. The study was conducted in a *Eucalyptus saligna* stand in the municipality of Telêmaco Borba – Paraná State, Brazil. The climate in the region is Cfb (Köppen classification) and the soils are Oxisols and Inceptisols. We delimited three plots with 367.5 m², with plant spacing 3.0 mx 2.5 m, where the tree population was at 6.7 years of age in clayey soil. Afterwards, we measured all diameters and selected the tree average diameter to cut in each plot. The trees were cut at ground level, with a minimum usable 8-cm diameter. We fractioned the components: leaves, branches, pointer (bark + wood) and trunk bark, collecting a representative sample of each fraction to be weighed to determine its biomass. For the pointer, were collected wood rings and bark. After drying, we milled the samples and analytically determined the contents of N, P, K, Ca, Mg and S in the laboratory. The biomass residue was 53.79 Mg ha⁻¹ with the components of bark, pointer, branches and leaves corresponding to 48.45%, 34.39%, 11.23% and 5.93%, respectively. The total nutrients obtained from the crop residue amounted 1,293.83 kg ha⁻¹. The results show high amounts of nutrients removed, mainly Ca (50.6%) and K (21.7%). The highest concentration of N, P, Mg and S are found in the leaves, K in the branches and Ca in the bark. Residues contribute significantly to the maintenance of nutrient cycles and ecosystem sustainability; therefore, ideally, they should be left on the soil after harvesting.

Keywords: Nutrient cycling; Sustainability; Forest Soils.

Creation of stingless bees front dimensions of sustainable development in the amazon

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The creation of indigenous stingless bees or beekeeping, has proven to be an excellent alternative for income generation in the Amazon, and can fit in with the principles of sustainable use of natural resources. The aim of this study was to identify the importance of creating stingless bees front dimensions of sustainable development in the Amazon. Through the research methodology of the literature on the topic. Results and Discussion: About 200 species of stingless bees live in Brazil, especially in the Amazon region. These bees have been used for hundreds of years by the indigenous and mestizo populations of the Amazon, but it was the last ten years that its holding has increased. Stingless bees may have a strategic role in the reconstruction and preservation of tropical forests and nature conservation in the Amazon. The use of products from these bees is part of the socio-cultural habits (food, medicinal, ritual, etc.) of many indigenous peoples of the Americas, such as the Amazon. Furthermore, the creation of stingless bees proposes generating additional income for the farmer who has a low income, being pertinent to beekeeping to Amazon. Conclusion: The Amazon region with its wealth of native bees have a great potential in creating these bees to generate income in a sustainable way, contributing to the conservation of forest biological diversity and respecting the cultural practices of the local communities who live there.

Keywords : Meliponiculture, Sustainable Development, Amazon

Physical and chemical properties and organic matter content in soils under agroforests planted in savannah in Santarém, Pará State, Brazil

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The objective of this work was to evaluate the effects on soil physical and chemical properties and organic matter content of soils planted with agroforest systems (AS) with ages of 10, 5, and 3 years (AS 10, AS 5 e AS 3 respectively). The AS were planted using techniques and principles of agroecology in a savannah ecosystem, and an adjacent area of native vegetation served as control. The soil is classified as a sandy-textured Yellow Ultisol. The study area is located in the Agroextraction Settlement Reserve in the region of Santarém known as the Eixo-Forte. The AS studied were implanted in a random and biologically diverse manner with more than 100 forest and fruit tree species, both native and exotic. Disturbed soil samples were taken at 0-10 and 10-20 cm in the soil profile, with 10 subsamples making up 1 composite sample for each sampling point. Samples were dried, passed through a sieve, and prepared for laboratory analysis. Bulk density was determined using undisturbed samples that were collected at 0-5 cm in the soil profile using volumetric rings of 95 cm³, with 3 replicates randomly located in each sampling area. Treatment comparisons were done using averages and standard deviations. Soil chemical and physical properties were generally improved by the organic matter input from the AS. Soil bulk density varied from 1,62 g cm⁻³ in the control to 1,44 g cm⁻³ in AS 10. Total cation exchange capacity increased in the AS due to a reduction in saturation by Al at 0-10 cm in the profile. There were few differences in the 10-20 cm depth, indicating that even after 10 years of AS establishment, system effects are still not evident at this depth.

Keywords: Yellow Ultisol, Agroecology, Soil Density

Utilization of industrial residues of Amazon wood for charcoal production to the pig iron industries

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In Brazil, about 60-70% of production arising from native forests become waste, material undervalued and generally causing damage to the environment due to improper storage, without a prior environmental control, promoting risk to the community, such fires, air pollution and beds. In parallel, cite the steel industries that require daily charcoal to fuel their blast furnaces to produce pig iron, ferroalloys and silicon metal. Against this backdrop, the present study aimed to evaluate the potential of industrial waste timber of Amazonian trees, aiming at its best utilization for energy purposes. To this end, we collected material from species *Manilkara huberi* (Maçaranduba), *Hymenaea courbaril* (Jatoba), *Cedrela odorata* (Cedro) and *Bagassa guianensis* (Tatajuba) in aréa dump timber region of Santarém, Pará - Brazil. Subsequently, the samples were carbonized in a furnace with maximum temperature of 450 ° C and charring rate of 1 ° C / min, kept at this for one hour. For statistical analysis, we used the mean comparison test of Scott-Knott ($p \leq .05$). It was found that *Cedrela odorata* showed higher calorific value and percentage of condensable gases associated with a lower density of charcoal among species, about 0.35 g / cm³, while *Manilkara huberi* and *Hymenaea courbaril*, values obtained in 0, 88 and 0.82 g / cm³ respectively. As for the gravimetric yield, species *Bagassa guianensis* and *Hymenaea courbaril*. not significantly different from each other, with an average of 41.7%, as *Manilkara huberi* and *Cedrela odorata*, which had an average of 38.8%. There was no significant difference of the four species to yield non-condensable gases, while *Cedrela odorata* had the highest percentage of condensable gases. For ash content, *Hymenaea*. had the highest average, while *Manilkara huberi* presented the lowest content among species, with 1.2 and 0.5% respectively. It is concluded that the species can be used for energy purposes, as compared others belonging to the genus *Eucalyptus*, they showed values similar to or higher than those commonly used for the production of charcoal.

Keywords: wood residue, energy, charcoal, native forests, Amazon

Main non timber forest products commercialized in National Forest of Tapajos

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The aim of this paper was to make a diagnosis of non timber forest products most used and marketed by communities of National Forest of Tapajos. The data collection was conducted in the communities of São Domingos, Nazare, Maguary and Pedreira located in National Forest of Tapajos, municipality of Belterra and occurred through photographic records and questionnaires to obtain data required for the analysis of socioeconomic community steps extraction, production and commercialization of forest resources extracted, analysis of the operational characteristics of the activity and main challenges for the development of activity at the communities. It was found that the non-timber products that contribute most to the income of community are Andiroba oils, and copaiba, piquiá and ecological leather, but there are some limitations that hinder the development of extractive activity in communities, it is necessary a better improve and qualification of the actors involved in the exploration and production of non-timber forest products.

Keywords: Extractivism, latex, production, species oilseeds.

Methodology of the technique of simple coppice to the management of plantations of *Schizolobium parahyba* var. *amazonicum* (Huber x Ducke) Barneby – Paricá no Pará

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In simple coppice regime, the forest is conducted from the vegetative propagation, commonly known as regrowth. Among the main tree species used in this scheme, in Brazil, stand out those of the genus *Eucalyptus* L'Hér., used for obtaining firewood, lumber, and raw material for pulp and charcoal, with average yields of 40 m³.ha.year⁻¹ in the first seven years. In this context it is cited another specie utilized for wood production, it is the *Schizolobium parahyba* var. *amazonicum* (Huber x Ducke) Barneby., usually known as Paricá, however, without the use of coppice, due to the lower profits presented, between 2 and 3% due to, mostly the wind action. On this, seeking to contribute to the appropriated management of areas of Paricá's reforestation it was selected a plantation area with 6 years old and spacing between lines of 6 m and 3 m between trees, where it was explored the fourth line, keeping the three initials, seeking to create a protection against the wind, where the same procedure was maintained to the other lines, totaling 14 lines removed in logging. After three months, it was verified that from the 647 explored trees, 52, 10 % sprouted, where 27, 01 % presented high of regrowth exceeding 50 cm. The technique was effective, emphasizing the regrowth occurred in the rainy season, where the competition of the competing vegetation, normally intense in this time, may have minimized this rate. It is suggested that periodic elimination of competing vegetation are conducted to enhance regrowth, as well as studies in other seasons.

Keywords: Modified simple coppice, Paricá, *Schizolobium parahyba*, Reforestation.

Valuation of a dense rain forest in the Eastern Amazon

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The valuation of forest products as a basic instrument of financial evaluation, allows the prediction of the potential profits to be obtained with the use of timber and non-timber species of commercial interest, therefore, an interesting strategy for forest conservation. The objective of this study is to appraise an area of 135 hectares consisting of dense rain forest. The area of study is located in the Tapajós National Forest, in the municipality of Belterra, Pará State, Brazil. From the definition of the area were systematically distributed 12 sample units of 30 m x 250 m (9.0 ha) in the NS direction. The level of inclusion in each plot was DBH \geq 10 cm, considering the following size classes (SC) and plot sizes, namely: SC 1: 10 cm \leq DBH < 25 cm in sub-plots of 30 m x 50 m, SC 2: 25 cm \leq DBH < 50 cm in sub-plots of 30 m x 100 m, and SC 3: DBH \geq 50 cm in plots of 30 m x 150 m. In the valuation of the standing forest the cubic meter (m³) of species and the price in dolar (U\$\$) values of groups of commercial timber species were considered; price groups were provided by the Brazilian Forest Service, while prices of potential species and not logging were obtained through local interviews. Prices per cubic meter of stem ranged from U\$\$ 19.42 m³ to *Sclerolobium paniculatum* L. Vogel and *Simaruba amara* L. to U\$\$ 77.02 m³ for *Tabebuia serratifolia* (Vahl) G. Nicholson, with an average price of U\$\$ 45.82 m³. The monetary value of timber products originated a total revenue of U\$\$ 59,666.38 and annual U\$\$ 5,966.64, which corresponded to a yield of 9.9 m³.ha⁻¹, considering regime of community management, and a value of U\$\$ 442.98 per hectare, while the non-timber ones showed an annual revenue of R\$ 97.679,20 for an area of 135 ha, which corresponded to a monthly income of U\$\$ 4,069.97 associated with the commercialization of PFNMs and income of U\$\$ 361.78 per hectare. The species with the highest monetary value was *Carapa guianensis* Aubl. that has its seeds used in herbal market. The total monetary value of the forest was estimated at U\$\$ 108,505.98, which corresponds monthly U\$\$ 9,042.17, of which 55% consists of the sale of standing trees and 45% for the commercialization of PFNMs. Considering aspects of conversational ecosystem, the non-timber management would generate an annual economic return that overrides the benefits of the annual production of wood or family farm, so it is recommended that *Carapa guianensis*, *Hymenaea Coubaril* and *Diploptropis purpurea* var. *leptophylla* be removed from the list of species for the purpose of cutting timber for possessing market for commercialization of PFNMs.

Keywords: Forest management; Amazon; forest products

**Agricultural defensive in the village ‘Usina Velha’:
factors that affect the health of the farmers**

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This work is part of the project “Family Farming in the Village 'Usina Velha' in the Municipality of Caxias, Maranhão”, developed under the scope of the Pibic Jr – IFMA and aims to highlight experiences on the use of pesticides on crops produced by farmers of the community. The research emphasizes the relationship: Application of chemical products X contamination of water X contamination of foods X flora and fauna. It was verified at the beginning of the research a disoriented use of pesticides with the application and discard of packaging. One of the serious problems identified was the use of Methamidophos, active ingredient prohibited by ANVISA in Brazil by Resolution RDC 01/2011. It will be developed lectures during the research to guide farmers to use pesticides correctly and to perceive the consequences of these pesticides to the environment as well as the damage to the community health.

Keywords: agricultural defensive, environment, health.

Economic feasibility of a model compound agroforestry wood species of high commercial value established in the municipality Medicilândia – Pará State

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The agroforestry system has been practiced for centuries in the Amazon, which includes a variety of combinations of agricultural and forest species, reflecting native plants and feeding habits of each region. In addition to the ecological benefits, as it offers protection against soil erosion, increasing nutrient cycling, improved microclimate, among others, have emerged as potential alternatives for income generation and employment, allowing satisfactory economic returns for small producers. Because of this, the study aims to analyze the economic feasibility of a system in Agroforest Farm Açaí I, located beside highway BR 230, Medicilândia municipality, State of Para. For research thought economic indicators: cost benefit (BCR), net present value (NPV) and internal rate of return (IRR). The results were above the values assigned to it in the literature, attesting the economic benefits with environmental and social gains offered local families.

Keywords: diversification of species, profitability, recovery areas.

Model forest in the lower Amazon River: a proposal under construction

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The Model Forests initiative has been coordinated in Brazil by the Brazilian Forest Service, as a way to introduce an alternative, voluntary and participatory concept for managing territories and landscapes by various institutions and groups in partnership. The activities were conducted in five Municipalities (Aveiro, Belterra, Santarém, Óbidos and Oriximiná), located in the west part of Pará, in the confluence Tapajós, Amazon and Trombetas river basins. Workshops were held with organizations, visits were made to communities and settlements, interviews with local stakeholders and discussions on Model Forests were conducted. Dissemination of the concept and all related discussions comprised interviews with 47 institutions of the territory and 10 workshops in Aveiro (1), Oriximiná (2), Óbidos (2) and Santarém (5). Most of the participants were favorable to the establishment of a Model Forest in the region, as a platform to support management at landscape level. The Forest Service, through its Regional Unit in Santarém, has been acting as leader institution, responsible for coordinating the process of building the Model Forest, in coordination and support of a Working Group composed of the following entities: Chico Mendes Institute for Conservation Biodiversity (ICMBio), Federal University of Western Para (UFOPA), National Institute of Colonization and Agrarian Reform (INCRA), Forestry Development Institute of Pará (IDEFLOR), Secretariats of Environment (Santarém, Oriximiná), Secretariat of Agriculture of Belterra, Centre for Studies, Research and Training Workers Lower Amazon (CEFT-BAm), National Council of Extractive Populations (CNS), Environmental Research Institute of Amazonia (IPAM) and the “Saúde e Alegria” Project (PSA), as well as other related entities. Participating entities consider that the characteristics of the Lower Amazon territory, which is dominated by forest landscapes, mostly on public lands, and where sustainable territorial development is a mutual concern and goal for several organizations already active in the region, are convergent characteristics with the six principles that guide the Forests Models (voluntary association, landscape approach, commitment to sustainability, governance, program activities and networking). Two important steps still remain to be taken: 1 – To create multi institutional Pro-Tempore Committee, and 2 – To agree in the territory extension and boundaries to be proposed as the Model Forest area. Furthermore, the group should select a strategic approach to start working together in such big territory and to consensually choose a name for the future model forest. Afterwards, the work should be developed aiming at preparing a formal proposal for the Forest Model, to be submitted to the Iberoamerican Network.

Keywords: Model Forests Natural resources, Sustainable

Ultrasonographic diagnosis of early embryonic loss and pyometra in buffaloes

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Early embryonic death and has been recognized as frequent causes of infertility in female buffalo and are responsible for great economic losses. IN the present study seventeen female buffaloes were submitted to sequential ultrasound examinations through a Piemedical equipment, using probes of 5.0 and 7.5MHz. The procedures began at 15th days after fixed timed artificial insemination (FTAI) throughout 60th day for each three days with the objective to follow up the embryonic and fetal growth as well as gestational losses. The embryonic vesicle and embryo were seen in an average of 17,82 – 1,98 and 22,50 – 1,73 days, respectively and the embryo showed a daily growth average of 1,10 – 0,42mm per day. The first observation of the embryo and annex membranes anatomic structures were observed in the following chronological sequence after the AI: heart beat and allantoic 28,00– 3,14 and 29,75 – 3,08 days, respectively. Anterior locomotors system, optic region and dorsal column 37,50 – 3,00, 39,00 – 3,46, 39,75 – 2,87 and 40,50 – 3,00 days, respectively. For the posterior locomotors system, placentomas, hoof cleft, ribs and vertebrae 42,75 – 3,77, 45,75 – 9,9, 51,00 – 4,90, 61,50 – 5,20 and 63,00 – 4,24 days. The fetal sexing was possible to be done at 54th days of gestational period with an average of 58,50– 3,00 days. The embryo losses was high (76,47%), showing a high level of fetal re-absorption with and without pyometra. The mode B real time ultra-sound technique showed to be very effective tool for the evaluation of the normal and pathological conditions in the female genital system of female buffaloes.

Keywords: buffalo, embryo, embryonic loss, pyometra, ultrasound

Quality of particle boards produced in China using sugar cane bagasse

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The use of plywood, hard fiberboards, medium density fiberboards, and particle boards increased on the past years in Brazil and the trend is that the demand increase, due to the growing scarcity of solid wood. This fact has intensified the study on the better use of agricultural and forest residues, and even, the so-called urban waste, such as plastics, paper, cardboard, pet bottles and Tetra Pak containers, for the production of panels to be used in construction, furniture, flooring and ceilings. Sugar cane bagasse is the largest Brazilian agro-industrial residue, in function of the volume produced. It is estimated that, every year, 5 to 12 million tons of this material is thrown away, often inappropriately, by the sugar and ethanol industry. Considering the large sugar cane production, the generation of waste and the search to aggregate values, the use of particle boards produced with sugar cane bagasse can become an option and an example for national production. China is a pioneer on the industrial production of sugar cane bagasse particle boards, but often, this boards are associated with low quality. This study had as objective to analyze the quality of particle boards produced in China using sugar cane bagasse through physical and mechanical testing of panels. Three panels, from different batch, totalizing 70 samples, were analyzed, by density, moisture, Janka hardness, elasticity modulus and rupture modulus. In the evaluation of the experiment it was used a completely randomized design, with 10 repetitions for each test. The performance of the panels was compared by Tukey test, 95% probability. As a result, it was observed that, statistically, the panel 1 was different from panels 2 and 3 in all mechanical tests. The panel 1 was classified as low density panel (0.48 g/cm^3) and its values, formoisture, Janka hardness, elasticity modulus and rupture modulus were 8.76%, 269.1 kgf, 23900 kgf/cm^2 and 100.33 kgf/cm^2 , respectively. The panels 2 and 3 were classified as medium density panels (0.60 and 0.61 g/cm^3 , respectively) The values for moisture were 8.33 and 7.66% (panel 2 and 3). For Janka hardness the values were 599,7 and 536.1 kgf (panels 2 and 3). Elasticity modulus 39486 and 40565 kgf/cm^2 and rupture modulus 180.0 and 173.9 kgf/cm^2 , respectively for panels 2 and 3. The results showed that panels 2 and 3 were in accordance with the numbers found in the literature and with values required by NBR 14810 and CS 236-66 for wood particle boards, proving that it is possible to produce particle boards with sugar cane bagasse instead of wood with quality in accordance with technical standards.

Keywords: Particle boards, quality of particle boards, sugar cane bagasse particle boards.

Cost of business forest management in the amazon region

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This study had as objective to estimate the costs of sustainable forest management in the Amazon region. Specifically, aimed the costs by activity of forest management in the region, the cost variation depending on the Annual Production Unit Area (UPA), the sensitivity of the average cost of m³ of managed wood in relation to the main activities of forest management, in addition, the behavior of the average cost of m³ depending on the variation of the cutting intensity and productivity obtained in management activities. It was used the software MS Project (Microsoft, 2010) to run the data. According with the productivity of infrastructure construction activities, dragging and loading, it was estimated the number of teams that would be necessary to ensure that the management was carried out according to the size of the annual harvest area. The maximum capacity of dragging of *askidder*, estimated from the *dragging* productivity observed, would be referring to 1,300 ha. The UPA's management of these dimensions would require two teams for sample inventory and 100%, two teams for cutting vines, three teams for delimitation plot and cutting, four sets of transport and a team for each one of the other activities being consulting, data processing, infrastructure demarcation and deployment, dragging and loading/unloading. It was considered that the activities would begin in September 2009, which would allow the period between the end of the cutting activity of vines and the beginning of the dry season, when it would start exploration, matched 1 year. A 150 days period was considered to obtain the *Prior Permission of Technical Analysis (APAT)* and 30 days for the *Authorization to Explore (AUTEX)*. The delimitation and characterization of the area, period for the APAT, sample inventory, preparation of maps, preparation of the management plan, period for the AUTEX and demarcation of the delimitation plot occur sequentially. From this point the *demarcation of trees* and *cutting vines* would be carried out simultaneously. The completion of the *map of exploration*, *demarcation* and *infrastructure deployment* would be sequenced depending on the conclusion of the *demarcation of trees*. The *cutting* was estimated with a 12 months term for the conclusion of *cutting vines*, as well as the start of the activity of *dragging* with a 6 months term for completion of the *infrastructure deployment*. It was assumed that the UPA was divided into compartments of 100 hectares. From the completion of the *cutting* in the first compartment, the activities dragging, loading and transport starts. The realization of these activities must coincide with the dry season in the Oriental Amazon region. Through the income observed of the management activities in the region and the current value of the resources involved, it was estimated fixed and variable costs, for each forest management activity. It was concluded that the largest cost component of m³ of wood was the shipping cost, being more than 1/3 of the estimated cost and that the scale effect is significant in forest management activities. Variations in the productivity of forest management activities tend to have effects of increase and reduction of costs, superior to the variation of the *cutting* intensity.

Keywords: cost of production, forest economy, forest management

Economic feasibility of a model compound agroforestry wood species of high commercial value established in the municipality Medicilandia – Pará State

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The agroforestry system has been practiced for centuries in the Amazon, which includes a variety of combinations of agricultural and forest species, reflecting native plants and feeding habits of each region. In addition to the ecological benefits, as it offers protection against soil erosion, increasing nutrient cycling, improved microclimate, among others, have emerged as potential alternatives for income generation and employment, allowing satisfactory economic returns for small producers. Because of this, the study aims to analyze the economic feasibility of a system in Agroforest Farm Açai I, located beside highway BR 230, Medicilandia municipality, State of Para For research thought economic indicators: cost benefit (BCR), net present value (NPV) and internal rate of return (IRR). The results were above the values assigned to it in the literature, attesting the economic benefits with environmental and social gains offered local families.

Keywords: diversification of species, profitability, recovery areas.

Buffalo under threat in Amazon valley, Brazil

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Since 1986 after a visit to Brazil, the eminent scientist and FAO expert Prof. Dr. William Ross Cockrill considered the Brazilian Amazon Valley as the “*buffalo paradise*” due to the utilization by grazing buffalo of a profitable off-take from the land. In the regions of lower and middle Amazon River due to tropical environmental condition of the grassland soils, the floodplains are closely related to water level of the rivers, which show a five meters difference between the driest season (November and December) and the full (May and June). Thus in western Pará region where the flood period coincides with the most intense rainy season and less rainy with the ebb of the rivers many small ponds and lagoons are seasonally formed which give a natural excellent condition for livestock, that is highlighted by abundance of native forage with high nutritive value. At the time of full, pastures are flooded, making grazing possible only for buffalo species that moreover causes weight loss and even death of other animal species, especially cattle. The current development process in the floodplains area in western Pará region is leading to progressive degradation of ecosystems. The large livestock animals, cattle and buffaloes represent one of the most important socio-economic activities of small and medium producers. However, many factors have threatened the buffalo breeding in this region and generated controversy about the viability of this important economic sector in the region, and case any social measures and advanced breeding techniques are not taken into the problem, buffaloes will tend to disappear from the regional scenario. The disorderly occupation of these areas and the lack of economic alternatives for the riparian “justify” the intense exploitation of natural resources because they depend for survival. From 1975 to 2000, the buffalo population in Brazil has increased by about 13% per year, making it one of the fastest growing in the world flocks, however at the regional level since 2000 when the population reached about 200 thousand heads began a decline of buffalo herd, which now came in 2012 to less than 110 thousand heads. Although buffaloes showed higher productive and reproductive performances when compared to cattle, on the other hand this fact is mitigated by the unclear role that buffalo seems to play in a floodplain controversy conflict where it has been accused of altering the floodplain environment and interfering with other productive activities such as fishing and agriculture. In this paper it is discussed the main causes and actors involved in that conflict which were classified as social like the land question, farmers, smallholders and riverside communities, religious groups, nongovernmental organizations – NOGs, media, local riparian unions and associations, financial institutions as well as factors affecting the buffalo management production system such as errors in the herd management, health-inefficient herd sanitary control, problems of inbreeding, price of milk and meat, indiscriminate animals export and slaughter, neglect of government agencies and lack of alternatives for new opportunities for buffalo development seems to be directly related to the problem.

Keywords: Amazon valley, Brazil, buffalo, floodplain, management

Sustainability and 300 years of sustainable forest management – from 1713 to 2013

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Sustainability – this word with great and global importance is used in different contexts and different meanings. *Höltermann* calls it a key metaphor like liberty, fairness or democracy. *Hans Carl von Carlowitz* is regarded as originator of sustainability, particularly of sustainability in forestry, but later on people rely on him, when they talk about, or proclaim, sustainability. *Hans Carl von Carlowitz* called his book “*Die hauswirthliche Nachricht und naturmäßige Anweisung zur wilden Baumzucht - Sylvicultura oeconomica*“. He proclaimed 1713 a forest-management that makes economic benefits possible for the living generation but also for following generations. He promotes only to harvest in one period as much wood as much can grow in the same period. He explains how to plant and how to thin out and how to care for the forest. In his time, people only noticed the economic function of forest, the value, the jobs, or the products, for example the firewood or the building timber. In the last decades sustainability became indispensable in science, in civil society, in business and in politics. Sustainable development is a part of global strategies formulated at the UN-Conference 1972 in Stockholm, in the Brundtland-Report 1987 and at the Conference on Environment and Development in Rio de Janeiro in 1992, where more than 170 states signed the Agenda 21. They signed a commitment to develop national sustainability strategies analogous to the common global framework strategies. Today sustainability means more, than *von Carlowitz* meant. There are different meanings, but the common ground of the different meanings of sustainability is: human acting must be environmentally friendly, socially acceptable and economically efficient. Economic acting and social responsibility have to be combined. In the year 2013 even in forestry sustainability means more, than 1713. Since the latest 1994 at the Ministerial Conference in Helsinki in Europe the multiple uses of forestry have to be ensured. Not only one, but all functions of forest, the ecological, the economical, the cultural and the social functions of forest have to be preserved for our and for following generations.

Keywords: Combineeconomic acting and social responsibility, ecological, economical, cultural and social functions of forestmultiple uses, sustainability, sustainable development.

Forest investments – Boon or bane for the development of rural areas?

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Tropical deforestation and forest degradation contributes up to 18% of worldwide anthropogenic carbon emissions. To avoid these emissions Brazil is a prime candidate for a REDD+ program as it contains more carbon in their forest than any other country. The carbon is estimated at 47 billion tons in the Amazon alone; equalling to 120 times more than what was traded under the Kyoto Protocol.

While there is considerable debate and discussion over how REDD+ programs will be designed and implemented, and how much they will cost to the nations or regions, the private investor is increasingly looking for alternative promising business opportunities by restoring degraded or reforesting deforested areas.

While the Brazilian pulp and paper industry is growing at 12 % fostering more monoculture plantations, new types of investors are entering the market, recognizing forests as assets for long-term capital investment that is detached from the development of the international device markets. Still, these investors expect a attractive risk-adjusted rates of return on their invested capital.

Although from a climatic and economic perspective fast growing monoculture plantations are the most efficient, providing the highest rate of return and CO₂ sequestration rates, they bear great sustainability risks in regard to the benefits of local people and biodiversity. It is thus up to politics and civil society to ensure that investments are subject to certification according to internationally accepted sustainable forest management standards such as the FSC. Until 2013 FSC has certified 7 million hectare of forest in Brazil, which equals to 1.3% of the Brazilian forests.

Chances to balance the monetary shortfall from investments in forests with higher biodiversity values, due to the use of native trees species in mixed stands and the engagement of local communities arise by the additional benefits from the sale of carbon credits.

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Potential of fishing areas of ornamental loricarideos downstream of hydroelectric Curuá-una, Santarém-Para-Brazil

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The hydro-Curuá Una was the first dam in Central Amazonia built over three decades in the river basin Curuá-Una, located at coordinates 2 ° 47'S, 54 ° 18'W, Santarém, Pará, Brazil. The present study aimed to characterize the fishing areas ornamental loricariids downstream of the dam the river Una Curuá-through spots called spatial distribution of productivity. The ornamental fishing experiment was conducted in 12 sampling months, once a month, with diving effort in 1 hour CPUE in each spot to capture the production and characterization of exploited species. In each spot productivity: "A": 2 ° 48'40 .2" S and 54 ° 17'54" W, "B": 2 ° 48'25 .1" S, 54 ° 18'00 .5" W and "C": 2 ° 48'21 .9" S, 54 ° 18'00 .7" W, limnological variables of temperature, pH, dissolved oxygen, conductivity, turbidity, with the aid of multiparameter device were measured. The fish were packed in polypropylene bags and intended Lab of Aquatic Biology / UFOPA where registered biometric data (weight - kg, total and standard length - cm) of each specimen. The main species caught were: *Pseudacanthicus* sp. *Leporacanthicus heterodon*; *Panaque* sp. *Ancistrus* sp. *Peckoltia* sp. *Peckoltia* cf. *vittata*, and *Hypancistrus* sp;. The spots are characterized by having bedrock and vegetation on both banks, since the spot has the largest current than others, and riparian forest on the right bank of the river near Curuá-Una dam already devastated. The ornamental fishing is more intense and more productive during the dry season and the beginning of the flood of the Amazon, the stain was the most productive C with average production of CPUE of 75 individuals / fisherman / time, their productivity depends on the experience of the fisherman, the variation annual hydrological cycle (natural event), control the flow of the river because the dam (artificial event). Fishing for ornamental fish in relation to productivity is not homogeneous.

Keywords: CPUE, Ornamental Fish, River Curuá-Una, Stains production.

Characterization of ornamental fisheries loricariidae downstream hydroelectric of river curuá-una, Santarém-Para-Brazil

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This article presents a characterization of Ornamental Fishing and fishermen in the region downstream of the dam Curuá-Una, Santarém, Pará. This extractive activity has economic importance in western Pará, that since the 1980s with the decline of the gold cycle, ornamental fish have become an aquatic resource as an alternative to non-timber forest products. Ornamental fishery representative of the family Loricariidae popularly known as "Plecos" River Basin Curuá-Una, fishing occurs in specific environments such as rapids and pedrais, and the city of Santarém is the main trading center in this region of the polarizer. The study was based on data collections in 2012 held in major fishing areas Loricariids of the river Curuá-Una with the methodology "snow ball" through application of questionnaires to groups of fishermen community of Santa Maria and Buerú. Were described the characteristics of the socioeconomic fishermen of ornamental fish, forms of learning the profession, time working in the fishing, organization in collecting, fishing gear used, expenses, form of profitsharing, marketing of harvested species. The fishermen interviewed are from the city of Santarém, their ages ranging 17-42 years, have a low level of education, the family is composed on average by 5 people, began the craft of the profession very young, and have acquired their knowledge informed by another person's family or friends, time experience ornamental fishery is 10 years on average; their productivity depends on the experience of the fisherman, the annual variation of the hydrological cycle (natural event), control the flow of the river because the dam (event artificial); in summer fishing is intense and the average monthly income is U.S. \$ 600.00. Ornamental fishing is a manual collection by diving fisherman using the compressor and transported by a boat, fishing tackle used as a pacifier, mask, stick, belt weighing, plastic glass, flashlight, "basquetas" plastic for packing the fish. The knowledge generated allows you to record the current status, economic and social involving ornamental fisheries, which can support medium-term management plans and decision-making policies for the management of fishery resources, ensuring traditional communities sustainable ornamental fisheries.

Keywords: Curuá-Una, Fishermen, Ornamental Fishing, Ornamental Fish, Sustainable Development.

Use and occupation of the mangrove by traditional fishermen and seafood catchers of the Mundaú community - Trairi – Ceara - Brazil

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Fishing activities of traditional fishing communities are governed by empiric knowledge gained, accumulated and reproduced over many generations. This knowledge about the art of fishery, the characteristics of animal resources and the use of fishing gear is continuously replicated in daily life experiences and passed on along relationships between community members. The study of traditional communities' interaction with their environment therefor reveals a picture of the population's world view. In this context, the present study seeks, by way of an ethnoecologically inspired participative methodology, to reveal how the fishing communities that live in the proximity of the Mundaú mangrove in the municipality of Trairi use the complex mangrove estuary, to identify the socio-ecologic relations at work there and to show the importance of the natural resources for seafood production and for the community itself. A total of 24 randomly selected seafood-dependent community members, 8 of them men and 16 of them women, were interviewed in 2011 by means of semi-structured questionnaires. It was found that part of the mangrove area is used for habitation, and that in these places there is dumping of domestic waste. All of the interviewees exploited at least one resource of the mangrove by way of fishing or the collection of seafood, 70% of the harvest being destined for domestic consumption and 30% for sale. For fishing, trawling is the most used technique. With regard to the use of animal resources, we recorded the collection of fish, shellfish and mollusks, the most cited being mullets, crabs, shrimps and snails, with further details of catching techniques. Environmental problems identified were logging, the large quantity of waste thrown into the mangrove and the disorganized occupation of the mangrove. Social problems encountered were the neglect of the colony of fishermen by the community, which resulted in difficulties to obtain retirement rights and fishing licenses. The exploitation of these areas serves as a secondary income. The results obtained lead to a series of activities in environmental education at the site, resulting in a better conservation of the resources exploited and an improved quality of life for the community.

Keywords: environmental problems, environmental education, ethnoecology, fishery, mangrove.

**Urban agriculture in Santarém:
reproduction of knowledge and urban sustainability**

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The intervention of the Brazilian state with the integration process of the Amazon territory, in 1960, had a great influence on the City entertainment settings. In the city of Santarém this influence is reflected in its urban setting, with great influence of rural populations. Thus, the formation of the districts of Santarém, is related to agricultural production, determining the socio-territorial reorganization of the city. The persistence of habits and customs rural, urban space, is discussed here as urban agriculture. In order to identify and characterize the different urban agriculture activities observed in Santarém / Para (2 ° 24 '52 "S and 54 ° 42 '36" W), this study was conducted. Data collection was through visits to farmers in 2010 in 16 districts of the city, prioritizing intentional samples, through the technique of "snowball". Interviews were structured and semi-structured interviews with 56 urban farmers, and traverse the spaces of production by the method of guided tours, as well as raised species (plants and animals) and his present (s) purpose (s) of use . Farmers interviewed, 42 were women and 14 men, age of farmers ranged between 30 and 80 years, mean 53 years, mostly concentrated in the age group between 40 and 55 years (working age population according to IPEA .) Most respondents had low education .. As for the origin, 16 farmers declared as originating in rural communities, 12 are children of farmers, while others are connected to the field, where they learned the crafts and rural taste for planting and creating. Were observed in Santarém, six different urban agriculture activities (homegardens, fish farming, cultivation of ornamental plants, nurseries of forest species, horticultural and mini-farm), developed in different spaces: backyards, private lots and side streets. The occurrence of 247 plant species and 11 animal species, with different purposes of use. Activities contribute significantly to the income of farmers, either through direct income, from the sale of goods or indirect income, obtained with the economy resulting from the production of foods that fail to be bought in the local market. The practice of urban agriculture are the result of accumulated knowledge by farmers, factor determining the specificity of each activity and the layout of the production spaces, which reflect dietary needs, health and income thereof. The lack of private space, is not a determinant for development activities, as farmers rely on public streets and private lots to produce or expand production. The importance that the different exercise activities for farmers varies depending on the purpose of the production and of the products obtained may be more symbolic / emotional or more economic / social. All activities identified contribute to the promotion of citizenship, is ensuring products that improve the quality of life of families of farmers, is absorbing family labor available.

Keywords: Urban agriculture, family farmers, income, local knowledge, Amazon.

Homegardens in the contribution of food security of family farmers in the Northeast Pará

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The homegardens are agroecosystems composed of a variety of plant and small animal species, providing products that contribute to a diverse and healthy diet. The purpose of the study was to understand the contribution of homegardens for food security in small family farms in the Northeast Pará. Structured and semi-structured interviews, guided tours, direct observation and 24 hour recall were conducted to carry out a survey of plant and animal species in 18 homegardens and to verify the food consumed at 30 family farms, including those produced in the homegardens, those produced somewhere else, and those of industrial origin. Of the 130 species, 70 are food plants (44 fruit, 21 vegetable crops and 5 grains), 31 medicinal, 17 timber, 7 ornamental and 5 food animals. Of the 70 food plants, 94% were consumed, especially fruits (59%), followed by vegetable crops (30%) and grains (11%). Industrialized products such as bologna, artificial juice and chicken farm were consumed in higher percentages by farmers with no homegardens. Farmers with homegardens have access to a better nutritional status by consuming greater quantities and a variety of food from the gardens, especially fruits. Homegardens were important to introduce changes in diet, contributing to diet diversification and complementation.

Keywords: agroecosystem, food, Pará, yard.

Constraints of long-term landscape evolution and links to recent grasslands and agriculture within the pampas, Argentina

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The continental margin in the state of Buenos Aires is distinguished by a very flat topography, the so called Pampean flats. The Pampean flats are an important area for the agriculture, especially the grasslands for the cattle. The grasslands are situated within three different basins and form together with two mountain ranges a unique landscape. The geographical situation near the capital of Buenos Aires is very important for the local logistics. These mountain ranges, the Sierras Australes and the Sierras Septentrionales, show two different time-temperature histories. The evolution of the neighboring basins (Salado basin, Claromecco basin and Colorado basin) and the evolution of the mountain ranges were strongly influenced by the opening of the South Atlantic. Different thermochronometers like fission-tracks and (U-Th-Sm)/He dating will help to constrain the longterm evolution of today's topography and morphology. The data show that the recent topography and morphology is linked to a strong phase of exhumation in Mesozoic times but also was influenced by younger tectonics and or climate change. The evolution of the basins, and therefore also the Pampean flats, is directly coupled to the evolution of the Sierras Australes and the Sierras Septentrionales and is a good example how recent space for grasslands and agriculture is linked to tectonic and climate change processes from the past.

Keywords: basins, grasslands, morphology, topography.

Strategies for prevention, control and monitoring deforestation in the municipality of Brasil Novo, Pará, Brazil

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The municipality of Brasil Novo, located in the region of the Transamazon Highway and Xingu River, Pará State, contained in the "List of Amazonian municipalities priority for prevention, monitoring and control of illegal deforestation", since 2007, this list was established by the Ministry of Environment. Once a member of the list, the municipality suffers economic and financial sanctions, like the agricultural embargo, besides being forbidden to market their products and receive credit from official institutions. To exit this list and become a green municipality, it must: reduce deforestation to less than 40km² per year; perform the Rural Environmental Registry in 80% of its territory, excluded indigenous lands and protected areas; and have deforestation lower or equal to 60% of the average deforestation in the last two years. The aim of this study was to identify alternatives for control, monitoring and preventing deforestation, resulting in a new sustainable model of local development. A survey was conducted about the actions being performed by the Municipality of Brasil Novo in partnership with the Federal University of Pará and organized civil society to reverse the environmental crisis condition. Among the actions and strategies detected are: the implantation of demonstration units for recovery of permanent preservation areas and legal reserves; advances with Rural Environmental Registry in properties, that currently have amounted to about 360,781.54 hectares, representing 79,75% of the registered properties in the municipality; the incentive for sustainable forest management in the five agrarian reform's areas; and environmental education. By the year 2012, the county lost 258,876.69 hectares of its forest cover, corresponding to 40.66% of its territory. This way, Brasil Novo has been used practices that provide the deforestation decrease, economic progress and social inclusion, thus creating a new concept of local development.

Keywords: green municipality; forest recovery, local development.

II. WATER AND SOLIDS RESIDUES

Recycling of fluorescent lamps

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Fluorescent lamps are a simple and effective way to save energy. Therefore the European Union regulated by law, that in the future in private homes only energy-saving lamps (fluorescent lamps and LED lamps) may be used. Although these lamps have a long life time of several years, the amount of waste from such lamps will increase step by step. Questions arise, whether these lamps can be recycled and whether the technologies are already fully developed? The main components of the fluorescent lamps are glass, aluminum, plastic, and about 3% of the so-called phosphors. The phosphors serve to convert UV-light into visible light. Additionally all fluorescent lamps contain small amounts of about 5 to 20 mg mercury per lamp, which is a toxic and volatile heavy metal. For this reason, fluorescent lamps in Germany must not be disposed of together with other household waste, but should be collected as hazardous waste at special collecting points. So far in Germany only about 30% of the lamps are collected separately. These lamps are almost entirely recycled, but whereabouts of the 70 % not returned lamps are not known. The above-mentioned phosphors are containing 10 to 20% rare earth elements, e.g. Cerium, Lanthanum, Ytterbium, Europium and Terbium. By the improper disposal / recycling of 70 % of the total number of lamps not only the harmful mercury is emitting to atmosphere, but especially the very scarce and expensive raw materials are lost. The recycling of fluorescent lamps is limited on glass and aluminum caps at the moment. In addition mercury is separated to be reused. The phosphors can be blown or washed out and mainly stored as hazardous waste in special underground landfills for hazardous waste. Only recently a new technology seems to be available. A description of the possible recycling steps of the rare earth phosphors is shown.

Keywords: recycling, fluorescent lamps

Comparison of different biodegradation tests for bioplastics

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Bioplastics or biopolymers are a wide range of polymers with specific properties. Either they are made of renewable resources and / or they are biodegradable. Due to the higher price of crude oil the market for bioplastics grows constantly. Additionally the market demands for more natural, so-called green products. A CO₂ reduction can be achieved for the whole lifecycle. The utilization of biodegradable plastics should be focused on applications, where the degradability is a special product property. For example within the agricultural sector, mulch foils can be ploughed in after cultivating and harvesting the crops. Catering products made from biodegradable plastics can be disposed off together with food leftovers. Another example can be found within the waste sector, when composting or digestion is applied. However the biodegradability for such applications has to be tested and certified for producers and consumers of bioplastics. This can be shown by a specific label. In Germany the 'seedling' is a quite common label to certify compostable (aerobic, high solid content) bioplastics. Biodegradation is defined as a process, in which microorganisms and fungi convert the original material into energy, hydrogen, carbon dioxide, methane, nitrogen, water, salts, minerals and biomass. Biodegradation can take place under different conditions. The main factors are water and oxygen content, temperature, pH-value, nutrients, pressure, electron acceptors and light. In the waste sector most commonly biodegradation is used in industrial compost facilities or digesters. Composting conditions are aerobic with high solid content, whereas digestion is carried out under anaerobic, either high or low solid content conditions. Therefore it is crucial to specify tests to determine the biodegradability of bioplastics in different environments. There are several international test standards by the ISO committee for Biodegradability of bioplastics. Also the OECD published several guidelines for testing of degradation and bioaccumulation of organic chemicals. The test methods vary especially between anaerobic, aerobic, high solid and wet conditions. For reviewing these methods, aerobic (ISO 14851) and anaerobic tests (ISO 14853 and GB21 of the German landfill directive) were carried out in the Institute for Sanitary Engineering, Water Quality and Solid Waste Management in Stuttgart, Germany. The different methods are compared, to evaluate qualitatively the applicability, comparability, workload and costs. Hereafter suggestions are given for the introduction of a certifying scheme for various biodegradation environments.

Keywords: biodegradation, bioplastics

Environmental audit system of solid waste management in UFPA campus of Belém

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The National Policy on Solid Waste (PNRS), enacted on August 2, 2010, by Federal Law 12,305, is a new landmark in the way the issue has been addressed in Brazil. Prior to National Policy existed Decree 5.940/06 of 25 October 2006, which instituted the separation of recyclable waste discarded by the agencies and entities of the federal public administration directly and indirectly, through the selective collection solidarity, and their allocation to associations and cooperatives of waste pickers. Based on these standards, the Federal University of Pará (UFPA) as an institution of indirect federal administration implemented the Selective Collection solidarity at its headquarters. The present work aims to conduct an environmental audit system in solid waste management of this institution, from the diagnosis of the functioning of selective solidarity deployed, verification of legal compliance and non-compliance of its collection plan and the indication of improvements from result of the audit. For the study were used the conventional steps of an audit proposal on Environmental Audit Manual were applied checklist (checklist) legal compliance standards imposed by the decree, which is applied at four levels: committee member Coordinators Management and Planning Unit, in charge of cleaning (outsourced), and maids cleaning and collecting (also outsourced). According to the audit carried out at the Federal University of Pará, realized there were two main points. The first related to the answers of respondents who demonstrated minimal knowledge about the system of waste collection in the institution. And the second point noted, is that there is adequacy of responses to the reality experienced by visiting technical area. In almost all places Voluntary Delivery there was no proper waste disposal in their respective containers (plastic, metal, glass, paper). There were many mixed materials and also outside of the bins. Thus, it is clear that there is a strong concern with the management of waste, there is not continuity of policies related to the particular suitability of the Decree, is the lack of training effectively suitable for the collection and separation of waste.

Keywords: Environmental Audit, Solid Waste, UFPA.

Spring's flow evaluation in nova américa farm, Botucatu, São Paulo, Brazil

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The perpetuation of surface watercourses is ensured by springs, which come from groundwater. They are unique elements, with a hydrological, geomorphological and pedological complexity, still poorly understood. The study aimed to evaluate the behavior of the flow from a spring between the rainy and dry seasons, make comparison between rainfall and to highlight the importance of water conservation. The spring under study is located in Farm Nova America Watershed, South Central State, in Botucatu - São Paulo - Brazil. The watershed is located in Cuesta de Botucatu, and is confined between the following coordinates: 22 ° 55 '37 "and 22 ° 57 '42" latitude (S) and 48 ° 19' 04 " and 48 ° 22 '48" longitude (W) Grw. It was measured flow rates in liters per second at different sources and periods. The spring showed variation in volume of water, with 1800 l/s in the dry season and 2090 l/s in the rainy season, predicting that during the rainy season it is replenished by groundwater and provides greater volume of water. The regularization of water production is closely related to the management and conservation of soil and forest, at the headwaters of the watershed, targeting the sustainable use and conservation of water resources.

Keywords: spring, water, flow, watershed, water resources.

**Proactive actions for sustainability of water in watersheds,
Botucatu - São Paulo - Brazil**

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Water is a natural resource and it is essential for the survival of living beings on the planet. Anthropogenic springs, polluted and silted rivers keep the sustainability of water in watersheds in danger, and it all became the challenges of contemporary society. Their quality, quantity and proper use become fundamental to sustainable development, economic, social and cultural life of humanity. The Organization of the United Nations (ONU) declared the water decade from 2005 to 2015, with three themes of awareness: water for ecosystems, water for people and ecosystems to people. The study aimed to develop methodologies for analysis of hydrological processes, flow measurements in springs and the source of the watershed in Cuesta and, articulate actions in university focusing on water as an element of sustainability. The methodology of hydrological processes was developed in three environments: forest soil, soil contour, and bare soil. The processes were evaluated by precipitation (P), intensity (I), runoff (Qds), base flow (Qbf) and flow (Q) in environments with and without vegetation. Measurements of spring's flow and sources were made during the dry and rainy season in the watershed of Cuesta. Proactive teaching and learning actions experienced during twenty workshops from 1994 to 2013 in the laboratory of hydrology, in Núcleo Cunha, Forestry Institute, and more four symposiums, resulted in books, scientific articles and ten abstracts presented at the 5th International Symposium Brazil-Germany in Stuttgart, July, 2011. The hydrological parameters evaluated are demonstrating that the environment without plant cover, showed high (Qds) and low water infiltration, erosion and sediment entrainment. The environment with vegetation showed higher water infiltration into the soil resulting in high base flow (Qbf), which replenishes groundwater and gradually feeds the springs and rivers, ensuring availability and sustainability of water in watersheds. The flow of springs and watershed showed variations between the dry and rainy seasons. Also, the experience of students of graduation and post graduation in forest science from the Faculty of Agricultural Sciences - FCA - UNESP, in twenty years contributed proactively to articulate the teaching, research and extension, all focused on sustainability. Field researches in springs and dynamics of scientific meetings in workshops and symposiums have brought together researchers providing technical and scientific exchange, and updating technologies on the sustainability of water in watersheds.

Keywords: water, sustainability, watersheds, hydrological processes, workshops.

Ecohydrological modeling of streamflow and nutrient loads in a rural lowland watershed in Germany

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Lowland rivers and their catchments are typical ecosystems with small amplitude of altitude, low flow velocity and high groundwater table. Hydrological processes which occur in a watershed influence water quantity and quality in surface and subsurface aquatic systems. Nutrients enter surface waters through point or diffuse sources. Point sources can enter at fixed locations, e.g. wastewater treatment plant outlets or industrial point sources. Diffuse sources contribute through many different pathways and are highly dependent on land use and management. In surface water bodies, the input of nitrogen (N) and (P) plays an important role in water quality because these nutrients are essential for phytoplankton and macrophyte growth and for water eutrophication. The objective of this study was to model hydrological processes and nutrient loads using the Soil and Water Assessment Tool (SWAT) in a rural catchment in Germany. The river Stör, a tributary of the river Elbe is located in the lowland area of Schleswig-Holstein in Northern Germany. In this study, 462 km² of the upper part of the Stör catchment was considered, because the lower part is already influenced by the tide of the North Sea. The topography is very flat and varies between 90 and 1 m above mean sea level. The mean annual precipitation is 851 mm and the mean annual temperature 8.2°C. The main soils in the upper Stör catchment are Histosol, Gley, Gley-Podsol, Cambisol, Podsol, Planosol and Luvisol. Land use is dominated by arable land (42.1%) and pasture (33.1%). The major crops used in agricultural areas are winter wheat (13.7%), rapeseed (1.8%) and corn for silage (26.6%). The urban area represents 10% of the total area. The most important city is Neumünster with nearly 88,000 citizens. The mean streamflow at the outlet of the upper Stör catchment, at the gauge station Willenscharen is 6.0 m³/s. For the SWAT modeling, digital elevation model, soil map, land use map, historical climate database and management operations are required. Daily streamflow was calibrated for 1st January 2006 to 31st December 2011 and validated for 1st January 2001 to 31st December 2005. Monthly nitrate-N (NO₃-N) and total P (TP) loads were calibrated from August 2010 to July 2011 and calibrated from August 2009 to July 2010. To evaluate the performance of the model, measured and simulated values were subjected to a graphical comparison and statistical analyses using the following index performance parameters: coefficient of determination (R²), Nash-Sutcliffe efficiency (NSE) and percent bias (PBIAS). The results of daily streamflow from the outlet of the upper Stör catchment showed R²=0.86, NSE=0.86 and PBIAS=1.1% for the calibration, and R²=0.84, NSE=0.83 and PBIAS=6.1% for the validation, indicating a very good agreement between measured and simulated daily streamflow values. The results of monthly NO₃-N load simulation presented R²=0.92, NSE=0.92 and PBIAS=0.2% for the calibration, and R²=0.94, NSE=0.86 and PBIAS=24% for the validation at the gauging station Willenscharen. TP load showed R²=0.86, NSE=0.85 and PBIAS=-1.7% for the calibration, and R²=0.70, NSE=0.65 and

PBIAS=9.2% for the validation, indicating a successful performance of the SWAT model to simulate $\text{NO}_3\text{-N}$ and TP load. The SWAT model represents a very useful tool to understand the hydrologic and nutrients processes that occur in the watershed scale. Also, after the calibration and validation of the model, it can help catchment managers to improve water quality using best management practices in the future.

Keywords: total phosphorus, nitrate-nitrogen, SWAT model, point and diffuse pollution

Solid waste in Belém: The systems for collecting and final disposal

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The present study aimed to address the management of solid waste in the city of Belém, because one of the major challenges to deal today is to find an effective and appropriate for the same, without affecting human health and without causing risks to the environment. In the capital waste production is approximately 1.500 tons per day, being part of the provisions of the dump Aurá. In this space, are deposited many types of waste in an incorrect manner. View

of this, the most appropriate method to dispose the solid waste selective collection, today being the most correct to be used to improve both the question of final garbage disposal as well as social problems involving the subject. In the town of Belém, that system it is still very precarious, its deployment does not include all of districts of the municipality hence brings with negative effects. The methodology used in this study is based on a bibliographical survey

through articles, books, websites, and then dice were collected in the department of solid waste of the public body responsible, the Sesan (Department of Sanitation). Having possession of all this material, it begins the phase of analyzing the data, therefore, the discussion about the correct management of waste in Belém. The final disposal of solid waste in the city of Belém happened in a disorganized manner and without any concern for environmental matters. The dump the Aurá is a location that presents a series of required criteria by the technical standards. All these factors contribute to different impacts that occur in social, environmental and economic activities in the city. Based on the results obtained through this research, it can be stated that both the final disposal of solid waste as a separate collection in the city of Bethlehem is deficient, since there is a neglect by the government, because it does not provide educational policies that help to better inform the public about the issues regarding the method of collection. So the best way to mitigate or even reverse this situation is the expansion of selective collection programs, through environmental education and sanitary, involving segments such as: information, orientations, clarification and awareness.

Keywords: solid waste, management, selective collection, transportation, final disposal.

Spatial distribution of infection occurrence by *trypanosoma sp.* in ornamental catfishes captured in Curuá-Una downstream river, Santarém / Pará

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Trypomastigotes parasites are often found in freshwater fish, however systematics of this group is in intense changes. As representatives of the family Loricariidae, captured for the ornamental trade downstream Curuá-Una river, already noted the hematozoan (Trypanosoma). The implication that these trypanosomes may have regarding sanity and future marketing of ornamental catfishes has not been evaluated. The present study aimed to observe the occurrence of infection of Trypanosoma sp. in ornamental catfishes through of spatial distribution in three capture points, called spots productivity, downstream river Curuá-Una, Santarém / PA. For six months (September-December 2012, January and May 2013), the species were captured: Pseudacanthicus sp.; Hypostomus sp.; Leporacanthicus heterodon; Panaque sp.; Ancistrus sp.; Peckoltia sp.; Peckoltia cf. vittata; and Hypancistrus sp. by fishing submerged in three spots productivity (collection points): “A”, “B” e “C”, with 1h stress / stain, within 6 months. Points are characterized by presenting bedrock and vegetation on both banks, the coordinates were plotted by ArcGiss ® software. The fish were packed in polypropylene bags and sent to the Lab of Aquatic Biology / UFOPA where registered biometric data (weight - kg, total and standard length - cm) of each specimen then were then anesthetized and subsequently, was made a caudal puncture and blood extension blade with Fast Panoptic Kit. The detection and quantification of hemoflagellates were performed under an optical microscope. We analyzed 78 fish, with 46 positive for Trypanosoma sp. (58.97%). The total parasites found were 1.367, while the maximum number of parasites was observed in a 178 Peckoltia cf. vittata, the spot “C” in the month of December 2012. In the month of May 2013 was the highest observed mean intensity of infection (64.66), in time of flood peak and high volume of precipitation, while in October/2012 found to lower average intensity (4). The “A” stain was observed at higher mean intensity of infection (30.72) and the lowest intensity was in the spot “B” (30). The monthly observation showed that the highest prevalence occurred in December 2012 at the time of river flooding and early rainfall, the lowest prevalence were in the month October (20%), September (33.3%) and November (50%) of in 2012. The spot “B” had a higher prevalence (63.63%), which is the deepest point and is where submerged tree trunks are, then the “A” stain with 54.54%, and finally the “C” spot with lower prevalence 32.20%. In most of the analyzed fish observed ectoparasites class Digenea.

Keywords: ornamental; hemoflagellate; UHE Curuá-Una; catfishes; stain productivity.

Watering Amazon - Reuse PET bottles in ecological bags

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The Brazilian Amazonia has the biggest tropical continuous forest of the planet, which houses great mineral, fauna and hydric resources and biodiversity of vegetable. This region takes 60% of the national territory and 12% of Brazil's population (about 25million people). As a result of the historic dynamic of occupation of this region, the most important cities of Amazonia are located at the bank of rivers of a various sizes and ecological importance. This data puts the urban occupation and the solid residues management in equal importance as the deforestation issue, although that issue has received less attention. Until now, the cities present great difficulty in transforming the solid residues in reusable prima materia. Santarém, 294.580 habitants (IBGE: 2010), a medium size city, situated at the bank of two great rivers (Tapajós and Amazonas) is one of these critical cases. The production and dispose of inappropriate waste is a problem that affects the urban environmental health and ecosystem of 'valley' and 'onshore' (várzea and terra firme), some of high ecological sensibility. The recycling is born as an alternative for the reuse of these residues. In this way, one of the goals to minimize the problem was to elaborate an enterprising project with the intention of generation and consolidation of the sustainable development, through the installation of a PET extrusion factory (transformation of PET to polyester fiber) at Low Amazonas region. The polyester fiber will be used in fabrication of returnable bags. With this added value to PET, we have income generation and reduction of social vulnerability of municipal trash collectors. This is the general purpose of RegarAmazônia project (reutilization of PET bottles in ecological bags), idealized by UFOPA's students of Economic Science.

Keywords: Recycling; Industry; Cooperative Collectors, Santarém.

Micropollutants with hormonal activity in the water cycle

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In the recent years many papers have been published covering the topic of endocrine disrupting chemicals (EDC) and their effects on the environment. EDCs are substances capable of interfering with the endocrine system, and up to now several hundred of chemical compounds have been identified as such. Adverse effects of EDCs have been described in scientific literature, for example, for mollusks (imposex - caused by tributyl tin), fish (incidence of hermaphrodite/intersex species and feminization - caused by wastewater), alligators (reproductive abnormalities - caused by pesticides) and more. There is a strong likelihood that exposure to EDCs during sensitive stages of development (fetal life, puberty) is connected to infertility, hormone-related breast and prostate cancer and other diseases. Although, the endocrine system involves a variety of different hormones and the respective glands secreting them, research so far has mainly focussed on compounds with estrogenic activity. EDCs with estrogenic activity can be divided into four groups: natural steroids (sex hormones, such as 17 β -estradiol and estron), synthetic steroids (e.g. active substances in contraceptives, such as ethinylestradiol), compounds produced by plants with estrogenic effect (estrogenic phytohormons, e.g. sitosterol) and industrial chemicals (xenohormones, e.g. nonylphenols, some phthalate plasticizers, bisphenol A and others). Among the 33 substances listed as priority substances in the European water frame work directive 2000/60/EG there are also some endocrine disrupting chemicals: 2,2',4,4',5-pentabromdiphenyl ether (flame retardant), diethylhexyl phthalate (DEHP), endosulfane and tributyl tin (pesticides), octyl- and nonylphenols (degradation product of tensides). In general, the representatives of the natural and synthetic estrogens are by 4-5 orders of magnitude more biologically active than those of the other two groups, their concentrations found in the aqueous environment lie in the ng/L range, whereas those of the other two groups lie in the μ g-mg/L range and therefore constitute so-called micropollutants. The sex steroid 17 β -estradiol, which is the most potent estrogen known, is capable of inducing the egg yolk precursor protein vitellogenin in male rainbow trouts already at concentrations of 0.5 ng/L - usually it is only expressed in females. Effluents of wastewater treatment plants (WWTP) have been identified as main source for EDCs in the aquatic environment. Thus investigations regarding the fate, the transport from and to different compartments (waste water - surface water - groundwater - potable water) and the efficiency of elimination of EDCs in the different steps of wastewater treatment have become a subject of intense research. In this paper we present results of recent investigations, in which the E-Screen assay, a biological *in-vitro* testing system based on human breast cancer cells (MCF-7), was used to determine the total estrogenic activity - an effect based summary parameter - of various samples. Estrogenic EDCs in the sample bind to the estrogen receptor of the cells and cause an increased cell proliferation; this effect can be quantified using a standard colorimetric assay for protein determination. Thereby, dose-response

curves are obtained, which are compared to the curve of the reference substance 17 β -estradiol. The E-Screen assay is a reliable and reproducible method for the determination of estrogen active substances, even at very low concentration levels in the ng/L range. Special focus of the studies was on the determination of elimination efficiencies in WWTPs, source identification covering the testing of individual "suspect" chemical compounds, and the investigation of mineral water.

Keywords: endocrine disruptors, E-screen assay, hormonal activity, estrogens, waste water

Sustainable water supply and wastewater treatment as a contribution to environmental protection

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Water as basic resource for living is not replaceable. According to the UN-General Assembly for Human Rights people are entitled to water and sanitation. Normally, groundwaters and surface waters are used as a drinking water reservoir or else as bathing water. For this reason the resource water must be sustainably protected. Water which is polluted by e.g. toxic substances or pathogenic microorganisms, causes waterborne diseases in the population. The quality of drinking water is subjected to clearly defined criteria. They can turn out differently, depending on the use of water. In addition to the direct human consumption, the water is used for irrigation of agricultural land as well as in the industry for different production steps and as product inlet. Based on the above mentioned considerations it is, besides a reliable water treatment and distribution, also inevitable to have a secure wastewater draw-off and treatment before discharging the water. The contribution concentrates on the necessary conditions for a reliable drinking water distribution and the sustainable drainage and treatment of urban and industrial wastewater, as well as the effects on the population and the environment, by discharging insufficiently purified wastewater into water bodies. Urban wastewater includes different substances, which can have negative effects on the population and environment. It includes, among other substances, pathogenic microorganisms, endocrine active substances (EDCs), as well as medicine residues. These substances can cause (long-time) damages on humans and animals and may represent health risks by bio-accumulators. In addition, there are high concentrations of nutrients as nitrogen and phosphorus, which are, during higher appearance in the nature, which are known to be responsible for eutrophication.

The composition of industrial wastewater is very dependent on the considered industry. Thus, no fixed compositions of the wastewater can be specified. Consequently, the wastewater needs to be separately regarded from every branch of industry and must be treated before discharging into the public sewerage. Most urban wastewater treatment plants are not constructed for the simultaneous treatment of industrial wastewater. Generally, a sustainable drainage and treatment of wastewater must be realized, so that sufficient protection of population and environment is guaranteed.

Keywords: wastewater, drinking water, industrial wastewater.

Potential production of water flow through the watershed of Cuesta in Botucatu, São Paulo state - Brazil

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This study aimed to evaluate the production potential of water's flow through the watershed of the stream of the farm New America in two seasons: dry and rainy. The watershed is located in Cuesta of Botucatu - SP and is confined between the following coordinates: 22 ° 55 '37 "and 22 ° 57 '42" latitude (S) and 48 ° 19' 04 "and 48 ° 22 '48 "longitude (W) GRW. The determination of river flow was done by the method of "area-speed", which consists in determining the average flow velocity in m/s in a cross section of the watercourse, multiplied by the area of this section in m², for obtaining the flow in m³ / s. Water velocity was estimated in meters per second, using the method of the float. To obtain the flow, was selected cross section of the river that is the end of the watershed, thus having the greatest flow of water flow (Q). The area was obtained by measuring the width of the river, then sub-divided into (n) sub-sections 20 inches wide (L), which were measured depths (H) of each section for the definition of geometric figures. The flow in the dry season was 0.72 m³/s and in rainy, 33.77 m³ / s. It was concluded that due to the large variation in the data collected and the high value of the discharge peak, this watershed is in the process of degradation, probably caused by human action. The land misused associated with lack of soil conservation practices are factors that indicate the low conservation of the area.

Keywords: dry and rainy season, flow, water, watershed.

Potential use of rain water for supply: the campus basic UFPA – Belém

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The use of water for purposes of drinking water need to be glimpsed throughout your cycle to minimize the deficit, as occurs in the Amazon. An alternative is the use of rainwater, yet quite neglected. This paper shows the use of a simple method to define the potential use of rainwater in 57 buildings of a campus basic UFPA in Belém. Therefore, considered the place rainfall, areas of roofs and specific demands. In all buildings investigated the potential use of rainwater is positive throughout all months of the year, which shows that can be filled by rainwater. What is a good example of how the use of this feature can expand the supply of Amazonian zone. To measure the potential of harnessing rainwater Campus Basic UFPA in Belem, the method employed in this work has the same base that employed by Ghisi et al. (2006) and replicated by Lima et al. (2011) regarding (a) determining the availability of rainwater; (b) Identification of infrastructure funding, and (c) definition of demand. But more specifically adopts the method of Flores et al (2012). The availability of rainwater was obtained from measurements of rainfall from the Belém area provided by the National Institute of Meteorology (INMET, 2011) and were used for the demands of daily consumption data measured raised by Sá (2012) in its 57 buildings Basic UFPA campus. To calculate the potential for exploitation is considered that for each 1 mm of rain that falls on 1 m² of roof is raised 1 liter of water. So if there is 100 mm of rain for a month in a 100 m² roof would be captured 10,000 l or 10 m³. The potential is expressed in% of meeting demand. In general set of data, the monthly volumes of accumulation are quite varied, the highest was 1,694,265 liters and 3330 liters smaller. In general, all buildings studied have positive potential of harnessing rainwater (in% positive), in other words, all 57 buildings of the Campus Basic studied can be safely supplied with rainwater. More than one way to define the potential for the buildings studied, the method employed demonstrates its ease, practicality and applicability. It is understood so that our efforts can contribute to the expansion of the use of rainwater and, by following, with the expansion of the scope of supply systems in the country.

Keywords: Amazon, rain water, water resources.

The impacts of urban effluent release and importance of sewage treatment plants

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Lack of sanitation and/or its inappropriate implementation is still a serious social environmental problem that affects Brazil. One of its main reasons refers to the high cost of the infrastructure works for water treatment and sewage, as well as for their maintenance. Although it is recognized the importance of the sanitary system, there are still few investments in this sector. Many Brazilian cities do not have any sewage treatment, implying in an unbalance not only social, but primarily environmental that directly affects the quality of life and the environment. This work traces through a qualitative research an overview of the sanitary situation in some Brazilian cities: (1) The environmental aspects and impacts were identified, in particular the negative ones, generated by lack of sewage and inappropriate release of urban effluents; (2) It is presented a brief analysis of significant environmental impacts related to the absence of a Wastewater Treatment Plant - WWTPs. The results revealed the urgency to implement public and private policies of sanitation which allow higher quality of life for the population and the environment.

Keywords: negative environmental impacts, sewage, urban effluents, treatment plant, wastewater.

Utilization of rainwater in public schools of Belém, Pará state

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The objective of this study is to quantify the volume of rainwater that could be captured annually to supply 06 public schools in the Belém city and assess how many people could supply each school monthly for this water and to propose the design of systems supply using rainwater and are able to meet their demands according to local rainfall characteristics and contribute to the sustainability of water consumption in schools. Schools are investigated: (a) Social Center Auxilium (b) State School Dr. Justo Chermont (c) Municipal School Almerindo Trinity; (d) Municipal School JosinoViana (e) Municipal School Palmira Gabriel, (f) School SalesianLabour. To determine the volume of water that could be used in each school were checked the roof area with the ability to capture and per capita consumption of water each institution and monthly rainfall of Belém. The measurement was carried out through the roofs of the tool and Google Earth AutoCAD software. The measures were satisfactory as compared with measurements taken in situ show an average error of 0.9989%. The per capita consumption used in the study was 50 liters / day per person, an amount determined by NBR 7729 (1982). The local rainfall was provided by the National Institute of Meteorology (INMET 2011). Was used the Normal Climatological historical series of thirty years (1931 to 1960 end 1961 to 1990) Season 2 ° DISME institute corresponding to the city of Belém. The capacity of water that could be used in each school is: 10511.12 m³ / year (Centro Social Auxilium); 7495.02 m³ / year (Dr. Justo Chermont); 4775.61 m³ / year (Almerindo Trinity); 1332.35 m³ / year (JosinoViana); 4668.06 m³ / year (Palmira Gabriel); 26114.25 m³ / year (SalesianLabour). The calculation of the amount of people who could supply each school with use of rainwater was carried out by obtaining the precipitation monthly rainfall of the Belém city, and assuming a system of water supply in the months where rainfall is higher. The number of people that each school is able to supply per month is: 685 persons / month in Social Center Auxilium; 418 people / month in School Dr. Justo Chermont); 267 people / month Almerindo Trinity School), 111 people / month in School JosinoViana, 217 people / month at Palmyra School Gabriel; 1,341 people / month at Salesian School of Labor.

Keywords: rainwater, schools, water

Analysis of the influence of solid waste disposal in water Altamira-PA Stream

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This research had as its object of study the Altamira stream, which is a sub-basin of the Xingu River, which is located in the urban area of the municipality of Altamira, Pará. This stream can be identified numerous environmental problems related to the inefficiency of urban planning and lack of care for the environment, as the accumulation of waste around this water resource. This study aims to analyze the inadequate disposal of waste generated in homes, allowing the bad water runoff in the stream, and can contribute to the physical and chemical changes of water. The methodology adopted were two stages, the first of which consisted of literature research, qualification and quantification of the waste generated in households, for that were conducted questionnaires and weighing the waste sample. In the second stage were made photographic records and processing the data from the previous phase. There is a large number and diversity of waste produced in homes that have recycling potential and are discharged directly into the stream, as found in the survey. Given the results analyzed, it is proposed to comply with the mitigation measures imposed on the company in charge of Belo Monte Dam, which includes the recovery area of the stream. In addition to independent actions of the City to ensure the maintenance of the environment and quality of life.

Keywords : Altamira, Altamira stream, hydric runoff, Pará, solid residue.

Resources management at the example of construction industry – improving resource efficiency and exploitation of materials, stored in waste and anthropogenic stock

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Background of the oral presentation is a status quo analysis regarding material and resources management of construction industry in Paraná carried out in december 2012. Therefore FIEP/SENAI-PR has organized bilateral meetings, company visits and workshops in the region of Curitiba involving relevant stakeholders of respective sectors of construction industry (including disposal economy). The expert regarding resource management and construction industry was provided by University of Stuttgart (Working Group “Resources Management and Industrial Wastes”). Ministry of Economics, Baden-Wuerttemberg contributed with financial support. Sustainable and cost-effective resource management systems can be implemented within individual companies, company cluster, complete sectors of the economy or even for a geographical region, municipal structure etc. As a first processing step towards a future implementation, some basic data has to be collected, balanced and aggregated. This includes amongst others, information regarding flows of material, energy, resources as well as monetary flows. Boundary conditions, such as relevant stakeholders, market situation, quality management, regulations and legislation has to be identified and considered in a appropriate way. This basic data can be used in subsequent processing steps to determine approaches for concepts and systems towards an integrated resources management. Regarding the improvement of resource efficiency a “Quick Check” as a fast method for the determination of “Hot Spots” for resource-saving will be illuminated. In addition, aspects of material recovery and “Urban Mining” and will be highlighted - showing the relevance of raw material stored in construction/demolition waste and anthropogenic stock. Starting from actual situation regarding data availability and ongoing data mining, approaches for a stepwise development and implementation of resource management will be shown at the example of construction industry in Paraná. Transferability to other regions and economy sectors will be indicated.

Sediment classification in a subtropical reservoir using echosounder technology

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Since long term management strategies for reservoirs become more and more important around the world, but especially in Brazil. The sediment in the reservoirs plays a major role in the context of eutrophication, Greenhouse Gas production and loss of storage volume. Therefore the application of modern techniques for sediment detection and classification are needed. In this study a combination of a Kongsberg EA 400 single beam echosounder with 200 and 38 kHz frequencies combined with the sediment classification tool of the post processing software Sonar5-pro was used for sediment characterization. The survey was conducted in the Vossorooca reservoir in south east Brazil, close to Curitiba. The main goal was to describe the optimal configuration settings for a single beam echosounding system in terms of sediment characterization in shallow fresh water reservoirs. During the survey 11 Sediment cores and 23 grab samples were collected at 34 different positions, in parallel the sediment at each position was ensonified for at least one minute (ca. 300 pings) while the boat was kept exactly at the same position. Various pulse length and input power configurations were tested. Using the Sonar 5 Seabed Classification Tool, the attack (hardness/ AttackSv1/ E1') and a decay values (roughness/ decaySv1/ E1) were exported for the first bottom echo as well as for the second bottom echo (attackSv2 and decaySv2). In addition to the "basic" attack and decay values, two values derived from the "first echo division method" (E1'/E1) and the "first/second bottom ratio method" (E1/E2) (Orlowski 1984) were produced. Then all echo values were correlated with a list of analyzed chemical and physical sediment parameters, like total C, total P, density, LOI and granulometry. Correlations between echo values and grab samples were considered separately from the correlations with core samples. Very high correlations, up to $R=0.91$, were found with the granulometric features as well as LOI and density of the sediment. In general the grab samples were significantly less reliable than core samples. In addition it could be shown that the 38 kHz frequency was clearly better for sediment feature detection than the 200 kHz frequency.

Keywords: echosounding system, reservoirs, "sediment characterization", Vossorooca reservoir.

Membrane technology application in wastewater treatment

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With over 150 realised membrane bioreactor (MBR) plants WEHRLE Umwelt GmbH is one of the leading plant engineering companies in the field of this technology. These plants are used for the treatment of industrial wastewaters as well as landfill leachate. In the MBR process the wastewater is treated in order to meet the requirements for its reuse or direct discharge. With an extensive know-how in biological, physical and chemical wastewater treatment, WEHRLE Umwelt GmbH is in position to design target-aimed process combinations that offer our customers an intelligent and innovative solution to their wastewater treatments. WEHRLE can provide a whole range of services right up to the delivery of turn-key plants, like concepts, laboratory plants, pilot plants, plant engineering, construction and fabrication control, commissioning, maintenance, service, plant operation and financing. The patented MBR technology – the *BIOMEMBRAT*[®] – combines the advantages of a highly efficient aerobic treatment and the most stable and reliable side-stream membrane separation. In the biological process, bacteria in an aerated reactor break down the biodegradable contaminants. The external “side-stream” membranes filtration retains completely all bacteria and suspended solids. WEHRLE’s bioreactor design is ideally adjusted to the biological, kinetic and mass transfer requirements of the microorganisms. The maintenance-free aeration system used by WEHRLE contributes to the ideal conditions for the biological process, due to the excellent homogenization and mixture of biomass, oxygen and pollutants. Also the use of specially selected ultrafiltration cross-flow membranes plays an important role in WEHRLE’s MBR-Design. The obtained higher concentration of biomass in combination with a specialized biocenose and excellent metabolism rates results in an optimized bioreactor and membrane concept, and therefore in very compact and reliable plants in comparison to conventional activated sludge and submerged MBR plants. Like this, WEHRLE puts into practice the best of the biological treatment together with the latest ultrafiltration technology. Further treatment of the obtained treated wastewater can be achieved when combining the *BIOMEMBRAT*[®] technology with Nanofiltration or Reverse Osmosis membrane filtration units to accomplish with stricter discharge or reuse parameters. For treatment of the concentrate produced in these membrane filtration units, WEHRLE offers different physical-chemical technologies to reduce the concentrate flow or even treat it up to direct discharge. WEHRLE Umwelt GmbH is represented in many countries, with subsidiaries in Brazil, Spain and United Kingdom, and many licensed partners in countries like France, China, India, Malaysia, Saudi Arabia and Thailand.

Keywords: wastewater treatment, membrane technology, membrane bioreactor

Related factors a mass movement in coastal of Paraná state

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The mass movements at the states of Rio de Janeiro, Santa-Catarina and Paraná are frequently in Brazil. At east of the National Park Saint Hilaire Lange, coordinated 25° 34' 23.85" South 48° 36' 51.04" east, state of Paraná, it is located the sedimentation area, nearby Santa Cruz river. The water supply was interrupted for several weeks and cannot supply the necessities of the municipalities Paranaguá, Morretes e Antonina, because was completely damaged. The aim of this study was to identify edaphic-climate factors, related with mass movement and sedimentation area, was resulted from mass movement, in 2011. The results indicated that the right rates of rainfall at the month, 577.30 mm and at the day 103, 20 mm, associated with soil characteristics can promote mass movement and degradation area. The diagnosis from edaphic-climate factor, contribute as a tool for restoration at deforested areas. According to the soil map of Paraná state (EMBRAPA, 2008) Cxbd24 and Cxbd19 are soils of occurrence at sedimentation area.

Keywords: National Park Saint Hilaire Lange, soil, climate.

III. RENEWABLE RESOURCES AND CLIMATE

**Characterization of charcoal of açai lump (*Euterpe oleracea* Mart.)
produced slope furnace**

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The present study objectifies the characterization of açai lump's coal, produced in slope oven. According to chemical and physical tests performed in açai lump's coal, it has been possible to determine the mainly features in order to qualify the coal, like Calorific Value, Humidity, Basic Density, Bulk Density, Friability, Fixed Carbon, Volatile Materials and Ashes Content. Among the obtained results, there are the average values: 23,33% of Volatile Materials, 29% of Friability and 0.06% of Coal's Humidity. Based on this results, it's possible to conclude that the açai lump's coal, produced in slope oven, obtained in the present study, when compared to others vegetable coals, placed in the specialized literature. It has great quality and might be applied, in most of the uses, as the replacement of wood vegetable coal as well as provide new possibilities for this waste which is usually discharged and becomes a huge agent of urban pollution in most of Pará's cities.

Keywords: Amazônia. Recursos florestais. Fitoenergia

Biomass operated Data Computing Centers – A Chance to balance Energy Infrastructures?

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Beside the availability of fossil and renewable energies another severe future challenge is the discrepancy and distance between energy production possibilities and consumption requirements. While especially in metropolis cities the demand of energy increases dramatically in many other areas energy e.g. in form of biomass is unused or inaccessible. This proposal focuses on a scenario that may help to adjust energy consumption and generation by removing heavy energy consumers from metropolis centers to rural areas. This may not only relax the heavy load of energy infrastructures, it may also generate many other additional benefits as to society and ambient. Many continents and countries are still dominated by infrastructures that were created in colonization decades. Availability of special goods, like minerals or fruits on one side and ports on the other side favored locations where nowadays giant cities and metropolis are located. Back country lost its importance to life when industrialization substituted labor, which created a lot of additional social pressure to the metropolis. The availability of sustainable energies may modify those traditional structures again, considering that in parallel social and work structures are changing at the same time. In metropolis cities not just the increasing demand of energy causes challenges. Current traffic, water and further infrastructures do not meet the requirements of rising standards of life. Also in factories the impact of work is changing. Computers and robotics are doing more and more individual manual work, while engineers control them from remote locations. Business and production is decoupling continuously introducing individual production to demand. Considering these developments the question must be: “Is it still necessary to locate factories close to the big cities?” And the answer is that those consumers of energy must not necessarily be there. It is already practice that engineering teams are working simultaneously at different places in the world, using servers and data processing centers in different continents and manufacturing finally at even other locations distributed all over the world. Why not transfer big consumers of power to those places where sustainable power, e.g. generated by wind and biomass is available? As described before big factories do no longer demand huge amounts of employees to operate the machines locally. In many companies there are more people employed in administration or development departments that do not have any personal contact with their production sites. Even more this applies to the data centers of many companies that are already outsourced anyway or at least duplicated to remote locations. Access to them is allowed to only few people, due to security reasons. Those are conditions that allow them to be allocated to almost any site in the world. This proposal will analyze impacts of remote data centers, operated with biomass and wind power on back county side, to energy and social structures. It is expected, that especially data centers may benefit enormously from such changes, because zero-CO₂-operation, fixed pricing for energy and improved security may be very attractive. But also impacts to technical infrastructures and society will be addressed. Finally the author is looking for partners to develop a respective pilot project.

Keywords: Biomass, Data Centre, Remote Operation, Energy Balancing.

Small-Scale Solar Energy in Brazil: Responses to Net-Metering and Democratization of the Grid through Distributed Generation

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New legislation introduced last year by Brazil's electricity regulator requires distributors to be complicit with net metering. A policy previously implemented in countries such as Japan and the United States, net metering creates favorable conditions for small-scale solar power by guaranteeing compensation for excess generation among grid-connected individual producers. This paper focuses on the immediate effects of the new policy regime on domestic photovoltaic (PV) installation and its democratizing potential for the Brazilian electrical grid. The Brazilian electricity matrix ready boasts a high participation of renewable sources. Yet lower effects on climate change come in the form of controversial hydroelectric dams that displace indigenous peoples, alter local terrains, and create monopolistic conditions for utilities, large power companies and developers. On the other hand, widely distributed PV could democratize control of electrical and political power – creating jobs, household assets, and a material stake in grid management and makeup. This paper addresses the challenges and opportunities for a Brazilian solar movement still in its formative stages, with the potential of diversified energy sources and participation in mind.

To begin with, how well suited are Brazilian resources and demands to a distributed solar energy future? To what extent do current regulations, norms and contracting practices favor large-scale power plants over distributed generation? And is ANEEL's net metering legislation an effective spark towards that future? Will commitments to provide compensatory credits to small-scale producers be duly and reliably fulfilled? Alternatively, are requests facing bureaucratic obstacles or backlogs that in practice dissuade installation and undermine the policy's goals? These questions are addressed through the lens of previous experiences with net metering, and evaluated to produce a prospectus of how the policy might play out in Brazil. Analysis of Brazilian energy systems, project auctions, and corporate profitability are illustrated with public documents and through interviews with private, public and non-governmental actors. Details on the actual effectiveness of the new rules are explained through experiences in dealing with panel producers and distributors, as well as interviews with regional PV system installers.

Keywords: Solar power, distributed electricity generation, net metering, democratization.

Climatological analysis of Belem-PA from 2001 to 2012

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Currently the urban centers are places of great expansion and concentration of population and economic and social activities that modify their metabolism causing changes in biophysical support that characterizes. This strong density, translates into human interventions on the cities and the urban environment, which can refer to pollution, the construction of buildings and pavements, reducing vegetation, among others. The urban environment includes natural, artificial and socio-economic elements that allow you to understand your metabolism and its dynamics, and the knowledge of factors and causalities that interfere, whether natural or anthropogenic in origin, it is essential in the study of urban climate "results from modification of the General conditions by the physical characteristics of the city (including the urban morphology) and the urban metabolism", (Andrade, 2007 modified & Alcoforado). The climate study for the urban environment it is important to understand the great variability of climatic phenomena, this paper proposes to analyze the climatology of the municipality of Bethlehem between the years of 2001 to 2012 with the goal to demonstrate the climatic variations arising in the city between the years, aiming at analytical comparison of the data, with a view on the understanding of the variability and trend of average temperatures maximum and minimum, from the air, precipitation, relative humidity, total insolation and evaporation rates, whereas the urban climate is a complex system and constant variance in the middle.

The city of Belém, capital of the State of Pará, Belém metropolitan region in the northeast of Bethlehem and with latitude -1.43° and longitude -48.43° . For this study we used information from Belém-PA (WMO: 82191), provided by the National Institute of meteorology (INMET).

The data were analyzed year after year, since 2001 the climate for 2012 with the climatological normal which is standard for this type of climatological analysis. For the results of average temperature, there was an increase of 1.57° C in the year 2009 and a decrease of -0.08° C in the year 2008. Maximum temperature data, there was an increase of 1.78° C in the year 2010 and a decrease of -1.15° C in the year 2008 and the results of minimum temperature noted an increase of 1.72° C temperature in the year 2011 and a decrease of -0.15° C the following year. Analyzing the contents of precipitation we see that in the year 2012 there has been an increase of 295.4 mm and in the same year we observe the decrease of -70.3 mm. for relative humidity, there was an increase of 2% in the year of 2008 and a decrease of -8.02% in the year 2001. In heat stroke there was an increase of 28.4 in the year 2009 and there was a decrease of -50.6 in the year 2003 and for the Evaporation rate presented an increase of 66.3 in the year 2005 and a decrease of -31.4 in the year 2009.

Keywords: Climate, Urbanization, Weather elements.

Energy efficiency and renewables for communities – approach and results

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Communities play a key-role in reducing the emission of CO₂ and its equivalents. Three aspects substantiate this claim: more than 60% of the primary energy consumption in Germany (excluding transport) occur in towns and cities; the potential for energy savings in buildings (in Germany: heating and domestic hot water) is high; Rising energy costs are motivation for energy savings. On the other hand, the community is only rarely the owner of the building. The implementation of measures therefore requires the participation of citizens. In a research project funded by the federal Ministry of Education and Research, the city Leutkirch scientifically supported by the Biberach University is looking for ways to encourage citizens to use renewable energy sources for electricity and heat generation and to reduce energy consumption by improving the building envelope. Joint actions were preferred during the process of public participation. However, most of the measures increasing energy efficiency are based on specific actions in households or on the energy efficient refurbishment of buildings mostly owned by individuals. In the presentation both the technical aspects as well as the process of public participation will be presented together with first results. For the evaluation of different concepts of public participation two quarters with different properties were chosen: An urban area with homogeneous buildings and a village with a heterogeneous population and also heterogeneous building structure. Technically and scientifically renewable energy for heat and power generation (PV) was presented and evaluated under the aspects of feasibility and cost during to process of public participation. In the presentation the German approach for supporting renewable energies especially photovoltaic systems the so-called “Energieeinspeisegesetz” will be compared to the approach of net metering as discussed in Brazil in respect to the effectiveness of enhancing the use renewable energies.

Keywords: communities, emission reduction, energy efficiency

Energetic characterization of three most abundant tree species in the second forest management cycle in the Tapajós National Forest

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About 70% of the wood used in Brazil is intended for power generation in different sectors. In this way, the charcoal produced is consumed mainly by the steel industry due to its energetic and bioreducer characteristics. In this way, the objective of the study was to determine the yield of charcoal production from the *Bixa arborea* (urucum da mata), *Protium apiculatum* (breu amarelo) and *Rinorea guianensis* (acariquarana) species, which has high abundance and frequency in the vegetation of the second management cycle of the Tapajós National Forest. For this purpose, were collected, in a forest management area, five trees of each species, and subsequently removed disks in a height of 2 meters from the ground, dividing them into smaller samples, used in the yield determination. The samples were placed in a muffle furnace at a maximum temperature of 450 ° C, carbonization rate of 1 ° C / min, with carbonization time of one hour. For statistical analysis, was used the Scott-Knott test ($p \leq .05$). The yield of the produced charcoal ranged between 39.5 and 40.15 percent, with no significant differences between the species. *Rinorea guianensis* had a higher percentage of non-condensable gases and lower pyrolytic rate. It is concluded that the species have potential for the production of charcoal due the similar yields to those found for eucalyptus charcoal, therefore, the wood density of the studied species are within or exceed the range of eucalyptus, which may form charcoal with better energy properties, as in the case of *Rinorea guianensis* and *Protium apiculatum*.

Keywords: Tapajós National Forest, Bioenergy; Amazon wood species.

Use of wood residues whit as a source of energy in the municipality Maraba, Para state, Brazil

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The wood waste obtained from the mechanical processing represent a serious environmental problem when your disposal is not suitable. Although considered a remainder, its reuse generates revenue by adding value to the products obtained. Due to lack of planning and knowledge of the timber industry companies about the potential of waste recovery studies are required in order to characterize and indicate uses and specific ways of adding value to them. Therefore, this study aimed to characterize waste wood for energy use generated by companies in the wood sector in the city of Maraba, Pará State, Brazil. By querying the Environment Municipal Secretariat (Secretaria Municipal de Meio Ambiente - SEMMA) we obtained the list of registered companies regularly then we selected those that would be used as research sources. Visits were carried out in lumberyards, furniture making, sawmills and, with the aid of questionnaire data were collected informations to characterize the waste wood, as wood species used, the type and volume of waste, the fate of waste disposal, among other information relevant to the search. It was found that the species most used by timber enterprises in the city of Maraba are the amarelão, tatajuba, tonka bean, angelim pedra, pequi, muiracatiara, cedar, ipe and maçaranduba. The waste generated were classified as sawdust, wood chips, shavings, and its disposal are generally directed to ceramics and bakeries for burning in furnaces. By the preliminary characterization of wood waste in the municipality of Maraba, state Pará, Brazil, verified that they are suitable for use as a source of biomass for energy generation.

Keywords : Biomass energy, environment, sustainability.

Long-term landscape evolution caused by climate change or tectonic processes, NW Namibia?

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Namibia's climate history is assumed to be stable for a long period of time (Heine, 2005). Since the opening of the South Atlantic in the Early Cretaceous, climate is one of the dominant parameters controlling erosion in Namibia. The aim of this study is to assess the impact of climate change versus tectonic processes since the Early/Late Cretaceous climate maximum on the long-term dynamic topography evolution of northern Namibia by the quantification of erosion rates. A combination of apatite fission-track and (U-Th-Sm)/He thermochronological data implemented in time-temperature models allows to draw conclusions on the causes for the exhumation history and associated rock and surface uplift trough time.

Keywords: climate history, Early Cretaceous, erosion, tectonic processes.

Landslide Formation caused by Climate Change on Volcanic Islands: Fuerteventura and La Gomera, Canary Islands

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The Canary archipelago comprises seven main volcanic islands off the northwestern African coast, which have been formed by multiple volcanic episodes. Among them Fuerteventura is the oldest, easternmost and nearest to the African continent. In western Fuerteventura, by 17.5 Ma huge landslides have removed about 3500 km³ of lavas and volcanoclastics (Stillman, 1999). On the other hand, La Gomera is the smallest and lesser known among all the Canary Islands. During the Old Edifice time several lateral collapse events/landslides which caused for the removal of large part of the island northern sector (Ancochea et al., 2006).

Different thermochronometric techniques were applied on samples representing the main rocks units from the studied islands to quantify the timing of landslide formation (Wipf et al. 2010). Rapid exhumation has started ~20 Ma synchronously with giant landslides. Interestingly enough the timing of the rapid cooling/landslide is close to major climate changes termed the Miocene climatic optimum. Relative warmth during Miocene is well documented in marine and terrestrial records (Zachos et al., 2008; Herold et al., 2011). In fact, rainfall is the most relevant factor for the generating of landslides. Particularly, the Miocene warmth exhibits broad increases in mean annual precipitation over central and northern Africa (Herold et al., 2011). These facts recommend being the climate change/increases precipitation rate is the main reason in the giant landslides.

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Knowledge and Skills of Business Professionals in the Energy and Water Industries

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Due to Germany's turnaround in energy policy (Energiewende), massive changes are taking place in the energy and water industries which leads to new and different demands on business professionals. These developments, together with an emerging demographically induced shortage of specialists, call for an industry-focused realignment of academic business education and training. This requires curricula geared to both recent scientific findings in various disciplines and the current and future requirements of the energy and water industries. Until today, the latter have hardly been studied systematically. In order to provide a broad database for the industry and for prospective education and training offerings, we have conducted a study in 1,800 member companies of the German Association of Energy and Water Industries (BDEW) that surveyed a) the changed professional demands on business professionals and b) the knowledge and skills of university business graduates that are currently required and will be required in the future. This study comprises a standard written survey of business executives and of those responsible for further education and training, a written survey of university business graduates and 25 individual interviews with top-managers (members of boards, business executives or heads of departments). The presentation will deal with some remarkable findings of the study which might be of interest to energy industries in Brazil as well. It is a characteristic of enterprises in the energy sector to expand their business between the market and governmental regulation, accompanied by an increasing complexity of business processes and individual job requirements. Therefore, business professionals need, beyond their stable general knowledge in economics and business administration, an understanding of (energy) law, technology (especially concerning renewable energy), ecology and sustainability. In addition, more specialist knowledge and skills are necessary, especially regarding risk management and international accounting. The companies thereby demand a type of executive we have classified as "T-shaped Professional". Top managers in particular expect professionals and university graduates with essential soft skills, i.e. primarily with the ability to approach tasks from different angles, think in terms of different contexts and solve problems in multidisciplinary teams. The survey of university graduates and an analysis of the current course offerings for business professionals in Germany in universities and in further education show that there are hardly any academic opportunities provided that can include the described specific knowledge and skills. The study programs have either a far too technical approach or they neglect technology, ecology, sustainability or law. Furthermore, the development of soft skills barely is an issue in the curriculum. In the context of these conditions we have developed and introduced a syllabus at the University of Leipzig that can prototypically represent a form of academic business education adapted to the requirements of the energy industries and supported by scientific findings.

Keywords: ecology, energy, sustainability, water industries.

Climate protection worldwide – a new approach for international cooperation

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European local authorities are more and more committed to international climate protection politics. Together with other project partners in Latin America and Europe, the German Rhein-Sieg district therefore developed the educational project “2 degrees more – so what? Climate protection at the local level as part of the fight against poverty” which was authorized through a co-financing by the European Commission in 2011. The Brazilian NGO “Projeto Saúde e Alegria”, which is located in Santarém in Amazonia, is one of the project partners in South America. Further partners and associates are e.g. the University of Talca (Chile), the City of La Paz (Bolivia) and the Peruvian Ministry of the Environment. The project aims to inform in Germany and Poland about the relationship between climate change and poverty. The South American project partners provide information and insights on the problems of climate change and show measures to adapt to these changes and to mitigate climate change. In close cooperation with the German NGO Lateinamerika-Zentrum e.V. and the City of Bonn, the Rhein-Sieg district organizes educational activities like informational school classes, a traveling exhibition, expert talks and discussions as well as information campaigns. Some project partners created short films about the current situation in their regions. Amongst others the Brazilian film from “Projeto Saúde e Alegria” can be watched on the project website www.protect-the-climate.eu. In July, the traveling exhibition was formally presented to the public and the media. From now on, the exhibition will be shown throughout Germany and Poland. The school activities will also start with the next school term in September. In Poland, similar activities will be realized by the local authority Powiat Bolesławiecki which is closely connected by a partnership to the Rhein-Sieg district. On the basis of this project, the Rhein-Sieg district started a municipal climate partnership with the city of Santarém and signed an agreement with the local authority “Prefeitura Municipal de Santarém” in 2012. This partnership is part of the program “50 Municipal Climate Partnerships by 2015” that is being jointly implemented by the Service Agency Communities in One World (German Ministry for Economic Cooperation and Development) and the North Rhine-Westphalian Working Party on Agenda 21 (LAG 21 NRW). It is designed to enable municipalities in Germany to join forces with regions and municipalities in developing and emerging countries, and develop joint programs of action for climate change mitigation and adaptation. In July 2013, the partners of Santarém and the Rhein-Sieg district met for the first time in Germany. They identified possible cooperation topics like the development of programs in terms of green municipalities, sustainable cities, local waste water treatment, power generation through small hydropower stations, agri-environmental cultivation and an urban traffic concept. The cooperation raises more awareness, fosters an economical cooperation and develops a joint approach with positive results to form the pilot implementation of further action. During the 6th German-Brazilian Symposium on

Sustainable Development in Brazil in September 2013, a more detailed project concept about the cooperation will be formulated.

Keywords: educational project “2 degrees more – so what?”, climate protection, Rhein-Sieg-Kreis, Santarém, municipal climate partnerships

Climate Change: Geological and social Properties

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The recent discussion related to the evolution and change of the climate on planet Earth is well known. This discussion is controlled and steered by the results of scientific analytical work over the last 30 to 50 years, computer based simulations of future climate evolution, and feelings of human beings. As the defined and discussed scenarios have summarized a tremendous hazardous change to the environment in the future, politicians have started to be active to control the human induced changes. As our planet is already 4600 Million years old and humans are only acting on the planet during the last about 3 Million years the climate evolution in the geological past has to be considered. Therefore, the presentation will guide into the evolution of the climate on planet Earth over the last about 500 Million years. The question how life has reacted to climate change in the past will be discussed and why is the recent climate change dangerous for life and/or human beings on planet Earth. The presentation will also follow the question: What climate do we want to conserve on planet Earth? Special emphasis will be given to the future evolution of Amazonia and the impact of ore mining on climate change.

Do ceramics store palaeoclimate change? Ceramic petrology and geochemistry of Paracas and Late Intermediate Period, Southern Peru

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The rise of Pre-Columbian cultures in southern Peru started with the Paracas culture (800 - 200 B.C.). In this period, aridification proceeded (rainfall was less than 150 mm/a), which was confirmed by an eastward shift of settlement. The following centuries were too arid to supply larger communities. During the Late Intermediate Period (1000 - 1400 A.D.) monsoonal raining intensity increased with rainfall about 150 - 200 mm/a. In this period the settlement bloomed again in the Andean footzone. The development of Pre-Columbian cultures in the southern Peruvian was closely coupled with the hydrological fluctuations and, thereby, varying water supply in the river oases. The adaptation of population to regional impacts of global environmental changes was reflected by a shift in settlement patterns. The spatially limited settlement options in the river oases led to population concentrations, and cultural developments. This shift also led to cultural changes, which may be reflected through changes in production techniques and raw materials sources of the local manufactured ceramics. To unravel this linkage, the presented study compares ceramics of the Paracas- and Ica culture (Late Intermediate Period). Various petrological and geochemical analyses like ICP-MS, ICP-ES, XRD and thin sections will be applied. This allows identifying changes in raw material sources and production techniques of ceramics as a possible reaction to climate change.

Keywords: aridification, cultural changes, manufactured ceramics, Pre-Columbian cultures.

Greenhouse gases from landfills – New ways in Quantification and Reduction

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Landfills from all over the world are estimated to emit nearly 850 million tons of CO₂ equivalents (MtCO₂e) each year (based on 2010). Between 1990 and 2010, global CH₄ emissions from landfilling of solid waste are estimated to have increased by about 20 percent, from 706 to 847 MtCO₂e. With emissions up to 24, 7 MtCO₂e, Brazil ranks 8th position worldwide (U.S. EPA, 2012). During the lifetime of a regular landfill, the generated gas can be collected and converted into electricity or heat. In this period, the motivation to minimize methane leakage emissions is high because of economical aspects. At dump sites or older landfills with decreasing amount of landfill gas, this interest is usually low. At the latest, after closing the landfill, when the post-closure care period starts which is at least 30 years from site closure, the controlling of methane emissions fades into the background. This Presentation gives a summary of two research projects from the University Stuttgart and some partners, aiming at two important aspects in this context:

- Shortening of the post-closure care period of landfills with an emphasis on reduction of greenhouse gas emissions.
- Measuring of the methane emission rates at area sources like landfills with an emphasis on checking the success of actions to reduce methane emissions.

To shorten the post-closure care period a new in situ treatment technique was being utilized on a part of the Dorfweiher landfill in Konstanz. This landfill was aerated intermittently with low pressure for three years. Outgoing air was treated passively in an open biofilter which covers the landfill surface. Since the beginning of the intermittent aeration in 2010, things have changed inside the landfill section in many ways. In many zones of the landfill body, the aeration caused aerobic conditions with a decline of methane production. Methane emissions have been reduced down to 20% of the calculated amount under aerobic conditions. Accelerated settlings are measured up to 15 %. The effects of the aerobic stabilization on the landfill are evaluated in a two-year monitoring phase started in 2013. Since methane emissions of aerated landfills can no longer be calculated with standard methods, and common measuring methods were not able to give emission rates; an open-path spectroscopic instrumentation was used to obtain path integrated methane concentration information along multiple optical paths. The multipath methane concentration data along with wind vector information were processed with a plane-integrating computer algorithm to yield a mass emission flux of the landfill. In this research, a TDLAS-System (“tunable diode laser absorption spectroscopy”) was used successfully to measure the methane emission rate. It was shown that the aeration of the landfill reduced methane emissions from about 17 g/s to 4 g/s.

Keywords: landfill gas, methane emission, solid waste.

Sustainable forest management in an associative way, in rural Southern Brazil

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The Araucaria Forest is one of the most important forest types in southern Brazil. Currently, is distributed discontinuously, fragmented and when present in small farms in general are mostly degraded and impoverished as the original diversity that characterized the typical forest, especially in the case of species with high potential timber, selectively logged in the past. The remaining forest under current law cannot be managed, and therefore adds no direct benefit to the owners, and reduce the potential area of cultivation. The restriction of the law in order to preserve is actually the opposite effect, though there is a breakthrough gradual and permanent on the natural forest areas for conversion to agricultural uses. Thus, despite the current concern about the natural environment, prevails for the owners of land the culture to see the forest as a problem, including by cutting high-value forest species that regenerate naturally as Araucaria. The project's general objective is to act directly on the question of production, quality of life, income generation and environmental conservation, seeking recovery of native forest and the sustainability of small rural properties, inserted in a context of forestry associations. Thereby promoting the development of rural region Southern Brasil. Additionally, aims in the medium and long term, generate a model of sustainable forest management for timber and non-timber remnants of Araucaria Forest, able to be replicated in southern Brazil. Currently there are 36 small farmers involved in the project with an average size of farms about 16 ha. The total area of native forest is about 214 ha with includes total protection areas along water courses within so non-timber use is possible. Since the beginning of the project in 2011, permanent plots were installed in the native forest areas demonstrate the effects of a sustainable forest management. This includes enrichment of the total protection areas and a sustainable way of using the native forest. Furthermore there were income created on the one hand by sawing wood of the fast growing species of eucalyptus, pines and the invasive species of the oriental raisin tree with the project own mobile saw an on the other hand though the participation of a project that financed plantation of Paraná pine along roads and frontiers with 5 R\$ for each plant during 21 years.

- Implantação e Manejo de Florestas em Pequenas Propriedades no Estado Paraná; Embrapa - Documento 167

- Manejo florestal de uso múltiplo: uma alternativa contra a extinção da floresta de araucária?; Maria Augusta Doetzer Rosot

Financed by Baden-Württemberg (25%)/ Paraná (75%)

Keywords: Paraná Pine, protection tropical rain forest, forest cooperation, silviculture

Climate change: Proposals of the Innovate Project

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The Innovate Project is a bi-national project supported by the Brazilian Ministry of Science, Technology and Innovation-MCTI through the National Council for Research and Technological Development-CNPq, together with the Germany Ministry of Research and Education-BMBF. The project is coordinated by the Federal University of Pernambuco-UFPE and the Technical University of Berlin-TU Berlin. INNOVATE studies the protection and sustainable use of natural resources (land and water) of primarily the Itaparica Reservoir area (meso-scale), in the Brazilian semi-arid region, with detailed studies of its subcomponents (local scale), and integrates the findings into the macro-scale which is the whole São Francisco watershed. The dynamic drivers are: management of land and water in the watershed, technology use, and climate change. The main indicators are: biodiversity patterns, economic efficiency, nutrient balances, water availability, water use efficiency, carbon dynamics, and stakeholder approval. In order to handle the large number of project members (more than 100) and the complexity of the project, INNOVATE is organized into seven sub-projects (SPs). Each SP comprises up to four research modules (RMs), and each RM has Brazilian and German partners. The impact of climate change and land use on greenhouse gas emissions by the Itaparica reservoir, is being studied. The multiple uses of water reservoir cause environmental as well as social challenges that create debates, e. g. among the different uses and the quality of water provided. In general, central debates circle around energy generation, irrigation, water supply and flood control. The land surrounding the Itaparica reservoir features a high biodiversity and is especially vulnerable to climate change.

Keywords: climate change, Innovate project, Brazilian semi-arid region

IV. MINERAL RESOURCES

How to drives sustainability in a territory with mining operations?

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Recently Alcoa established a bauxite mine at Juruti in the Brazilian Amazon. Setting up a large, new project in any town always affects the territory economically, environmentally, and socially. In face of that and to promote an agenda of sustainability was a proposed the *Sustainable Juruti* model based on a tripod approach with multi-institutional partnerships aimed to provide mutual benefits for companies, communities and local government. Its components are: 1) The Sustainable Juruti Council, an inter-sectorial forum for dialog and collective action among the parties, considering a long-term agenda; 2) Sustainability Indicators, a platform for monitoring the local development and providing the Council with qualified information; and 3) The Juruti Fund, which finances activities prioritized by the Council and mobilizes resources to generate an endowment fund for present and future generations. This model is considered to be a pluralist governance experiment aiming to promote local development based on sustainability and cooperation in the midst of intense conflict of interests.

Keywords: funding, indicators, governance, mining, sustainability.

**Socioeconomic impacts arising from implementation
of bauxite exploration project in city Juruti, west of Pará**

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The deployment of a large mining project causes big impacts (positive and negative) to a region. Some of these impacts are provided by the Environmental Impact Studies and its associated Environmental Impact Report (EIA/RIMA). There is a huge preoccupation for the vegetation and wildlife of the region to the detriment of the social and economic impacts. The people are also affected and this should be part of the study as defined by the National Council Environment (CONAMA). In the Amazon this concern is greater. The implementation of the Juruti Project brought this discussion to the west of Pará. The Aluminum Company of America (ALCOA) installed in Juruti city a bauxite mine and since the changes are evident in the city, but there are few studies that systematize. This paper presents and analyzes data on the social impacts, mainly in the field of education, that had a large increase in the number of enrollments, which directly reflects the transfer of federal funding for the sector; and the field of health, of which highlight was the construction of hospitals and health centers. Presents the economic impacts: employment generation, strengthening the local economy and increase in tax collection.

Keywords: Socioeconomic Impacts, mining, Juruti, ALCOA.

Identification and analysis of mineral extraction areas in the environments of Santarém urban zone

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Nowadays, Santarém city lives an intense economic and population growth driven mainly for the construction of commercial ventures and housing, added to public politics that incentives for the development of the region. As consequences of this growth, is really growing the demand for mineral resources to meet mainly the demands of construction industry. The geological characters of the region are favorable to the mining activities and the mineral exploration scene unfolds in a misguided way, illegal, disordered and aggressive to the environment. With this, it's necessary to do a study contributing to the improvement of the mineral extraction practice. This work has as objective, identify, map and character the areas where there is mining activity in the urban zone at Santarém city. This work is a first step to the evaluation of the environmental impacts caused by this anthropic pressure, as well as designates alternatives to the local environmental development.

Keywords: mineral exploration, environmental impacts, urban growth.

Mercury in the Amazon: human influence or natural geological pattern?

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One of the main discussions regarding the levels of mercury in the Amazon is itself related to the origin of the point sources of the metal. Since the 80s, the quantitative studies on total Hg in water and sediment have intensified in an attempt to find a reference value for the metallic element. In this sense, the main basins of the Amazon region, citing the Amazon River, Negro River, Madeira River, Tapajós River and Trombetas River were thoroughly explored, and different concentration ranges were found and suggested. This research, carried out between 1999 and 2011, concentrated in the region between the Coastal Zone and Amazon Continental Shelf - ACS (47°52'W-4°19'N and 51°04'W-2°16'S), between Orange Cape, Amapá State, and Maguari Cape in the state of Pará, where due to physical and chemical forces, such as changes in the pattern of salinity (density of water), pH and flow of ocean currents largely or almost all of the load material suspension transported by the Amazon basin is deposited, and with it a significant amount of mercury that is deposited in the sediments at different depths. The values of total Hg found in the ACS ranged between 14 and 160 ng/g, getting between the values suggested by authors who have studied watersheds clear (Tapajós and Trombetas rivers) in the Eastern Amazonian and the levels found in the basins located in the Western Amazon, especially the rivers Madeira and Negro. The heyday of mining in the Negro River was the past decades, while the Madeira River still has mining activity, though now declining. Such patterns, associated with levels of total suspended solids found along the Continental Amazon and ACS suggests that anthropogenic influence, although evident in the appearance of point source pollution, is not the main drive-force of total Hg in the Brazilian Amazon, and this function is due to of natural geological activity. The results of the mineralogical spatial corroborate this assertion.

Keywords: deposition, mercury, mining, pollution.

**Environmental planning in patrimony speleological:
Study of the dynamics in the landscape of the Speleological
Province Altamira-Itaituba, Pará state – Brazil**

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The Speleological Province Altamira-Itaituba is located in the contact strip of that following geologic domains: Amazonas Sedimentary Basin and of crystalline base of Xingu Complex. The geological structure is sandstones of Maecuru Formation and shale of Curuá Formation. This research is developed from the geocologic analysis of the landscape of the Speleological Province, though a systemic method, highlighting a study about karst in non-carbonate rocks. The research seeks to diagnose the natural landscapes and cultural heritage Speleological as a tool for environmental planning. Actions are proposed environmental planning, adopting models for use and occupation focused on social environmental sustainability, and contribute to the future creation of protected areas.

Keyword: environmental planning; landscape; patrimony speleological; Province Altamira-Itaituba; speleological.

V. SUSTAINABLE DEVELOPMENT AND ECONOMY

Sustainability, global responsibility and ecological industrial policy – perspectives for international cooperation

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The expectations of the environmental policy and the use of scarce resources rise in Germany. But if you are also one of the most powerful economies in Europe, with a strong export-oriented industry: How can that be combined under the umbrella of sustainability?

On one hand, we are heavily dependent on imported raw materials. What are the ecological, but also social backpacks carried by these commodities? Companies in industrialized countries must pay more attention to the conditions in their supply chains and in their producing countries. We have a responsibility for how and under what conditions commodities are gained. Methods of analysis are for example Life Cycle Assessment and Life Cycle Sustainability Assessment.

On the other hand, we export products, e. g. Baden-Wuerttemberg, as well as many capital goods in machine- and plant engineering industries. The more efficient, resource-saving and environmentally friendly these machines are, the more they can contribute to the solving of the problems in the world and to the value added for all involved. Resource-efficient technologies are therefore a key area of innovation for the German economy.

Here is a chance for example in the cooperation between Germany and resource-rich countries. The global challenge is to close material cycles and to protect the environment. In the state of Baden-Württemberg, the issue of resource efficiency is currently in the focus of the sustainability strategy of the first “green” state government in Germany.

GNSS/MEMS-based LowCost Multisensor Systems for Out- and Indoor Navigation and Georeferencing

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The Institute of Applied Research (IAF) of the Karlsruhe University of Applied Sciences (HSKA) is the central research institution for the development of mathematical models and software for robust algorithms for a general GNSS, MEMS and camera based out-/indoor navigation and geo-referencing of bodies (b), in the frame of the joint RaD project “GNSS-supported LowCost Multisensor Systems for Mobile Platform Navigation and Object-Georeferencing (www.navka.de)”. The NAVKA concept of a multisensor-multiplatform-navigation design means the treatment of so-called lever-arm design parameters, as essential and innovative part of the mathematical model for a navigation state vector estimation. The eleven lever-arm design parameters are the position and orientation of the individual i -th sensor (s) on the j -th platform (p), and the position and orientation of the j -th platform (p) relative to the body frame (b). Conceptually the NAVKA lever-arm design provides the navigation state vector (position, velocity, attitude, acceleration and rotation-rates) by modelling in a deep-coupling GNSS, MEMS (accelerometers, gyroscopes, magnetic field sensors, inclinometers, barometers etc.) and lowcost camera sensor data.

In that way, the NAVKA-algorithms enable a general treatment of distributed sensors on a navigated body (b). E.g. the data of external platforms (p), such as e.g. smartphones, can be modelled together with the data of body (b) distributed real or virtual single sensors (s) or sensor-platforms (p). As a world-wide unique feature the mathematical model of the NAVKA algorithms consists of three components and includes in addition sensor-calibration parameters leading to a self-calibrating multisensor-multiplatform design. The three above mentioned algorithmic components are the new developed NAVKA navigation-state forecasting, the lever-arm based individual sensor observation equations, and specific - static or dynamic conditions - to be put upon the navigation state vector. So a wide spectrum of out- and indoor navigation applications can be driven by the NAVKA-algorithms. Georeferencing applications, such as for cameras mounted to UAV, for mobile laser-scanning, and for the georeferencing by smartphones and tablets, can be driven by using the navigation state vector together with the data of different other sensors (s) coupled to a navigated body (b).

The developed navigation platform www.robinette.de, and its applications are presented. Further, the full spectrum of all different areas, where the NAVKA algorithms and NAVKA driven platforms are presently applied, is presented. These concern general machine navigation, such as for tractors and for cars, new manned aircrafts and e/FCHV-vehicles, like the innovative Volokopter (<http://www.navka.de/index.php/en/>), water and air robots (UAV), and seamless out-/indoor georeferencing and navigation applications, e.g. for safe and rescue (SAR) purposes in buildings.

Geodetic Infrastructures for GNSS Positioning Services (GIPS) – General concept and GIPS-development for the State of Brazil -

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The worldwide ongoing process of the establishment of high precise DGNSS-positioning services and respective GNSS-reference station networks, which are related to the globally GNSS-consistent ITRF and ITRF-derivatives (e.g. ETRF89 in Europe, or SIRGAS in South America and Brazil) implies the replacement of the georeferencing in the old independent classical national reference frames by ITRF-related ones. Accordingly the new age of GNSS-positioning services - as interdisciplinary tool with a broad and growing spectrum of precise satellite positioning, navigation, mobile GIS and mobile IT applications (www.navka.de) - requires the establishment and maintenance of a geodetic infrastructure for GNSS positioning services (GIPS).

GIPS (www.moldpos.eu) is divided into a transformation and a geomonitoring component. As concerns the transformation component, the old plan position data, which is related to a classical reference frame, has to be transformed to the ITRF-related horizontal georeferencing (B, L) provided by the GNSS-service. This forward transformation (GIPS-1, trafo-1) concerns the establishment of modern GNSS-related databases for the infrastructure for spatial information, e.g. INSPIRE in Europe, and worldwide (cadastre, GIS, navigation, urban planning, construction, transportation, meteorology, land management, precise agriculture, etc.). The backward transformation (GIPS-1, trafo-2) of the ITRF-related GNSS-position to an old classical datum is needed, because the classical non-ITRF reference frames will still be relevant for at least one decade or more. The presented concept and software CoPaG (www.geozilla.de) solves the above 3D-datum transformation problems (GIPS-1, trafo-1, trafo-2) by a finite element related mathematical modelling (FEM) and in a strict and general concept, including quality control. The computed high precise parameters are stored to transformation parameter data-bases.

The ellipsoidal GNSS-heights always need a further processing, in order to transform h - by $H=h-N$ - to the physical height H referring to the height reference surface (HRS) N . The software DFHBF (www.dfhbf.de) solves that height transformation problem (GIPS-2, trafo-3) and models again in a Finite Element (FEM) concept or alternatively by Spherical Cap Harmonics. Global geopotential models (GPM), existing HRS models, vertical deflections, terrestrial gravity g and identical points (h , H) can be used as observations for the computation of a HRS database by the DFHBF-software. The above databases can be used on GNSS-controllers and can be implemented reference transformations for setting up RTCM 3.x transformation messages for GNSS rover-clients (www.rtcn.org).

The capacity of an absolute positioning by GNSS-positioning services requires, that possible changes of the coordinates of the GNSS reference stations in the amount of few millimetres are detected immediately. To solve that task, the GNSS-reference station MONitoring by the KARlsruhe approach and software (MONIKA) has been developed (www.monika.ag). The MONIKA approach and software can, besides the

coordinate control of GNSS-positioning services, also be applied for a use of the permanent GNSS-stations as a geosensor-network for geodynamical questions and research, as well for a setting up temporary GNSS-arrays as a disaster monitoring and early warning GNSS-service, e.g. for land-slides, flood and construction areas. Following the mathematical models for the above different GPS-components, and examples for different countries, the geodetic infrastructures for Brazil are presented. They which have been developed at HSKA in cooperation with the Universidade Federal Rural do Rio de Janeiro, Instituto de Tecnologia and the Departamento de Engenharia (UFRRJ), and the Instituto Brasileiro de Geografia e Estatística (IBGE).

GNSS/LPS based Online Control and Alarm System (GOCA) - Mathematical Models and Technical Realization of a Scaleable Geomonitoring System for Mining, Natural Hazards and Buildings

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The real-time multi-sensor geomonitoring system GOCA (GNSS/LPS based Online Control and Alarm System) is developed at the Institute of Applied Research (IAF) of the Karlsruhe University of Applied Sciences (HSKA). GOCA applies GNSS/GPS, terrestrial sensors (LPS) e.g. total stations, leveling and hydrostatic leveling instruments for a deformation monitoring and analysis.

GOCA is designed for monitoring of natural hazards, for mining and geotechnical installations and buildings. Along the complete so-called geomonitoring-chain, the GOCA-software is responsible for the further processing of the sensor data in a three steps sequential real-time adjustment and deformation analysis procedure, where GOCA provides displacements, velocities and accelerations in a unique three-dimensional coordinate-system. The respective mathematical models of a geodetic monitoring, which are based on the classical standard of a geodetic network adjustment, as well as the respective estimation principles and algorithms, are presented. A first focus concerning the deformation analysis is set on the 3D online displacement estimation. A second focus is due to the Kalman-Filtering, which provides additionally also the object-point state vector of the velocities and accelerations, and includes a respective forecasting and an early warning alarm-setting.

The complete geomonitoring chain is pointed out. In that context, the GOCA-system is realized by the software packages GNSSControl/TPSControl (data acquisition in GNSS and TPS geosensor-networks), GOCA deformation-analysis software (modelling and forecasting or deformation states), GOCAEarth (reporting and visualization of results) and GOCA-Alarm (alarm-management in case of detected or forecasted critical states of a monitored object). Further the component VirtualGOCA has been developed for planning and pre-analysis of geomonitoring arrays.

The input data interface of the GOCA-system is open for all kind of monitoring data, and the output data interface is again open concerning the provision of the above state vectors computed by the GOCA-software. So all GOCA output data is useable as input for integrated system analysis approaches, such as e.g. FEM analysis software and structural health-monitoring. The latest developments of the mathematical models and sensor-technology of the GOCA system are presented. They are directed to the use of lowlost GNSS-sensors, and to algorithms, soft- and hardware for local GNSS/MEMS multisensor-platforms on displacements as well on vibrations of structures (structural health-monitoring).

Finally GOCA installation examples out of the spectrum of the different world-wide GOCA projects are presented. They concern the use of the GOCA system for the geomonitoring of the deformation state and a respective early warning for landslides, volcanos, monitoring in mining areas, dams and buildings.

Awareness with photos: Education for Sustainable Development in school practice

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In order to present and discuss the use of photography as a strategy for Education to Sustainable Development during their school practice, we developed a study with 12 science teachers trainees, belonging to Public Schools of Porto Alegre, totaling 40 class hours. It was observed that participants need to have moments of discussion and reflection on their own actions in the classroom, leading them to question their views on different aspects of the teaching and learning environment. To facilitate the further reflection we proposed that each participant bring 05 photographs with images that represent the environment. The observation of the photographs over the meetings, the discussion intently on its representation as teaching material to be explored and especially the interaction between them have created opportunities for promoting awareness of a quality leap in activities involving Environmental Education. Participants were encouraged to work the concept of Sustainable Development with his students, develop environmental education activities in their own classes, as we developed the course. Our problem was to investigate whether the discussions we have planned, from the photographs presented in later meetings and classes in each school, the teachers did reflect on the different points of the process of teaching and learning by modifying his views on the environment. The research undertaken was a qualitative, since we do not analyze specific variables interpreting educational universe but seek the testimony of teachers and their students. We used as documentary analysis works produced by teachers, in groups or individually during the semester. For data collection, we use the on-site observation of our meetings, we selected what our study group called teaching episodes. The sequence of the lines indicates the awareness when the teacher overcomes their own biases and offers well planned activities creating conditions for learning. By the analysis of our records it is clear that the strategy of using photography environmental awareness scan and should be part of the knowledge construction involving the environment.

Keywords: Environmental Awareness, Education to Sustainable Development, Environmental Education, Teaching Practice, Teaching Science.

**Participatory diagnosis of the use of açai in communities
in the area of influence of the national Forests Itaituba I, II
and Trairão in the Southwest of Pará.**

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The *açai* (*Euterpe oleraceae* Mart.) is a typical palm tree of amazon forest and very expressive for the culture and economy, especially to the population that lives in the BR-163 Sustainable Forestry District. Considering the importance of this plant, the working group of the National Forests Itaituba I and Trairão held a participatory diagnosis about the use of native and planted *açai* in five communities that are part of the aforementioned protected areas (conservation units). The aim was to gather information about the use, management, limitations and other aspects relevant to use. For this diagnosis were applied three tools: participatory design of duty cycle, line of life and matrix SWOT. It was observed that the main positive points raised regarding the use of *açai* were its abundance in the region; its importance as source of food and of employment and income generation. The Communities pointed possibilities and demands as: installation of agroindustries (manufacturing factory palmetto and *açai* depulper), legal production and realization of training courses. The main difficulties observed are related to the lack of legalization of the *açai* palmetto exploration and regularization of land in the region. Scarcity of fostering for planting and lack of technical assistance are pointed as limiting factors for expanding in reforestation with this specie. The tools used in the diagnosis secured the active participation of the community. The survey results will contribute to future government interventions and organizations working in the area of BR 163.

Keywords: *Açai*, participatory diagnosis, Sustainable Forestry District, consultative council, conservation units.

Fractional conservation: socio-environmental dynamics in the National Forest of Tapajós (FLONA) in the western Pará state, Brazil

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This paper is a contribution to the reflection on the effects, effectiveness and contradictions of public conservation and environmental policies in the Amazon, Brazil. It is based on field research and secondary data analysis in the conservation unit National Forest of Tapajós (FLONA) in western Pará state, Brazil. The principal claims are that local processes undermine environmental protection in favor of economic benefits incentivized by megaprojects and markets. Furthermore, the socio-economic biases at the local level contribute to accelerated social and environmental degradation. During the 1970s, the FLONA Tapajós was created to protect nature. At the same time, public policies incentivized migration of smallholders to the outskirts of the conservation unit. Due to both the conservation interests of the FLONA inhabitants and the constant presence of the Brazilian governmental conservation agency, illegal logging inside of FLONA has been curtailed. A contrary trend to these conservation efforts has been, amongst others, the successful secession in judicial terms by one community of FLONA. Additionally, at the buffer zone of the conservation unit, capitalized investors and planters bought nearly all available land from local smallholders and cut down the remaining tropical rainforest for soya bean cultivation, as the BR 163 leads to the port of one of the world's most powerful international marketers for food in the neighboring city of Santarém along the bank of the Tapajós River. The developments inside – the secession of one community - and on the outskirts of FLONA – land grabbing - provoke a series of inquiries about the contradictions between conservation policies and socio-economic reality in the Amazon region. The author's preliminary findings suggest that opposing principles such as natives' versus migrants' rationale as well as sustainable small-scale production and food-gathering versus utility maximizing principles are at stake. Furthermore, superposing different property right regimes and conservation guidelines from the beginning of FLONA's creation have been complicating the scenario, as do prospects of further megaprojects in the region. As a result of this contribution, a fractional model of nature conservation and multifaceted influence spheres of the state with different degrees of social equity, democracy and environmental protection is suggested for further discussion.

Keywords: Amazon, tropical rainforest, conservation policies, land grabbing, environmental governance

Implication of Agro-extractive Settlement Project (PAE) in the participatory governance of common natural resources in Amazon Floodplain

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Floodplain, although occupy 2% of the Amazon basin, is a rich environment with fertile soils which maintains abundant natural resources. Throughout the history of human occupation, the floodplain played a central role in the economy of the region as a source of food, employment generation and environmental services to humanity (FALESI, 1999; RIBEIRO, 2007; SECTION, 2008). In spite of the importance of the region, the land tenure of the Amazonian floodplain has always been ambiguous (BENATTI, et al., 2005). Since 2006 the government created 15 Agro-extractive Settlement Project (PAE) in the region of the Lower Amazon floodplains to regulate land ownership and to encourage the process of community participation in the management of natural resources. By the proposal of the PAE, the areas of the settlement will be administered by the population settled through Council of Management. The land-use model will be through Concession Property Use. The main objective of this paper is to analyze the impact brought by the creation of PAE in the governance of common natural resources in the Lower Amazon floodplain communities, considering the different levels of social organization existing in the region. The research data of this paper was obtained through field work and literature review which included analysis of the documents collected in the electronic pages of State bodies and non-State entities related to PAE, Focal Groups and interviews. The study area is located in 3 Agro-extractive Settlement Project (PAE) of the floodplains of the Lower Amazon in the municipality of Santarém. The data collected were compared, confronted and analyzed in the light of literature on environmental governance. 86% of the communities of PAEs analyzed had some kind of community fishing agreements which internally regulated the use of fisheries resources in the lakes of the communities. Also these communities showed a greater participation in the management of fisheries through institutions such as the Community Association and Fishing Colony. The interviews with community leaders in the region 82% demonstrated some kind of dissatisfaction by the way the process of PAE being implemented in the region. Although the majority did not agree with the process of implementation of PAE, all respondents agreed that they support PAE in their region. The study points out that the problem is not in the PAE itself, but is in the process as it is being implemented. In relation to the Utility Plan(PU) that defines the norms of the PAE, 33% do not agree with it and argue that some existing norms of PAE hinders the developing of the floodplain. But still 77% of respondents believe that PU is required for proper functioning of PAEs. The main problems presented by the respondents were in relation to the process of implementation where the realities of the communities were not taken into consideration. The lack of dialogue between the community and the government entities like INCRA responsible for the implementation of PAE created some kind

of disbelief in the communities. Some basic questions regarding the occupation of land by the landlords in the PAE are not yet resolved. The study shows that the success of the PAE is very much related to the effective participation of the shake holders in the process of implementation and the governance of the system.

Keywords: Agro-extractive Settlement Project. Amazon Floodplain. Participation. Governance of Common Natural Resource.

Proposals for sustainable development in Amazonia

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Amazonia is the biggest connected tropical rainforest on earth with a total extension of approximately seven million square kilometers. The main part of this rainforest is located within Brazil and called “Amazônia Legal” corresponding to more than 50% of the country’s total area. Amazonia is supposed to host the highest biodiversity of all ecosystems and, additionally, the biggest superficial, liquid fresh water resources. This implicates for Brazil and the international community as a whole not only a huge wealth in terms of natural resources and huge potentials for future developments - beside infinite scenic attractions - but also an extremely high responsibility to protect and preserve it for future generations. Unfortunately, vast areas of Amazonia have been destroyed or degraded in recent years due to anthropogenic actions like deforestation, fragmentation, mining, pollution, flooding etc. Many animal, plant, fungi and bacteria species are in danger of getting extinct before they could even be discovered and described (and potentially used) by mankind. The risk for the Amazonian ecosystem is to be so severely damaged that a point of no return gets passed and it entirely collapses. If, however, “the lung of the world” cannot “breathe” anymore, this could result in catastrophic consequences for the climate worldwide. Severe droughts in Amazonia during recent years could have been only a little warning of what might still be expected for the future if the course will not be changed fundamentally very soon. Mainly responsible for the threats connected to degradation of natural areas are the increase of inadequate land use in Amazonia, such as intensive cattle breeding and huge monocultures of soy beans, construction of dams and flooding of giant areas, the extraction of minerals, oil, etc. As part of this ecosystem and depending on its services, the indigenous and river communities living within Amazonia are also in danger of getting extinct. Generally, the local population does not benefit in any way from the use of their land but has to suffer all the negative consequences. Relocation of these communities in order to realize mega projects like water power plants or highways is currently a growing social problem in Brazil. But conservation efforts can only work if the local population is included (and not excluded) by creating new and alternative sources of income. This presentation, however, shall not be limited to address mayor current ecological and social problems in Amazonia, but it also wants to present possible solutions for - at least some of - these urgent problems and show feasible alternatives to conventional land use for the future. The idea is to establish in the medium- and long-term an economic system in Amazonia that allows its population to benefit from its own natural richness instead of implementing a “foreign” conventional market system causing inevitably the destruction of this unique ecosystem. Among these alternatives it is worth to mention the valorization of traditional knowledge in all its forms and the right for the local population to patent this knowledge and also benefit from it financially, development of ecotourism in general, commercialization and export of local food products such as

endemic fruits, propagation of the Amazonian cuisine, use of plants and animals for medical treatments, production of handicrafts from seeds and other parts of plants as well as large-scale reforestation projects. Another huge challenge is to control deforestation in a giant area from air and space and provide well-trained personnel in task forces that are able to react immediately when crimes are registered. At last, many more national and international research, education and infrastructure projects in form of direct investments are needed in and for Amazonia and its population in order to improve and increase conservation efforts on one hand and educational and medical services even in very remote areas on the other. These are only some of the duties that Brazil and the international community have to deal with in order to preserve Amazonia for future generations.

Keywords: Sustainable development, conservation, Amazonia, creation of alternative sources of income for local population

Amazonian value chains and regional development: the case of the Lower Tocantins River.

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The Lower Tocantins river region offers a wide range of agricultural and extractivist products like açai palm fruits, pepper, oil palms or manioc flower, which are produced for local and national consumption and for exports. These products do not only generate value added in the agricultural sector, but also indirectly in other sectors like industry and commerce. The value chains of agricultural and extractivist products form the basis of the rural economy and hence for the development of the nine municipalities of the region. A total of twenty value chains are analyzed from primary producers to final consumers, including all the intermediaries in between. The evolution of the regional economy during the last decade is then revealed by combining the structural value chain data with production data from the municipal level for the years 2001-2011. The results show that agricultural and extractivist output value has tripled in real terms during the decade, mainly due to increasing prices. But only nine out of the twenty products also augmented their output volume. The regional value added is around 70% of the agricultural output value, meaning that for each R\$ produced in the agricultural sector, additional 0.7 R\$ are generated in regional commerce and industry. Therefore, the price boom should also have generated higher benefits to the regional non-agricultural sectors, including the palm oil industry, of more than 100 million R\$. Based on the analysis, some general conclusions for the development of the region are discussed.

Keywords: Value Chains, Input-Output-Analysis, Regional Development, Lower Tocantins River

Diagnosis of socio-economic community farm island riverside, city of Senador Jose Porfirio - Pará

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Traditional communities - located in coastal and riverine areas - are usually formed by poor families who depend directly on natural resources for their livelihoods. In some cases, families build their homes in risk areas - unsuitable for human habitat - or permanent protection areas, which are under the rule of law state-owned. The aim of this work was to make a socioeconomic diagnosis Riverside Community Farm Island. The study was conducted in the community of Island Farm, near the right bank of the Xingu River, in the municipality of Senador Jose Porfirio-PA. It is located about 50 km southeast of the city of Altamira. Data were obtained through structured questionnaires and semi-structured communities applied to families, a total of 20 questionnaires were made in several visits in locus. We analyzed the demographics based on the following parameters: gender, age and number of children. Social indicators consist of education level, condition of residence, source of water supply and electricity. Through the interviews we found the twenty families interviewed (75%) women, whom were between 16 and 59 years (25%) of men were between 34-48 years. In terms of numbers of children, residents had on average 3-5 children. Of the total respondents (65%) had complete or incomplete primary education and (35%) were illiterate. What also shows a significant number of low education of community residents. With regards to housing (95%) of residents had their own houses while others (5%) had leased houses by neighbors. Households obtained water for domestic wells and electricity through a generator purchased by the community. It was observed that the main income generating activity is fishing family, and her craft or ornamental. With respect to government transfers (75%) of residents receive family allowance (5%) and school bag (20%) receive no benefit. It is assumed that the relative low quality of life of the community is determined by the same distance to the headquarters of the municipality of Altamira. The isolation of the community may also be contributing to greater reliance on family activities related to natural resources such as fishing.

Keywords: traditional communities, natural resources and fishing.

Socials and economics aspects of the parque residencial Manaus: elements for analyse

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This word to show the results about geography analysis in the naturel, economic and ambient aspects, identify in the research at (ParqueResidencial Manaus). For to get the basic facts was to applied the methodology proceeding: camp observation georeference in points, treatment and systematize about the basic facts in the report (U.G.P.I.) Office Sanitation Program the rivers in Manaus. During the analysis fact about the residence and people origin, rent and family supplier was possible the composition about the analyze. In relation about the residence, the results were evident that 16, 8% of the residences of the 2015 were to make up for with improvement. About the rent 64,1% the family to investigate are command for women. This fact amount the Brazilian women situations that's the woman is the principal command the unirelatives. The I.B.G.E. to indicate between 2001 and 2009, the proportion of the Brazilian family's to command for woman grows up for 35%. Recent facts to show that almost 22 million families to declare were the women to command the house. About the people origin of the resident in the park 45,4% was born in Manaus and live in distant district of the downtown, that's what is 30,5% are the rural space in Amazon and 21,5 are the others states of Brazil.

Keywords: Família, Mulheres, Manaus.

Current aspects of social affairs: differences between Brazil and Germany

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The article discusses some differences between social affair in Brazil and in the Federal Republic of Germany. The reflections are the results of a residency program on Germany with the support of the German Academic Exchange Service (DAAD – Deutscher Akademischer Austauschdienst) and Pontifical Catholic University of São Paulo in 2012. One aspect that deserves attention are which determinants are in the enclosure of the social affairs on Germany and which are the insertion points between those problems and the social affairs in Brazil. The activities performed during the research include consulting official information sources of the Federal Republic of Germany, visiting colleges for data collecting about researches made on Brazil. The analysis was complemented by an interview with master's students of Social Services and Law schools of Heidelberg University SRH, Germany. Those students are professionals that are in many social public and private policies in the labor market. We can conclude that the gap between social affairs on both countries have significant differences that are in the core of the historical and cultural differences of each country and demands research and intervention from the public powers to minimize the social problems that comes from different origins and have different aspects but are still related to general population life conditions. Therefore exclusion is the most common aspect related to social problems on both investigated realities.

Keywords: Social Affairs, Research, Social exclusion, Difference

Innovation and communication processes for sociobiodiversity valorization in the Tapajós National Forest

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This paper presents design strategies aimed at optimizing processes of innovation and social development within the protected areas in western Pará. Based on the analysis of approaches with a focus on design for social innovation, sustainability, human-centered and in its territory, build parameters for reflections and actions that can contribute for add value to the local sociobiodiversity. Indicates opportunities and challenges in the productive chain of the rubber for the local market. Suggests the inclusion of new perspectives on the value chain of this material, in view of its potential as a source of income for the population of the Tapajós National Forest. Analyzes field experiments with communities in the Tapajós National Forest, involving projects and workshops for creating visual languages and brand to artifacts made with natural rubber. Points to the need for deeper issues relating to planning, development model desired, markets, sustainability of the projects and autonomy of communities living in that area. Thus, the paper proposes the designer in this context as a facilitator, in order to contribute to the planning of actions for sustainable local development.

Keywords: design, rubber, sociobiodiversity, innovation, communication.

Local Productive Arrangements of Ecological Bricks as critical to economic and environmental sustainability in the Amazon

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This study aims to analyze the environmental and economic impacts, of the implementation of local production of ecological bricks in the city of Pedro II, in the state of Piauí, in addition to economic gains in the region, in terms of the ability of social inclusion disadvantaged groups from the insertion in that production process, which, besides guaranteeing them income, may give them maintenance condition and independence in a future period. Green bricks are perfect substitutes to the ceramic brick 6 or 8 holes for admitting their same functions and to be up to 6 times more resistant, secured by certificates Determination of Compressive Strength and Water Absorption, made in the laboratory. Are interesting also because its production process does not require burning, which is environmentally sustainable, and economically viable alternative. Realizing that much of the wood used as firewood, both in the production of ceramic bricks and other unsustainable activities comes from the Amazon, it is proposed the assimilation of Ecological Brick in denial to deforestation in Brazil, and for the preservation of native forest. Will address these ideas Solidarity Economy and Ecology, the example of local productive arrangements and its ability to promote sustainability in various aspects, from environmental to socioeconomic. It will be also addressed the concept of Green Economy and an analysis of the effects of such production practices on the environment of the region.

Keywords: Sustainability, Solidarity Economy, Local Productive Arrangement, Ecology and Green Economy.

**Macuxi and wapichana indigenous peoples from Boa Vista/RR:
a social economics analysis**

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The urbanization of indigenous populations constitutes a growing phenomenon and this process has been going on with serious economic and social problems. Accordingly, it expresses the need to implement differentiated policies that attend their specificities, since this context puts them in a situation of vulnerability to economic and political stresses. This research investigates the socioeconomic situation of indigenous people who live in Boa Vista/RR (Brazil), bridging and supporting this reality with the contribution of Anthropological Science, in addressing interethnic and historical contacts, because of the continuous occurrence of indigenous people in the Brazilian Far North region. Hence, it was done a descriptive investigation research, along with a sampling of 384 residents in Boa Vista who self-identify as belonging to indigenous ethnic Macuxi and Wapichana, investigating aspects related to earning and access to the labor market. In this work it was shown that, mediated by peculiar values situation of interethnic contact, indigenous migrated to Boa Vista, where 63.0% of these families live in severe socioeconomic status. Moreover, we discuss public policies that can improve this situation.

Keywords: Indigenous. Poverty. Public Policy. Interdisciplinarity. Environmental Sciences. Earning.

Creative city and urban natural resources: sustainable social economics development perspective for Boa Vista/RR

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This article aims to evaluate the creative potential present in the multi and intercultural reality of Boa Vista, capital of the state of Roraima, and how to take advantage of it in the generation of a sustained socioeconomic development, with focus in the improvement of the quality of life of the urban populations, as it respects the Economical Humanism. With view in the "genius loci", search to detach the importance of the economy of the creativity starting from the net of positive intersections humanized and that humanize, centered in politics that seek the development of talents, technologies and tolerance, in the local urban context. Is like this to be, the comparative method is used with cities that went by the process of urban reinvention, developing an economy that moves around of intangible assets, and symbolic in the invigoration of traditional sections, becoming creative cities as they stand out New York and London. This way it understands that the creative potentialities, identified in the context of Boa Vista, it can elevate in personal computer and macro level, its degree of human intelligence, the desires, the aspirations, motivations, imagination and their inhabitants creativity, harmonizing socioeconomic development with life quality and human well-being.

Keywords: Creativity. Natural resources. Economic Development.

Sustainable development: an analysis of GDP in green perspective

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The last two decades of this century register a state of profound global crisis. It is a complex abnormality and multidimensional whose facets affect all aspects of our life: health and way of life, the quality of the environment and social relations in the economy, technology and politics. It is a crisis of intellectual, moral and spiritual dimensions. A crisis of scale and urgency unprecedented in the entire history of humanity. The shortage of natural resources is a key for sustainable development. In an economic system, both the raw material and the final product need not be measured in monetary units. The measurement of what is produced in the economy of a country is made via the Gross Domestic Product (GDP). However, according to the definitions of environmental economics, there is another way, wider, to compute this production, which is by the Green Gross Domestic Product or Ecological GDP. This paper intends to discuss the growth and development having as parameter the concepts of gross domestic product, not only from the traditional measurement, neoclassical, but also the green or ecological perspective. According to the classic definition, GDP is all that is produced within the geographical limits of a country, by national and foreign companies. The Neoclassical economics is based on the analysis of prices, having a "metaphysics" concept of the economic reality, acting as a constant search for money. As to the ecological definition of Gross Domestic Product, in the calculation of GDP, the Neoclassical GDP should be computed more the wear of the nature elements (externalities), occurred in the production of GDP, taking into account the recycling of waste materials and their use in the production process. It is observed that the difficulty in measuring and quantifying the environmental problems makes it difficult to incorporate in the private costs, the "real" costs of environmental preservation. Mechanisms such fees, taxes and tariffs, are not proposed efficiently to ensure the polluter-pays principle. Preservation of the environment is an investment whose return is difficult to quantify, and often involve global responsibilities. However, the implementation of this new style of development will define the necessary foundations of a new society.

Keywords: domestic product; externalities; sustainable development.

Regional development in the Amazon: sustainability in foreground

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The regional development presents itself as one of the current guidelines of the political, economic and social system in order to build a socioeconomic, cultural and environmental dynamic structure, inclusive and sustainable. It represents a new way to promote development from territorial promotion, acting as a systemic and spatial cut in formulations of public policies, government strategies and in the agents and local factors treatments. So, the search for evolution and improvement of the structures and tools that ensure equitable development, social cohesion, the environmental and cultural sustainability and balance, without forgetting or privileging the macroeconomic conjecture, brings out the need to reflect the realities and possibilities involving Amazon in a intra and extra-regional space. So, this work seeks to analyze and contextualize the Amazonian pattern of development and the relationship of fundamental vectors to social, economical, political, environmental and cultural sustainability, achieved for a fairer reality, with inclusion and promotion of development in its multiple scales.

Keywords: Regional development; Amazon ; Amazon sustainability

Sociodemographic characteristics and vulnerabilities of the Amazon region: the case of Calha do Purus subregion

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The Calha do Purus region is largely classified as an area with multiple uses of natural resources in a sustainable way. Although state and federal government has been planning its territory according to preservation and sustainable alternatives guides, monitoring and incentives policies must play a central role in a sustainable development. On the other hand, an accelerated deforestation driven by agriculture frontier expansion has proven that a predatory traditional model of economic growth still prevails. Migrants from different parts of amazon region decide to live in Calha do Purus looking for a job. Thus, a recent population increase took place which impacts directly on sociodemographics characteristics of this region. Besides a huge economic performance between 2000 and 2010, Calha do Purus has a considerable share of its population living in vulnerable conditions. So, it becomes extremely important to assess whether this development model will provided better living conditions for the local population. To understand the living standard of this population, we will begin our analysis with the rise in the number of families who receive the benefits of BOLSA FAMÍLIA from Federal Government. In 2010, nearly 62% of Calha do Purus population earned this support. Families who receive this money belong to the most vulnerable in society and often are at social risk and absolute poverty. This indicator shows the mismatch between the social and economic situation in the region and highlight the need to develop productive activities based on the potential of the region, generating income for the population. The precariousness of transportation infrastructure became a problem to get access to public services like health and education, especially in rural and riverside population. This article aims to analyze sociodemographic characteristics and vulnerabilities in a multivariate approach applying factor analysis and clustering statistical measures.

Keywords: population; socioeconomic development; living conditions; sustainability.

Drainage basin as unit of environmental planning: Grants to environmental management in the Island of Príncipe-São Tomé and Príncipe / Africa

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The study on drainage basins has gained increasing attention in environmental planning actions in different countries. It is clear, therefore, that this fact is related not only with the inclusion of new insights about the importance of watershed for environmental management, but mainly due to increasing environmental degradation around these basins. Thus, both the agricultural activities, fishing, tourism, and other forms of exploration of natural resources, have triggered environmental and social impacts at different scales, affecting both the developed and industrialized countries, as well as underdeveloped, regardless of their rates of industrialization. It is understood that the practices of use and occupation of land differ in time and space and due to several factors, such as natural, cultural, socioeconomic, political, technological and other. Thus, we sought to develop in this paper an integrated analysis of the drainage basins of the island of Príncipe, through geocological approach, considering the different forces that acted and operate in the dynamics of local environmental systems, as a basis for the realization of an economic ecological zoning regional. Incorporated into this analysis the natural aspects, historic-geographic and cultural economics, intrinsic to the formation of social and environmental of the Príncipe Island, with emphasis on the relationship between society / nature to the surrounding watershed. It is hoped that this work will contribute to the direction of the development proposed for the place, valuing and including local communities in environmental planning processes through the application of sustainable actions relevant to the quality of life and environmental conservation measures.

Keywords : watershed, Environmental planning, Príncipe Island.

The timber sector and the Verde Para Sempre extractivist reserve: challenges for sustainability in the municipality of Porto de Moz, Para, Brazil

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This study aims to characterize the timber sector in the municipality of Porto de Moz - PA, identifying potential marketing channels for managed timber in RESEX Verde para Sempre. The methodology was based in the Participatory Rural Diagnosis, through personal interviews with owners and managers of sawmills and plants of furniture, plus residents in RESEX Verde para Sempre. In order to insert the extractive communities in the formal market, it is necessary to regularize the use of the timber resource. Therefore, we identified eight initiatives of communities of the RESEX Verde para Sempre where are organizing to the adoption of sustainable forest management, such as community Arimum, Jussara, Paraiso, Inumbi, Itapeua, Espirito Santo, Por-ti-meu-Deus e Belem. It was found that companies have on average six employees, where the main activity is the manufacture of furniture (70%). Consuming on average 4m³ of timber per month, coming from local producers which do not have forest management plan (80%); own area without forest management (10%), and areas with forest management plans (10%). The non-use of managed wood is mainly due to the fear that the price of products increase and local consumers do not have the financial means to acquire them. Approximately twenty timber species are used, highlighting the muiracatiara (*Astronium lecointei* Ducke) and marupa (*Simarouba amara* Aublet) as the species most frequently, with 16 and 12%, respectively. The market is still predominantly local, with products marketed within the same county or neighboring counties, such as Laranjal do Jari, Vitoria do Xingu and Altamira. One of the main problems faced by the sector is the wood shortage, corresponding to 50% of respondents, followed by lack of areas with forest management plans, with 20%. In general, the timber sector of Porto de Moz is formed by small businesses purchasing timber from small producers, participating in a market unregulated. Given this scenario, the regularization of forestry timber in RESEX Verde para Sempre, will contribute to solve problems related to the demand of raw material for sawmills and legalized plants of furniture, allowing the marketing of products in regional markets, national and international.

Keywords : timber sector; extractive communities; sustainable forest management.

Natural Hazards and Urban Planning: The case of the Communities of Jamaica and Água Funda in the City of Praia – Cape Verde

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The unbalances caused in the relations with nature, indicate that man himself is increasingly a victim of the environment, through manifestations of risks; with the aggravation that in most cases communities are unprepared to respond effectively to these manifestations. That the world's populations prefer to live in urban areas is evident and this leads to saturation and chaos in those surroundings due to occupation of risky and environmental degradation areas. The city of Praia is no exception to this global scenario and each day it is witnessed the proliferation of unplanned communities in risky zones as it is the case of Jamaica and Água Funda, subjects of this study. The main purpose of this study is to demonstrate the importance of urban planning for risk management in the communities of Jamaica and Água Funda, and therefore, propose, in the light of planning, some course of actions in order to alleviate the current problems, and focusing on the sustainability of the communities referred to. The urban planning can, thus, constitute a response to minimize the current and future risks facing these communities. This research methodology is based on literature review and field work, including informal interviews with local authorities and populations. It is expected that the process of risk analysis can support the local planning and bring positive impact on proposals for local management, both in the quality of the local populations' lives as well as in the implementation of environmental conservation policies.

Keywords : Natural hazards, Urban planning, City of Praia, Cape Verde.

The challenge of sustainable development in the Amazon: perception of potential impacts of the Reopening of BR 319

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The Amazon region requires concerns about development proposals, considering historically implemented projects that caused irreversible impacts on the environment. With the arrival of military rule in the second half of the twentieth century, in almost all of Latin America, the boundaries become national concern, in view of the conservation and preservation of the Amazon Rainforest. Among the major 'development' project deployed in the Amazon region by military governments, there is the opening of roads, cutting off the region from north to south and from east to west, showing the most devastating of which was perpetrated in the fabulous regional ecosystem Amazon. Analyzing the effect of these roads, as roads occupancy, all, without exception, were truly responsible for the widespread devastation occurred in these Amazon spaces. Given its size, it is projected that the greatest impact in Amazonas state resulting from the opening of roads, was the construction of the BR 319, planned to connect the capital of Amazonas to the rest of the country, and consequently drain the production of the Industrial District and Agricultural of the state. While the prospect of reopening the BR 319, which at first was part of the PAC – Portuguese acronym for Growth Acceleration Program - of Federal Government, causes excitement and at the same time caution in future projections by the scientific community and the residents in the region who can their livelihood with the use of natural resources offered by the environment. Analyze the impacts caused by the construction of roads in the Amazon may allow gathering information capable of ensuring effective participation of riparian people in public hearings to be held for building works as the bridge over the Rio Solimões, as part of the reopening of the BR 319. Environmental Education, associated with awareness transdisciplinary, is considered an important tool for participatory environmental management in the pursuit of building future scenarios that address sustainable development for the Amazon region, requiring responsible public policies that actually target the collective welfare and conservation and preservation of the Amazonian ecosystem.

Keywords: roads, environmental impacts, environmental education, awareness transdisciplinary.

Analysis of potencial landscape of municipality of Carolina-MA for the management of ecoturism and geoturism

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Natural resources play a major role for the growth and development of mankind over the years. At present, there is a diversification in terms of the potential landscape sites, which have become important source of income in many Brazilian municipalities. The appreciation of the green and the pursuit of activities related to nature are constantly increasing. In this context, this work was carried out in the municipality of Carolina, located in the south of Maranhão/Brazil, also known as the "paradise of water." That city has a high potential landscape, translated into lush waterfalls that make up the Chapada das Mesas overlooking the Tocantins river with a vast number of tourist attractions, among which stand out the Tourist Complex Pedra Caída, the Serra Torre da Lua, the Morro do Chapéu and the Portal da Chapada, visited annually by a significant number of tourists. Thus, Carolina has a rich set landscaped with high possibility for the development of activities related to ecotourism and geotourism, boosting the local economy and making the city known internationally. However, all this potential is threatened, since urban infrastructure problems affect the development of these activities and undertake the preservation of natural resources. However, all this potential is threatened, since urban infrastructure problems affect the development of these activities and undertake the preservation of natural resources. The main problems are: the advancement potential of soybeans, lack of sanitation and solid waste disposal. Thus, the main result of this study was to survey the potential landscape and local activities impacting these environments, developing proposals to mitigate the degradation of natural resources through environmental and spatial planning at local level. Main products, we emphasize the development of a management plan with proposals compatible with the capabilities and limitations of the municipality, seeking to combine economic growth with conservation of natural resources, prioritizing development guided by the principles of environmental education and sustainability.

Keywords : Carolina, Potential Landscape, Ecotourism.

The role of the Universidade Federal Rural da Amazônia for local development in Pará

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Local development, seen as base programs and regional development projects implemented in the Amazon, has its bias grounded in endogenous and popular participation. The idea of working with communities in the various areas that fall within the natural resources is very complex, because the cultures developed to that population cannot be linked to your identity. For this type of action is needed that respect the local customs, the vocation of each community to develop certain activities, and who have a development from the inside out, listening to stakeholders in the promotion of these policies, while also taking into account the sustainability as a way to use the surplus production, using management techniques. In this context, operates the Universidade Federal Rural da Amazônia - UFRA while transforming society and catalyst for development. University is committed to seek ways to solve the problems and challenges of their economic and social context, through the generation of knowledge and practical application. With the goal of training professionals working mainly in the field of agricultural sciences, it has an important role for the State of Pará, since it has much of its production for the exploitation of natural resources. This study presents results and projects that contribute to the development of a sustainable, developed in the UFRA's experimental stations. It discusses the importance of research and experiments in practical life and in the contexts to which they are inserted. The analysis is based on data from Experimental Station of de Freshwater fish farming in Castanhal and Farm School of Igarapé-açú, where the former works on fishery resources and the second planting of annual crops and horticulture, and corrals and pastures for cattle, goats and sheep. It can be seen through these initiatives, the UFRA can fulfill its role as propagator of knowledge that permeates the walls of the university and is reflected in the economic reality and the local culture.

Keywords: regional development, sustainability, natural resources.

**Use of forest products by traditional communities in the Amazon:
prospects for sustainable forest management in the extractive reserve
Verde Para Sempre, Porto**

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The aim of this study was to describe the use of the forest products by traditional communities of the upper Guajar river. It will be evaluate the possibility of the regularization of extractivist activity through the consolidation of a project of sustainable forest management adjusted to the traditional practices. The survey was conducted at the communities Belm, Bom Jesus, Deus Prover and Bela Vista in the Extractive Reserve Verde para Sempre, Porto de Moz - PA. Data were collected during meetings and structured interviews with residents community residents, based in participatory methodologies. The communities have being using the tree *Mezilaurus itauba* for the manufacture of sawed pieces and for the building of boat, being both for their own use as for business purposes. This represents the main source of income of the extractivists. The communities work in family groups and, when necessary, hire manpower among other families, when there are too many orders of boats to building. The extrativists have been exploring the community area in several locations, mainly in river edges, due to the facility of wood outflowing. The first treatment is on made on the three falling and transportation site inside the forest is performed with the aid of the wheelbarrow wooder and a small tractor. The buyer seeks the production at the community headquarters or when required the extractivist take to the cities. For the implantation of an project of sustainable forest management adapted the forms of use of forest resources extractive communities, it is necessary to make adjustments in the practices of forest use, such as mobilizing social organization, the zoning of the intend forest, incorporate more species to be exploited and improve the forestry activities management.

Keywords: extractive communities, traditional knowledge; timber resources.

**Working conditions of pickers of recyclable materials of landfill
in the municipality of Altamira, PA**

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This paper analyzes the conditions of waste pickers in the city of Altamira PA, using two sets of analyzes: a literature review and field visits - with a questionnaire. The data collected indicated that the population of waste pickers comprises a large number of women. These waste pickers have a low level of schooling and no technical training, which hinders the inclusion of these people in the labor market. The monthly income obtained by them is low, accompanied by poor working conditions. It is necessary to create a cooperative for these professionals, giving them their labor rights. This class of workers is on the margins of public policy and society, but it has a huge importance to the environment, favoring the reduction of solid waste generated by the residents of this municipality.

Keywords: Waste Pickers, Recyclable Materials, Solid Waste, Landfill.

Flood mapping through interdisciplinary methods as an instrument for urban and regional planning in Amazon

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Flooding is a common natural hydro-meteorological event, but can be a hazard. In the Amazon region, riverine floods and flash floods occur frequently. Human populations and settlements in the Amazon are, historically, located close to rivers affected by riverine floods, or located in places with insufficient urban planning and basic infrastructure. Both factors contribute to the distribution of risk-areas and the increase in the frequency of disasters in urban areas. Hazard is defined as an event or process with natural or antropic causes that have the potential to generate losses. Floods are considered as natural hazard. Given the multi dimensions of flood impacts in urban planning issues, this work argues that interdisciplinary methods are necessary for mapping flooding areas. On the one hand, hazard can be quantified and mapped through deductive approaches and methods from the natural sciences. On the other hand, hazard can also be described from the population perspective at a local level using social sciences methods. In the first case important inputs are topographic and slope data for geomorphological mapping. In the second case, timeline methodology can indicate the most severe flood and a spoken map give the population the opportunity to point out the affected areas. The interdisciplinary methods using both data inputs are appropriate for urban planning challenges. This method was applied in a case study in the lower Amazon, in the urban area of Santarém. High resolution images and remote sensing were essential tools. A Geographical Information System was used to integrate data into a single database. Results show that 9 neighborhoods have high and moderate susceptibility areas to floods. Flood mapping is the first step of risk mapping as a key issue to the sustainability of regional planning.

Keywords: Amazon, Flood, Interdisciplinary Methods, Urban Planning

ATLIMARJOM: A study of the socio-economic development and sustainable association of Recycled Materials Catchers de João Monlevade/Minas Gerais State

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The dynamism of the current economic system, which aims at profit as an end, created plenty of challenges to be treated as social and economic exclusion of a significant part of the population that is unemployed or is not employable, besides the environmental degradation. In this context, the recycling materials catching has become a tenable alternative to encourage the economic and social development linked to the environmental maintenance, as it presents some factors of its economic, social and environmental availability. This school work has as its propose analyze, in the Industrial's Engineering perspective, how the organizations of the third sector can be sustainable aiming at the local development using as an object of study the ATLIMARJON (Association of Recycled Materials Catchers of João Monlevade) in the city of João Monlevade – Minas Gerais State where does the materials catching in the streets of the town. Within the methodological procedures it is used the bibliographic and documentary review. It was diagnostic several internal and external difficulties to the organization. Accompaniments are still done in the administrative, productive and organizing activities, participations in the meetings and ATLIMARJON's activities. And it is on elaboration the action planning with the diagnostic results. At the beginning, is possible to notice a big sustainable potential in the association, but the non-engagement in the group is caused by many problems in the administrative, financial, productive and political fields. At this way, it is noticeable that the third sector's organizations linked to the recycling have a sustainable potential that proves the existence of alternatives to construct a fair and sustainable society.

Keywords: collectors, recyclable materials, sustainability, sustainable development.

**The lessons of Carajás: mining development and its impact
by observation "in loco" of Vale's actions.**

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To which extent the sustainability actions by the Cia. Vale restrain themselves to the media discourse or actually configure themselves as interventions that have caused real impact and have recreated meaning in the relationships between the company and society, causing a logic different from the predatory appropriation that has oriented the occupation of the Amazonian territory? It's well known that the incorporation of socially and environmentally responsible practices did not displace the focus of the corporation from what has always been their primary goal: financial profit. It's exactly the opposite. In the present moment one realizes two trends that decisively orient the movement of global capital concerning the Amazon: from an infinite *locus* of wealth exploration (extractivism of raw material) the preserved forest has turned into a valued financial asset and potential source of profit. Added to this, the international media coverage influences the public opinion that puts pressure upon the companies, governments and institutions to adopt more responsible attitudes towards the environmental question. The responsible actions are then valued by the international financial capital, which demands, from the companies, more transparency and opening to dialogue with all the groups that suffer the impact of their activities (stakeholders like employees, communities, shareholders, local, state and federal governments). Therefore the need to focus the investigation of this debate/conflict of the participatory communication among the stakeholders: to map out the intentions, discussions and decisions which generate negotiated practices and their effects on the Amazonian habitat through relationships between communication and politics. The discussions are based on thoughts of Brazilian and Amazonian authors such as Celso Furtado, Edna Castro and Lucio Flavio Pinto.

Keywords: Amazon, communication, media, sustainability

**Socioeconomic characterization community actaaia,
mojú settlement project I and II, Santarém, Pará**

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The socio-economic survey of rural communities by diagnostics is a valuable tool, which allows the evaluation of the situation of families. This study had as objective to describe and analyze the socioeconomic situation of the community ACTAAIA, located in the broad area of Santarém, PA, to understand the local situation and propose ways to improve the quality of life of settled families. The research began with the data collection of the municipality, being: urban and rural population, main economic activities, mortality, education, infrastructure, agricultural production and health. The second stage included the collection of primary data, with structured questionnaires to 63 families, community and key players meetings. The collected variables (identification of the head of the family; identification of production systems; infrastructure; household composition; health and education; land-use; organizations; environmental awareness) were presented using descriptive statistics (mean, relative frequencies). Forty four communities were interviewed. The production systems were identified: agriculture, extraction of vegetables and poultry. The marketing is developed through middlemen, wholesalers and sell directly to consumers at the Municipal Market of Santarém. The Actaaia community has land problems due to lack of planning of land distribution, as well as its use, resulting in low productivity and diversification of agricultural crops. As a result of this process, there are the macro issues such as: lack of education, poor health care, hunger, lack of recreation, employment, access roads without maintenance, among other factors.

Keywords: Rural development, family farming, Amazon.

Working conditions in recyclable material cooperatives of São Paulo Municipality, São Paulo state

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This study aimed at identifying the working conditions and health risks in recyclable material cooperatives to support discussion for the implementation of public policies that foster social and economic inclusion of the pickers. According to the Institute for Applied Economic Research (IPEA, 2012) 26% of the 1,100 collective organizations of waste-pickers in Brazil are located in São Paulo State. Because of the informality of the work and high workers turnover due to the social prejudice of the activity it is difficult to quantify the actual number of employees working in cooperatives or associations, which must be between 40 and 60 thousand. In the scope of the National Policy of Solid Wastes enacted in 2010 (Law 12,305) by the Brazilian government, the participation of cooperatives or other forms of association of waste-pickers in selective collection and reverse logistic is prioritized, therefore the number of cooperatives is expected to increase in the next few years. In order to characterize the working conditions of the waste-pickers we visited six of the 20 cooperatives of recyclable materials which have agreements with the municipality of São Paulo, in September 2012, October 2012, and April 2013. The information presented refers to observations of the workplace and working process, as well as on interviews with the heads of the cooperatives based on a protocol developed by the Health Surveillance Coordination of the São Paulo city. The main risks factors identified were: 1) Accident: fire, injuries from sharp materials and other equipments (shredders and bales); 2) biological: fungi, molds, bacteria, viruses, rodents, pigeons, spiders, flies, bees, among others; 3) chemical: dust and heavy metals (Hg, Cd, and Pb) derived from fluorescent lamps, batteries and electronics; 4) physical: noise, poor ventilation and lighting; 5) ergonomic: lifting, pushing, pulling, or carrying heavy loads; awkward postures and movements; and prolonged and repetitive work performed standing. In all cooperatives we observed poor hygiene and safety at workplace. Most of them face the problems of waste accumulation due to space constraints as well as problems on work organization since the amount of material received is greater than the screening capability of the pickers. The material unloaded in the cooperatives is of poor quality, some are hazardous or non-recyclable wastes, such as fluorescent lamps, diapers, and food scraps, which are inappropriately discharged with the recyclable ones. This scenario puts a challenge of how to develop this activity in order to allow income generation through decent work and social inclusion. A more effective participation of local governments and all stakeholders in the process are required to improve the working conditions of the waste-pickers by means of empowerment and professionalization, in addition to providing health and psychosocial assistance to the workers.

Keywords: cooperatives, occupational health, recyclable material, solid wastes, waste-pickers.

As development thinking in the south-southeast Pará to assume responsibility of Hans Jonas?

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The natural environment of the south and southeast Pará some five decades has been undergoing major structural and sudden transformations. A huge area of forests and rivers was suppressed in the name of the developmental potential of the region: mining, cattle ranching, steel ... Livelihoods of communities integrated with nature (indigenous riverine, small extractive rubber, chestnut) have changed profoundly. Such transformations are straight consequences of various economic projects installed in the region. Some with few highlights, but no less impactful, others with greater relevance and scale to the international market: Trans-Amazon Highway, Great Carajas Project, Hydroelectric Tucuruí, ALPA, Hydroelectric Marabá. However, from a possible reflection of the thinking of Hans Jonas (1903-1993), all of these projects as all the environmental degradation due to the same in the South and Southeast of Pará are offshoots of an ontic ontological structure that permeates all instances the real in contemporary, namely the modern technique (*moderne Technik*). For Jonas, on the trail of his teacher Martin Heidegger (1889-1976), modern technology is not a cultural movement in contemporary among others. Much less, the technique has to be a simple consequence of materials innovations of our skills in the natural world. First of all, the technique is a way of covering and uncovering all designed contemporary. The issue of modern technology is of singular importance in Hans Jonas, is the question that instigates a new ethical possibility westward. Because the issue of modern technology to produce large prints implications ontic and ontological dangers for humanity and for the planet: as environmental degradation, the possibility of imminent decimation of life on the planet, emptying full of meaning in human relationships and the distance being. The initial theoretical ground of Jonas is the indentation of metaphysics held by Heidegger and thinking about the essence of modern technology by the thinker of the Black Forest. As Jonas, on the trail of the thought of Martin Heidegger, the contemporary technique stems from developments of metaphysics. However, reserves the Hans Jonas thought singular and a philosophy all its own. Jonas answers the question of modern technology with the proposal of a new and distinct ethical project for humanity. The ethical project of Jonas is based on the search for a principle of respect and responsibility towards humanity and the planet, thematic equity in your great work, *Das Prinzip Verantwortung (The principle responsibility)* published in 1979. As the subtitle indicates *Das Prinzip Verantwortung, namely Versucheiner Ethikfür die technologische Zivilisation* (Assay ethics for a technological civilization), the principle responsibility constitute a new practical rationality that this account of the challenges posed by the modern technique technological civilization. For Jonas, the relationship modern technique and morality cannot be understood from the conventional ethical parameters. To the thinker, the modern technique would not be subject to the weightings of Moral Philosophy by then. In this context, to understand the modern technique is necessary to break with

traditional moral criteria. Because, on the issue of modern technology orbits consequences and ramifications civilization unique in history, which bring into play the human existence and life on Earth. In this context, this conference is scoped to think about economic development - nature in the South-Southeast of Pará light of the thought of Hans Jonas.

Keywords: Amazon, Development, Environmental degradation, Pará.

Amazon, barn of non-living natural resources: opportunities and challenges for sustainable development

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The area of more than 7 million square kilometres of the continental Amazon River Basin represents 5% of the land surface of our earth. The countries within the watershed amongst Brazil are Bolivia, Peru, Ecuador, Colombia, Venezuela, Guyana, Suriname, and French Guiana. The geological history of the Amazon allowed the concentration of minerals widely availed above all by people living in the Andean region. The Incas and other Andean peoples already developed technologies that enabled the exploration, extraction, processing and use of gold, silver and gems. From the nineteenth century geological studies led to the discovery of new world class deposits to meet the growing demand for industrial metals in the U.S. and Europe. Factors such as urban growth and infrastructure in the countries within the Amazon catchment area, the world wars and the exhaustion of the main known mineral deposits led to the opening of several world class mines in the Amazon. In the Brazilian Amazon basin, even where geological mapping covers less than 5% of the area on a scale of 1:100,000, there are mines of gold, silver, iron ore, bauxite, copper, nickel, manganese, chromium, tin, niobium and tantalum, and zirconium, amongst metallic ores. There are also mines of industrial minerals such as kaolin and limestone, and reserves of gypsum, potash and phosphate rocks. The mineral aggregates used in construction and infrastructure such as roads, railways and dams are spread over all states with more intensive activities concentrated in large urban centres. Even occurrences diamonds and other gems are already known and partly mapped. A better knowledge of the Amazon geodiversity in a scope that allows land use planning and mining where there is concentration of minerals can serve as opportunity for policies that articulate the exploitation of non-living natural resources considering the protection and conservation of forests and stimulate economic and social development in municipalities and states where mining takes place. In the proposal for new regulatory framework for mining sent to Congress by the Federal Government, the creation of the National Council for Mineral Policy is planned, which will define policies directed to mineral exploitation in the Amazon, such as: (i) Geological studies to be developed by the Geological Survey of Brazil – CPRM, (ii) Specific requirements in the call for the bidding of the areas in the region, (iii) Conditions that guarantee the articulation of mining with the protection and preservation of environment aiming at sustainable development, as clauses in concession contracts for prospecting and exploitation.

Keywords: Geodiversity, new mining bill, sustainable mining.

Saving for the reconstruction of a landscape environment in my city

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The article deals with an activity of Financial Education that has as Thematic line the environment, sustainability and mathematics, with a group of students in the ninth grade of elementary school at the Lutheran Confession School in the city of Taquara- RS. The proposal aimed to work the importance of the preservation of the environment, especially in public spaces and where the street in front of the school was adopted to develop the project. At first, the students visited the city dwellers and presented the proposal and the possibility of them contributing to its implementation. Then, a seminar was organized with the secretary of the environment of the municipality where it was possible to clarify doubts and questions regarding the flowers by season, since in Rio Grande do Sul there are four well-defined seasons, adequate types of trees for these spaces, soil fertilization. After then, each student made a piggy bank to save money related to his/her contribution for the purchase of seedlings. Later on, we checked the price of seedlings, which were previously defined, and which will be transplanted. After this inquiry, the purchase of the seedlings started according to the amount of money collected and after, its planting. Therefore, this proposal is intended to provide moments of reflection, bringing out the necessity for preservation of urban spaces, making them more beautiful and harmonious, allowing an individual and collective reflection of urban-environmental issues, using the known experiences as an stimulation for a changing in attitudes and later the dissemination of this proposal to other students and the community in general.

Keywords : Environment, financial education, sustainability.

Stormwater drainage system – study of case in Batista Campos neighborhood, city of Belém, Pará state, Brazil

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The process of urbanization waterproofs the soil, difficult the infiltration of storm waters accelerating its superficial flow bulkier. The stormwater drainage system has the intention to organize the urban development and avoid prejudice material and humans losses, such as floods and disease. The urban drainage is dimensioned hydraulically in two principal levels: the Macrodrainage and Microdrainage. Macrodrainage the flow stormwater in the background of the valleys and floodplains, while microdrainage is, basically, defined for the ways to the public routes. Belém is a city surrounded for water, located in the mouth of a arm to Amazonian's delta in Guajará bay, cut for many channels, streams and rivers. The consequence of the process of urbanization the rivers was channeled in sewer or simply grounded, with the justification to sanitize, integrate and beautify the city. The Batista Campos neighborhood is on one of the 14 watersheds' Belém, the Estrada Nova watersheds, with extension of 9,54 km² and 72,70% of the soil bound to flooding. The methods used were: interviews with 70 people that live in this place and with engineer of the department town of sanitation (Secretaria Municipal de Saneamento – SESAN). The results of the interview with the SESAN were that there are not a planning of urban growth connected to stormwater drainage system. The absence of the sewer and proper disposal of solid waste are the major problems that influence in flow to the superficial water of the rain. Therewith, occur constants flooding in the area affecting directly in the populations' quality life. The answers in the interview with the dwellers were: 71,43% said that there are not selective collection in the neighborhood, 77,14% answer that there are flooding constantly in the streets. The people said that the classification of the drainage system was: 44,28% bad, 38,57% medium and 17,14% good. About the project of improvement 67,14% they do not know information about this. Thus, were observed a shortage related with the basic sanitation and the drainage system to the the area. There are many focus of flooding and, in the moments that rain the water arrives to invade some houses, therefore, many dwellers must keep their furnishings always overhead to avoid bigger damage.

Keywords: Drainage; Sanitation; Batista Campos; Estrada Nova watersheds;

**Economic viability of an agroforestry model composite of timber species
of high commercial value established in municipality
of Medicilândia, Para state, Brazil**

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The agroforestry has been practiced for centuries in Amazon that includes a variety of combinations of agricultural and forestry species, reflecting native plants and feeding habits from each region. Apart from the ecological benefits it offers such as protection of the soil against erosion, increase the cycling of nutrients, improvement of microclimate, among others, appeared as potential alternatives of job e income generation, allowing satisfactory economics returns to small producers, along with conservation ecosystems. On this account, the study aims to analyze the economic feasibility in a Agroforestry System on the Fazenda Açaí I, located alongside BR 230 road, Medicilândia municipality, State of Pará, through economic indicators: benefitcost ratio (BCR), net present value (NPV) and internal rate of return (IRR). The results obtained were above values as assigned by the literature, certifying the economic benefits, together with environmental and social gains offered to local families.

Keywords: Diversification of species, profitability, recovery areas.

The unsustainable in small communities of family farmers, before the expansion of soybean agribusiness in western Pará, Brazil

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The term sustainability has become a true "umbrella", that has been supporting a lot of varied situations. Despite of the uproar around the theme, and considering the importance of it in front the environmental crisis faced by society, this research aims to analyze the vulnerabilities of communities of family farm in Amazonia before the intensification of soybean agribusiness. The emergence and consolidation of large corporate farm in this region are based on the extensive exploitation of natural resources, causing changes in use patterns and soil cover and consequentially disrupting the social organization of local communities. These dynamic results from economic pressures of national and international scale. After all, perceived a close relationship between the economy and the advancement of the external fronts of expansion in the Amazon. In the end of '90s and beginning of 2000s, mechanized agriculture, particularly soybeans, was introduced in the region of Santarém and Belterra in western Pará, favored by a number of internal and external factors. As a result, intensified the coming of farmers, especially from the north of Mato Grosso state. The focus of this research is analyzes the influences and consequences of the insertion of big agribusiness dynamics in rural communities of family farmers, considering, how it handles harassment by land, by entrepreneurs seeking the sale or lease of same? What are the possible changes of these actions to the dismantling of the production chain of food? These communities will be able to resist for long the way they are? Or they run the risk of being dispossessed, thus addressing the unsustainability? The methodology is based on field observation, analysis of satellite images and interviews with families remaining in the communities and businesses in the area. The communities are Açaizal object of analysis, the Açaizal Silver and Paca, located some 80 km from the municipality of Santarem-PA, near the BR 163. Communities are contiguous and, despite having gone through the same pressure, different in degree compared to business expansion. Concluded that, if there is no combined investments for the economic revitalization of family farmers, the sustainability of their stay in the communities is compromised.

Keywords : agribusiness Amazon, rural communities, sustainability

**Environment perception assessment of the Uraim rural community
(Paragominas, Pará, Brazil) concerning of the gallery forest of Uraim river**

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With the evolution of the agriculture, the socio-economic development and the lack of knowledge of farmer, happened alterations of the nature environmental, destroying areas richer biodiversity like a gallery forest in the Amazonia. In this case, is very important that the people of the rural community obtain knowledge about the ecosystem forests. The environment perception, based on traditional knowledge, of Uraim rural community at Paragominas, Pará, Brazil, was investigated in order to evaluate local activities impacts and their relation with environment process on the gallery forest of the Uraim river. The study comprised the application of a questionnaire to 20 farmers of the Uraim rural community. Spontaneous observations of the interviewers were valued with the aim to raise the history of the use and the environmental situation of the gallery forest. Educational-interactive activities related to the gallery forest management were adopted to trace the environment perception and the community sensitization as participative diagnosis and popular mobilization. The diagnosis showed low socio-environmental development, with essentially domestic and subsistence activities. Of interviewers, 95% believed that the reduction forest fires and the gallery forest recuperation were extremely important to conservation of the forest ecosystem. 70% of the interviewers never participated of gallery forest management activities. However, the Uraim rural community has good understanding of the impact of such activities on the environment, but this was not sufficient to change behavior in order to handle adequately the forest resources.

Keywords: sustainable development, environment education, gallery forest.

Mapping of commercial establishments of the urban area that buy recyclable material in the city of Santarém – Para

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With the population growth in the city and consequently the increase of waste, on average 1 Kg/day per person, arises the need to work with environmental education, encouraging the population of Santarém the selection for after recycle, as a source of income or just as a way of developing an environmental conscience. In the process of evolution and construction of a society committed and practicing of environmental responsibility, was idealized this work that aims to describe the mapping of business establishments in the urban area that buy recyclables in the municipality of Santarém in Pará State, with the specific objective to disclose the points of collecting recyclable material of the urban area in the municipality of Santarém, arouse the interest of the people of Santarem for a new economic cycle arising from the recycling and environmental education develop a guide containing mapping information of commercial establishments in the survey, because an informed public is an informed population. Of the 21 commercial establishments mapped, 05 (five) receive all kinds of waste: aluminum, plastic, paper / cardboard, metal, copper, etc., Five (05) for receiving waste into a new product: oil burning and kitchen, scrap wood, shredded paper, etc., fourteen (14) work with the Reverse Logistics, clearing the market share of all waste that market themselves as: glass bottles, tires, car batteries and cell containers of perfumes and medicines. An environmental policy coupled with social commitment turns into a population environmentally educated part is done, just need commitment and accountability of the population.

Keywords: mapping, recycling, environmental responsibility.

How can community-based approaches improve the ecosystem management in national parks – the case of Cardoso Island (Brazil)

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Cardoso Island is located on the Lagoon-Estuarine Complex in the State of São Paulo in Brazil. It was declared National Park of Cardoso Island (PEIC) in 1962. With the establishment of the Park, conflicts arose between the ecosystem services provision focussed on through the park administration and the wellbeing of the traditional population living inside the park as the new rules affected the provision of their basic needs, their social relations as well as their freedom of choice and action. Pressures came from two sides: the restriction of using forest resources for the community and the impact of tourism on the environment. However, the community together with the park administration found a way to solve these conflicts by elaborating a management plan and fostering the community's self-organization and participatory management. This poster presents the result of an analysis of the governance model that underpinned this process of community engagement and development of sustainable solution strategies. The analysis was done based on face-to-face interviews, field visits, literature review, and document analysis. The conclusions reflect upon the capacity of communities in addressing environmental challenges and how community engagement can become a motor in fostering sustainable development.

Keywords: local governance, community engagement, natural resource management, ecosystem services

**The importance and difficulties on identification and valuation
of cultural ecosystem services - the case of Marujá community,
Cardoso Island – SP, Brazil**

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Marujá community is located in Cardoso Island in the State of São Paulo, Brazil. The whole island area was declared National Park of Cardoso Island (PEIC) in 1962. The community uniqueness relies on active management participation with the park administration. Through a pioneer project indirectly funded by KfW, the community together with the park administration elaborated a management plan, which had the great purpose the attempt to solve conflicts regarding their independency about space and natural resources, among other points. Regarding this social involvement in search for a better way to maintain their culture related to natural environment around, it seems relevant to better understand which are the relationships between community and the place, explained by the own local people. Cultural ecosystem services and their associated values reflect non-material benefits that arise from different relationships between human and the environment. Because of this detachment from monetary terms, cultural values are traditionally marginalized on valuation analysis for many reasons. Methodological difficulties and ill-fitting categorization are notably substantial ones.

This paper presents an analysis of the cultural values expressed by the Marujá community regarding their relations with the beach ecosystem, chosen by its relevance on the community's subsistence. The analysis was done based on face-to-face interviews, field visits and literature review. The discussion reflects upon the understanding of the main difficulties on the process of cultural valuation in a traditional community and the importance of a better understanding of cultural values as a relevant tool to better address environmental decision making specially when involves this local framework. The present investigation is part of CiVi.net project, a seventh framework project of the European Union.

Keywords: cultural valuation, community, ecosystem services, decision making, environmental management

Technological innovation networks in the interaction of communities in new habitat for innovation in the Amazon

Gonzalo E. V. Enriquez

The aim of the paper is to analyze the **technological innovation networks productives**, formed by communities who explore biodiversity and in the Brazilian Amazon are contributing significantly to form **new habitat for innovation**, involving small communities of rural-urban character, very small towns, cities medias and large cities, where they produce socioeconomic impacts, technological and cultural, highly positive, productive chains of biodiversity. In this sense the analysis is able to obtain an integrated view of the object network of this article and their relationship in the context of new habitat for innovation in the Amazon. The methodology that is used for the preparation of the work consisted of three ways that complement each other. On the one hand is used for secondary sources. A second strategy was to conduct interviews with small busikluaserness owners, entrepreneurs, and researchers with incubator managers who are formulating strategies for deployment of technology parks, focused on the diffusion of technological innovation, for the economic use of biodiversity. We also conducted interviews with representatives of institutions involved in public policy development in the Amazon. The third strategy, which was the difference of the article was to organize the information obtained in an array of technological performance that shows the specific role of the actors of the networks, as well as their technological intensity, productive and social, which form part of this new habitat innovation, rapidly growing in the Amazon, observed only in recent years. **There is part of the original job**. Along with presenting this integrated vision of new habitat for innovation outcomes Article fulfill a fundamental function to warn of the need to focus on the actions of public policy in order to enhance the natural resources of the Amazon, which are part of the greatest resources available to the Planet and there is consensus that finite resources are not inexhaustible, as was thought in the recent past, generating such arrangements impacts of supply chains and social Amazon. The biggest result is in the orientation of public policies to act in productive base, through networks that are consolidated, creating conditions to broaden the mechanisms of training entrepreneurs to form part of business incubators, technology parks, centers of innovation, business condominiums and other mechanisms, such as industrial complexes, all aimed at harnessing the abundant biodiversity. Likewise, the article synthesizes information scattered about the institutional base that must operate in the new habitat Innovation in the Amazon, especially the specifics of the complex development model in the region, unlike the rest of Brazil, which has already established models. **This complete article** is intended to show possibilities to address the difficulties of the process of technological innovation within the equity of access to genetic resources and sharing the benefits of biodiversity and incorporate best practices in networks to perform the registration of intellectual property and registration patents for products from both traditional knowledge, as research conducted in laboratories of Amazon.

Keywords: Technology, Habitat for Innovation, Technological Networks, Amazon, biodiversity.

From action to actors: the need for reorienting development policies in response to the global challenges of climate change, food security and poverty

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National and international organizations engaged in the design of policies for rural development tend to perceive the huge diversity of smallholders' socio-productive systems in the tropics as obsolete and ineffective. Despite a common agreement about the importance of local knowledge and cultures, mainstream policies assume that smallholders need to be profoundly modernized to more effectively use the opportunities of markets and the globalized world. Still, the development model of industrialized countries is taken as a blueprint although a growing consensus about its ecological incompatibility, social limitations and economic risks. But, smallholder groups such as colonists, traditional communities and indigenous groups, although from a technical point of view employing sub-optimal land-uses, may show better socio-environmental balances if compared to capitalized actors active in the region. Taking this into account, this paper, based on results of intense research in the Amazon region, discusses the potential of locally driven socio-productive systems for local development. The findings show that the valorization of smallholders' systems as a reference for development would allow to better use local capacities, thus reducing transaction costs for the smallholders thereby increasing the probability of success of supporting measures. Understanding of smallholders as part of the solution rather than as an obstacle for a sound rural development provides new opportunities for mobilizing actor-specific potentials through meaningful adaptations of context conditions, in particular technologies and markets.

Keywords: globalized world, rural development, smallholders.

VI. HEALTH AND DEVELOPMENT

Juá lake: the faces of regional development

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This is a bibliographic study followed by a visit *in loco* and testimonials, on the process of urbanization and occupation of the area of the Lake of Juá, which has peculiar feature of Amazon and living the dilemma very common to the region, how to control the growth of cities without environmental and economic impacts to occur. The Juá Lake, located approximately 09 km from the Centre of the city of Santarém-Pará, has one area of 956 hectares. With aspects of large area of flora and fauna, being easily accessible, by Fernando Guilhon Highway and the Rio Tapajós. In the past the village was composed of 20 families, but with the exodus of its population, remained only 07 families. Visiting the area talked with d. Raimunda, old local resident reports all difficulties faced with the lack of infrastructure and shortage in recent years, caused by serious environmental problems and public indifference, which according to her, is already almost impossible to live in the community, but also reminds nostalgic time of abundance, fish, daily feed basis, of the legends M'bóia, and faith in Our Lady of Fatima, patron of the place. With the goal of making a survey of the facts and bring the discussions to a reflective side, the course of specialization in Environment and Society development of the Amazon, visited the Juá, listened to residents, government agencies, civil society and organized, anyway, as the occupation of the area of Juá, besides mentions features for an effective and sustainable alternative development. According to Lima and Pozzobon (2005, p. 45), "the capacity of a given population to occupy a certain area and exploit their natural resources without threatening, over time, the ecological integrity of the environment". So this article seeks to contribute a reflection by the society in a responsible manner. The text is organized into three sections: first treat of the concepts on the Lake, Juá 's historical and cultural heritage and their transformations; in the second time we will see the laws and policies pertaining to the case, the master plan of Santarém; Finally, the fight for survival of the Lake, which consider the social and environmental aspects.

Keywords: Urbanization, Juá Lake, Public Policies.

The production of medicinal plants in urban areas of Fortaleza, Ceará - Brazil

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The production of medicinal plants in urban areas of Fortaleza created a model of sustainable development. The cultivation of medicinal plants should occur without the utilization of agro-chemicals, irrigated with water without chemical or bacteriological contamination, the natural resources in the area of production being conserved. The methodology consists of: Selection of urban areas of Fortaleza belonging to organs of the municipality; Planning and construction of plots of medicinal plants, the native trees being preserved; The plantation of medicinal bushes, which also serve as shade and wind-breaks for other species; The utilization of solid wastes for the production of organic compost; Environmental education in the cultivation of medicinal plants; Production of phyto-therapeutics of medicinal plants, scientifically authenticated. The program was established in the municipality and found acceptance in the local population. Today, ten species of medicinal plants are cultivated in an area of approximately three hectares in different locales in the city. Two pharmaceutical workshops produce thirteen phyto-therapeutics.

Keywords: medicinal plants, urban areas, sustainable development.

Feelings and behaviors of residents on the shores of an urban palm swamp

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Environmental education and environmental perception have arisen as weapons in defense of the natural environment. They help reunite man and nature and ensure a future with better quality of life by developing in individuals a greater sense of responsibility and respect towards their environment. A study was conducted to evaluate the environmental perception of people living on the banks of a palm swamp in the urban area of Arinos, in the Northwestern part of the state of Minas Gerais, Brazil. The palm swamps are included in the savanna formations. They generally occur in headwater areas having at its periphery cerrado vegetation in restricted sense. A cross-sectional questionnaire containing three fields (Identification and profile of the individuals; Concern about the environmental impact, personal and environmental habits and Diagnosis of land use) was applied. Seventy homes on the banks of the palm swamp were surveyed between the months of September and October 2012. The obtained data were tabulated and a descriptive analysis was performed. As to the profile of the interviewed, most were found to be women (65%), to have low education (23% were illiterate and 30% had incomplete primary education) and 37% were local native. Regarding the individuals' attitudes towards the environment, 87% of the interviewed said the palm swamp is very important for the city. However, their personal habits and activities were found not to correspond to the importance they claimed. Asked about the concept of sustainable development, 58% of the individuals could not answer about its meaning and 73% were unaware of the Brazilian forest code. It was noticed that 58% of the residents used to burn their waste on the palm swamp and 38% did not know about garbage collection. Another 22% said they throw garbage in the street. Regarding the land use on the palm swamp area, mainly fruit crops, sugar cane, cassava and vegetables are cultivated. Fifteen per cent of the individuals reported the use of chemical fertilizers and pesticides in their cultivations. Regarding the palm swamp extraction resources, it was observed that only five residents explored the *Buriti (Mauritia flexuosa)*, for selling its pulp. The majority (60% of respondents) raises chicken and cattle grazing can be frequently observed along their properties. Regarding pollution, it is common sense among the local residents that its main source is domestic sewage (45% do not have sewage treatment and still use septic tanks) besides dead animals and domestic waste. The results show that there are conceptions on the importance of the palm swamp for the city. However, the perceptions about the impacts caused by misuse of the palm swamp environment by the local residents, their negligence regarding the concept of sustainable development and environmental legislation imply the need for urgent recovery and preservation campaigns and actions.

Keywords: environmental education, sustainability, urban development, environmental impact

**Health conditions and social habits of neighborhood Maria Magdalena,
Itaituba - Pará, Brazil: critical evaluation and risk factors
for the promotion of public health**

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The Neighborhood Maria Magdalena, is located in Itaituba City, Para, Brazil, in the model farm, and had its emergence from 2005 with the start of construction planning campus IFPA. The encroachment of the old farm was an unplanned settlement process, thus highlighting the potential for problems related to health issues, social, economic, environmental and urban planning that together represent strong aggravating when it comes to public health. Before long, these aggravating were becoming prominent, and from there became a need for a study to assess the relevance factors of the process of environmental degradation and public health of this neighborhood, such as water supply, flooring, solid waste collection, sanitation and public health, highlighting the problems of the residents who live in precarious conditions. The research was exploratory and explanatory, which involved literature, field data collection, direct observation and interviews with residents, through the use of an instrument to collect data directly within the discipline of Public Health and Environmental Campus IFPA in the period from October 31 to November 21, 2012. Interviews were conducted in 166 households in the neighborhood Maria Magdalena. In analyzing the results we observe the actions of the Community Health Agent that performs in minimum conditions, the actions recommended by the Ministry of Health is a low control of infectious and parasitic diseases such as dengue and worms that are closely related to health conditions and environmental living these residents. His focus of attention is predominantly the individual. With regard to the customs of the residents of this neighborhood, it can be observed that 55.42% of respondents have the habit of walking barefoot near their homes being susceptible to contamination by various types of genres of worms. It was also low occupancy Magdalena neighborhood, where the blocks have less than 50% of the batch inhabited. As the arrangement of pits in relation to water supply wells, we obtained the following data from respondents: 147 households (89%) have septic tank, 15 households (9%) did not have pit dwellings and 4 (2%) were not informed, and the data of the average distance between pit and pit showed considerable variation between 3 and 40 m. The final disposal of household sewage is inadequate because it does not have sanitary sewer getting open without any treatment, and the accumulation of storm water causing flooding in streets that do not have forms of water runoff. We note that due to the lack of social habits need to be focused health education to residents of the neighborhood, in order to have awareness and changing habits. Public policies are needed for the initial inclusion and improving people's livelihood.

Keywords: Health, Sanitation, Environmental Risks.

Preterm births rate at sagrada família hospital in 2011 in Santarém – Pará, Brazil

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Preterm childbirth is defined as being the gestation that ends between 20th to 37th weeks. Epidemiological studies have indicated risk factors for prematurity: sociodemographic factors; young pregnant women; poverty degree, pathological processes; additive behavior of a pregnant woman (cigarette use, drugs and alcohol). **OBJECTIVE:** Identify preterm births rate at Sagrada Família Hospital in 2011 and classify them according to their etiology. **METHODOLOGY:** Statistical-documental method study from retrospective character, where there was rate investigation and maternal causes of prematurity on delivered childbirths in Sagrada Família Hospital from January to December, 2011. **RESULTS:** Out of 2.253 childbirths from January to December, 2011, 1.426 (63%) were normal childbirths and 827 (37%) were Caesarean section. There were 36 childbirths, equivalent to approximately 2% of the total, of newborn preterm. Concerning the ages at the moment of the deliveries of newborn mothers, 61% are in the age group between 20 and 34 years old and the conjugal situation observed was that 83% of the pregnant women were single and their educational level was that 41% had reached full high school. Concerning the prenatal service, 92% of the pregnant women went to the doctor for their consultation. Concerning these prenatal consultations, 39% of pregnant women made 4 to 6 consultations. Concerning the gestational age, newborn of 32 to 37 weeks totaled 47%. As far as mother's obstetrical records is concerned, 69% of these mothers were in their first pregnancy. The rate APGAR of the newborn in their first minute alive <6 is 29%. Concerning the evolution of this rate in the fifth minute alive, 36% of the newborn have evolved to APGAR >7. The highest rate of prematurity and the low weight when being born was of 23%, measuring weight between 1.501g and 2500g. Concerning the clinical evolution, 42% of the newborn have come to death. We certified that the birth of newborn preterm is not a routine at Sagrada Família Hospital, however they represent 2% of the total of childbirth delivered within this institution in 2011. The birth of preterm has multi factors, not being able to identify an only factor and causal in order to be prevented or softened during the gestational period.

Keywords: rate, preterm birth, maternal causes.

Risk of metal contamination in water sources for public supply in the metropolitan region of Belém - Pará, Brazil

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The pollution of sediments are originates from domestic and industrial effluents, urban and agricultural discharges. The situation is more critical in areas where there are activities open dumps. The Metropolitan Region of Belém (MRB) is cut by rivers, channels, streams and lakes present in diverse sizes and shapes. This huge mosaic, composed of aquatic ecosystems, there is a constant anthropogenic pressure resulting from illegal occupation of the urban environment in the vicinity of the environmental limits, causing pollution and contamination of water bodies. Among the pressures on the environment, deserves the Aurá landfill, which is in uncontrolled conditions, thus better conceptualized as open-air dumps, presenting numerous sewage resulting from the lack of a sanitation program suited to suburban communities, wastewater derived from the decomposition autochthonous organic (manure), and high waste generation source of metal contaminants. This research aimed to evaluate the content of metallic elements (Al, Fe, Mn, Cr, Ni, Cu, Pb and Cd) in sediments in the Aurá River (1°25'-1°27'S and 48°21'-48°23'W), one micro-watershed with small draining close to Bologna and Água Preta sources, which supply the MRB, and located downstream of the landfill, receiving wastewater rich in metals. Monitoring the concentration of metal elements in the last five years has shown high concentrations of metals Mn, Cr, Ni and Pb. When analyzed from the point of view of enrichment factor (EF), the results indicated strong evidence for metal contamination in sediment Pb ($EF \leq 3.3 \leq 5.4$) and Cd ($3.8 \leq EF \leq 5.7$), suggesting environmental contamination by leachate produced in the landfill. Environmental risk occurs in two ways: 1) from the perspective of the associated ecosystems, may be occurring contamination and metal accumulation in different abiotic and biotic compartments, interfering, and perhaps even altering the pattern of local trophic levels; 2) from the perspective of human health, traditional communities and people living near the dump illegally consume water from water bodies that comprise the micro-basin of the Aurá River may be being infected by highly toxic metals, such as Pb and Cr in this its hexavalent form (Cr^{6+}). The effects of ingestion of toxic metals already well documented, presenting among other symptoms abdominal pain, vomiting, diarrhea, anemia, leukopenia, nausea, convulsions, depression, lethargy, headache, tremors, paralysis, and where several long term, birth defects, mental retardation and death. The results show that there is need for a more accurate monitoring in the region as well as in other watershed areas.

Keywords: human health, contamination, environmental risk.

**Interdisciplinarity in Environmental Education:
to protect the health and conservation of natural resources**

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Interdisciplinarity in Environmental Education, working to protect the health and conservation of natural resources, has shown that disciplinary and interdisciplinary knowledge are not antagonistic but complementary, since the interdisciplinary knowledge corresponds to a holistic view of the different levels of knowledge. Therefore, the Environmental Education thought from the bias of interdisciplinarity can ensure a more sensible reality, and promote an active placement of social agents against social environmental problems of each community. In this perspective the Laboratory of Geocology of Landscapes and Environmental Planning of the Department of Geography, Federal University of Ceará, has carried out its activities in the community of Coqueiro Alagamar, municipality of Pindoretama - Ceará, from workshops and training courses with students and teachers of the community. The actions took place in an integrated manner, seeking to respect the cultural and traditional knowledge of community residents. Activities occurred on Saturdays and Sundays in the community Coconut Alagamar, counting as minimum hours 12 hours / class (each workshop / course), having as support a residence rented by the project and the Primary School Nair Vasconcelos. The themes contemplated issues highlighted by the community, culminating in workshops on issues related to solid waste generated by the community, such as: a) garbage and recycling b) manufacture toys with scraps c) reuse of cooking oil in production of homemade soap and d) reuse of some foods. From the implementation of these actions was possible to show that environmental education has ensured not only the awakening to the understanding about the rights to a healthy environment, but has allowed: 1) higher level of community organization; 2) reaffirmation of care with natural resources, 3) enhancement of knowledge and regional foods; 4) complementary source of income; 6) greater coordination with the local authorities and, 7) greater autonomy. Thus, it was possible to establish a connection between the different knowledge, providing the exchange of environmental knowledge through workshops and courses taught, thus enabling the discussion of issues important to the development of the community.

Keywords: Environmental Education, Health, Environmental Conservation and Interdisciplinarity.

Environmental education and sustainability in areas of mangrove

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The increasing degradation of coastal ecosystems emphasizes the need for a reflection on today's society where development is guided by a logic of destruction of natural resources, little considering the use of these resources, the health and the welfare of population. Thus, the valuation of coastal ecosystems in educational institutions, from practical Environmental Education has become fundamental in changes of attitudes, seeking to promote improvements in the quality of life of the local population from the value of sustainable practices. Accordingly, the extension project MANGROVE: Environmental Education in Areas of Mangrove, developed at the Department of Geography at the UFC, worked with public school students in the community of Iguape Aquiraz-CE. Iguape has a diverse landscape and cultural framework, however, have lost much of its original environmental characterization due to pressure exerted by the growing property speculation that generates a disordered residential occupancy, leading to impairment of mangrove forest and lake ecosystems due to pollution and water contamination caused by sewage releases, contributing to these environments become receptors of a wide variety of pollutants. These problems have triggered water contamination and death of aquatic animals and mangrove vegetation, as well as damage to the health of communities, which use these areas as a source of income and leisure. Thus, we sought to promote discussions on environmental conservation and preservation, where participants of LAGEPLAN - Laboratory of Geoecology of Landscape and Environmental Planning - , Department of Geography, Federal University of Ceará promoted for two years, thematic workshops addressing questions about the : i) geographical distribution and formation process of mangrove ii) fauna and flora and its local and global importance iii) man's relationship with this environment, iv) environmental issues (sewage, garbage, water contamination, deforestation, etc. .), emphasized from the realization of practical field carrying the knowledge built classroom for experiences in practice. The studies related to the environment and health were made from an integrated analysis of environmental systems, enabling students to build individual and collective critical read

Keywords : Health, Environment, School, and Lake Mangrove Ecosystems.

**Ecotourism and sustainability
in the National Park of Chapada das Mesas – MA, Brazil**

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Ecotourism has been increasing over the years, this activity has arisen due to the great advances of tourism only interested in profits and that several times generate serious environmental problems for local communities. Thus, its order aims to balance the conventional tourism with the preservation and enhancement of conservation beyond practices. The ecotourism activity has as basic principles the using of resources in a sustainable way, maintaining natural diversity, social and cultural, training for teams to present the area visited, and partnership with local communities. The research in question was developed in the National Park of Chapada das Mesas, in the municipalities of Carolina, Riachão e Estreito, in the state of Maranhão. It aims to conduct the analysis of ecotourism in conservation unit, highlighting its potential and problems. The theoretical framework was based on the perspective of system analysis, considering landscape components as systems/geoenvironmental units. During the study, we used the following methodology: i) Field observation and reconnaissance of the area to support mapping and satellite imagery, ii) Location and cartographic representation of the analyzed area; iii) Diagnostic of potential of ecotourism iv) Preparation of proposals that can contribute to improving the management of scenic resources surveyed. The results consist in the analysis of ecotourism activities, in integrating diagnosis and proposal management based on the problems and potentials found, and that the research gives significant contributions for future research and also for the community inserted in the Park and its surroundings.

Keywords : Ecotourism, Environmental Preservation

**The Public Ministry role before the Environment –
Historic Heritage and Cultural of the Old City and its surroundings**

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This present work has as in its scope to unveil of the Public Ministry role before the Environment - Historic Heritage and Cultural of the Old City and its surroundings, focusing while constitutionally legitimized institution, designed to protect the transindividual rights and diffuse interests, collectives and homogeneous, which is entered the historical and cultural environment. The research analyzes the various analytical categories about the environment and historical and cultural heritage, environmental damage against Cultural and Historic Center from Old Town and some surrounding neighborhoods, beyond the case study of Public Civil Action judged by the Attorney General of the State, involving the building in area tumbled, better known as Engomar Iron. The documents used during the investigative process were the Constitutional laws, Environmental, Criminal, Civil, State and Municipal, analysis of photographs, several journalistic sources, understood in a period from 1985 to 2012, institutional documents (IPHAN, Monumental Program) questionnaire application to interview with 2nd Environmental Justice Promoter, Cultural Heritage, Housing and Belém Urban Dr. Nilton Gurjão, observation Terms of Adjustment of Conduct and Public Civil Action inspection judged by the State Attorney General. As regards, with respect to the theoretical grounding, it was used a copious legal doctrine concerning the specific area of Environmental Law, which provided understanding the role social, political and institutional of Public Ministry, as a political agent of the law, allowing to protect the environment for the cultural historic heritage from Old City and surrounding, providing opportunities reflectively critical the access to legal and scientific knowledge about the Urban Environmental Law in Amazon society.

Keywords: Environmental, Historic-Cultural Heritage, Public Ministry and Public Civil Action.

Environmental impacts arising from the tourist beaches

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The exploitation of natural ecosystems has grown haphazardly and without proper sustainable management of natural resources, aiming, generally, only economic returns. Studies indicate that tourism has a great capacity to promote environmental impacts both in terms of positive and negative order. According to those studies, among the environmental impacts, are highlighted: invasion of the beach area by traders; action of squatters who settle dwellings; use of beach area as a port; accumulation of trash; and traffic of vehicles which modify the landscape. The beaches of Santarém, for being endowed with undeniable natural beauty and presenting great potential for tourism exploitation are not immune to those impacts. Thus, this study, as from qualitative research, searched for investigating the situation of environmental impacts, in particular the negative ones, resulting from the intense tourist flow on the river "beaches" in the region of Santarém. This research showed that natural heritage is increasingly threatened. In this case, measures of sanitation, planning of tourist activities and environmental education programs are necessary and urgent to conserve the river beaches ecosystems of that region.

Keywords: environmental impacts, river beaches, tourism.

**Geotouristic approach of the municipality
of fluvial environments Santarém, Pará State - Brazil**

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With emphasis on the development of a tourism focused on natural and cultural heritage, ecotourism offers a sustainable approach in order to encourage conservation and environmental awareness training, for the well-being of the people involved. This segment promotes special emphasis on the biotic environment, not providing a similar importance to the abiotic environment, which is intrinsically related to the fauna and flora. Under this framework, geotourism can be considered as a segment of emerging tourism, linked to ecotourism, because in addition to promoting the appreciation and conservation of the abiotic environment, also aims at sustainability and local development. Contemplating such a proposal geotouristic, this study aims to add this tool to tourist practices currently used in the municipality of Santarém, Pará, in order to emphasize the geological heritage specifically related to fluvial this area. Introducing the tourist exploitation of the landscape, contributions to areas as geology and geomorphology, in order to add culturally and scientifically known to the locals and tourist. Given the importance of river environments to life of the local population, as for transportation of passengers and cargo, product flow and supply of food to several outlying communities of the cities, this study presents several screenplays geotouristic that can be exploited in the area confluence of the rivers Arapiuns, Tapajós and Amazon. Such routes would encompass the various "beaches" in existing hydrological regime ebb, the meeting of the waters of the Amazon and Tapajós rivers, as well as morphodynamic channel of the Amazon River near the site at issue, in order to provide the knowledge popularization and conservation this peculiar geological heritage.

Keywords: geological heritage geoconservation, geotourism

Synthesis of new biolubricants and conversion of glycerol to organic compounds

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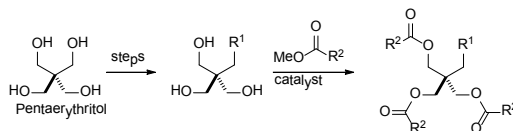
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Renewable materials like vegetable and animal oils are attractive sources for organic chemicals. Motivations for research on new materials from renewable feedstocks are increasing oil prices and the potential of the products being biodegradable which would benefit the environment. Since triglycerides are decomposing at higher temperatures, they are not ideal for use as biolubricants. One solution is to use glycerol analogues where the hydrogen at C2 is replaced with a carbon chain and the 2-OH formally is extended to a hydroxymethyl group as in trimethylolpropane (TMP, $R^1 = \text{Me}$). In part one of the presentation we outline synthetic routes to such analogues and discuss the properties of the derived lubricants.



Related to this work is the conversion of glycerol, which is formed in the biodiesel production, into valuable organic chemicals. Here we are developing processes that pass through diglycerol.

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**Importance of food species of agroforestry homegardens
for family farmers in the Northeast Pará.**

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The homegardens are composed of a variety of plant and small animal species, providing products that contribute to a diverse and healthy diet. The purpose of the study was to understand the importance of food species of agroforestry homegardens for family farmers in the Northeast Pará. Structured and semi-structured interviews, guided tours, direct observation and 24 hour recall were conducted to carry out a survey of plant and animal species in 18 homegardens and to verify the food consumed, including those produced in the homegardens, those produced somewhere else. Of the 130 species, 70 are food plants (44 fruit, 21 vegetable crops and 5 grains), 31 medicinal, 17 timber, 7 ornamental and 5 food animals. Of the 70 food plants, 94% were consumed, especially fruits (59%), followed by vegetable crops (30%) and grains (11%). Farmers with homegardens have access to a better nutritional status by consuming greater quantities and a variety of food, especially fruits. Homegardens were important to introduce changes in diet, contributing to diet diversification and complementation feeding.

Keywords: agroecosystem, food, Pará, yard

VII. BIODIVERSITY AND ECOLOGY

Ecological Architecture and its Identity Participation in the Paraná's Countryside - Brazil

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The buildings since ancient times are part of the organization of society in which, in addition to playing the role of a physical reference, represent historical changes, cultural, political, and socioeconomic status of a territory. To realize a construction, it is necessary to interpret their functionality within the context, considering current from the elements present in it to those predecessors to it. Natural resources have direct participation in many architectural lines, has been adapted in recent years to replace more expensive materials or simply a matter of availability of other resources in the area in which the building is erected. Through this study seeks essentially to verify the importance of ecological architecture in the process of historical-cultural manifestation of family farmers six mesoregion in the State of Paraná: Mid-South, Ribeira Valey, the Metropolitan Region of Curitiba, Complex Palmeira-Castro, Araucárias Biodiversity Corridor and Biodiversity Corridor of the Paraná River. Through this analysis, we intend to further perform a rescue of the trajectory described by agricultural expansion from the perspective of ecological architecture, noting the role of housing construction in the establishment and exercise of professional activities by farmers in the study.

Keywords: Ecological architecture. Family farmer. Identity. Natural resources.

Description of urban arboreal trees in the Boa Esperança Avenue, Marabá-PA, and their impact in the life of local population

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The presence of trees in an urban setting is essential to maintain the quality of life, both for its scenic or concept for its ability to establish microclimate conditions. They besides having a natural beauty, contribute to thermal comfort through its shadow, and sound functioning as a barrier to the propagation of sound. Also reduce the level of air pollution, fixing CO₂ mainly from motor vehicle exhausts and chimneys of industries. This work aimed to study the urban trees on Boa Esperança Avenue, in the city of Marabá - PA, and its direct and indirect impact on the quality of life of the local population. The choice of avenue for the study was due to the fact that it shows a gradual increase in the percentage of trees per meter of avenue. We conducted an inventory (census) to obtain data on the characteristics of the trees, and the following data collected: (i) species, (ii) Circumference at breast height (CBH), (iii) Height of the tree and (iv) sanity, and a parallel socio-environmental form was applied to the local population with the question in the following parameters: thermal sensation, ventilation, canopy projection, and the possible problems caused by the trees on the avenue and its benefits. The result was 134 specimens foot, and 30 different species of these about 36% were composed by *Ficus sp* (exotic) and 21% of *Licania tomentosa* (native). Among all species, approximately 80% were concentrated in an area corresponding to 25% of the street, in the middle third, and of these 5% had some type of disease, of leaves or bark. Based on the results of the field research, the following references were considered: around 51% of respondents feel the direct impact of high temperature, 45% stated that the area is poor ventilation and 52% said that the tree projection is small because the trees are not suitable for arborization. Among the interviewees there was a percentage of 65% who said they do not have any kind of tree in their home, and 57% reported not attending any arboreal space in the city. Based on the results, public policy, for the welfare of the population, should invest in urban forests with advance planning to determine the best species to site. These species must be native, large (to enable a condition microclimate), with deep roots and healthy, which was not observed in the study area. The wooded stretch of the avenue in question presented microclimate conditions that reflected positively in the opinion of the population.

Keywords: Thermal Comfort, Quality of Life, Microclimate

Ecophysiology of savanna species as a tool for sustainable management in the West of Pará

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In Brazil, the savanna ecosystem occupies predominantly Central Brazil. Represents one of the main hot spots for conservation in the country due to the high biodiversity of plants, fungi and animals. Disjoint areas of savanna are also found in other regions of the country. In Western Pará, these areas occur in continuous patterns or isolated islands, where the density of woody plants results in different phytophysognomies. Has lower diversity and endemism when compared the savannas of Central Brazil, however, it is believed that the processes of differentiation and new plant associations were occurring in present. Thence is essential that the use of natural resources of these areas is done in a sustainable way, especially because of the ecological importance of regional plant - animal interactions peculiar that ecosystem. In this context, the study ecophysiological is an essential tool that assists management policies and sustainable conservation, since that signal of fragility and/or skills to the occurrence, frequency and recruitment of plants species. Accordingly, this study aimed to characterize the ecophysiological behavior of species frequently found in Amazonian savanna. Thus, we selected four frequent woody species in this ecosystem. The variables physiological were obtained using a gas analyzer in the infrared region (IRGA). Were analyzed: photosynthesis, transpiration, stomatal conductance and leaf temperature. The four species studied were: *Byrsonima crassifolia* (L.) Kunth., *Salvertia convallariaeodora* A. St.-Hil., *Anacardium occidentale* L., *Tocoyena formosa* (Cham. & Schltld.) K. Schum. Results showed a reduction in the rates of photosynthesis and increased leaf temperature of the species at times of peak solar irradiation. *T. formosa* showed higher leaf transpiration rates temperature while *B. crassifolia* showed lower rates. The species have a low coefficient of maximum likelihood as the rates of photosynthesis, transpiration, stomatal conductance and leaf temperature in the period 8:00 to 9:00 h and 11:00 to 12:00 h ($\Phi = 32.71$ and $\Phi = 23.25$, respectively - $p > 0.0001$). Thus, it is concluded that high leaf temperatures may result in reduction in the rate of CO₂ assimilation in time 11:00 to 12:00 h, therefore, reduction of vegetation may influence the CO₂ assimilation of these species. *T. formosa* is more sensitive than the others on the transpiration rate and leaf temperature, thus, deserves special attention for their conservation. *B. crassifolia* has the best physiological strategy as drought stress, this may explain their high frequency in relation to other. *B. crassifolia*, *S. convallariaeodora*, *A. occidentale* e *T. formosa* show physiological plasticity as to the times of day and have a different ecophysiological behavior, thus demonstrating different strategies for its maintenance and spread in the environment. Due the ecological importance and food of studied species, the areas where they occur should be managed observing their physiological profile for the best use of natural resources.

Keywords: Sustainability, plant physiology, Amazonian savanna.

Interaction man/nature in ecological trail

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Increasing population causes negative impacts on the environment, such as deforestation, river pollution, improper use of natural resources, and others. Environmental education is a tool for environmental awareness of society, where its main function is to encourage the preservation and use of natural resources in a conscious and sustainable way. This study aimed to raise awareness, reporting knowledge and arousing wide interest in environment appreciation, reflecting, by the way, attitudes and decisions of each human being to improve life quality. Lageado Ecological Trail located in the College of Agricultural Sciences at Sao Paulo State University (UNESP), in Botucatu campus, was the main tool for carrying out this work, giving to community the opportunity to be in direct contact with nature, where they received guidance on how to take care and preserve the Nature. The activity on track was held on 28th April, 2013, with 30 visitors aged between 9-50 years, who's varied education levels; monitored by professor and UNESP graduate students. During the walk were several activities such as dynamic, picnic and stops at important track points where it was applied the theory of five senses: sighting, hearing, taste, touch and smell. It was used questionnaire method for evaluation, testing community knowledge before, after and how they could apply recently acquired knowledge. Obtained results from the questionnaires were: 63% had little knowledge about environmental education before the trail, 10% had no knowledge and only 27% had much knowledge about subject. After trail, 84% of tested population stated that obtained knowledge about environmental education brought changes in their attitudes and thoughts, even in their home, school and community, serving as a multiplier of environmental awareness, preservation and respect for Nature. During the trail, the group learned about the wide forest biodiversity, seeing giant trees, besides they could understand man/environment interaction and preservation importance. On the five senses, 43% said that the vision and hearing were the most noteworthy. About track dynamic, 100% of the group stated to be important, since it can help in the integration process, bringing learning through playful method. Observing the percentage, it could realize that the activities on the trail brought greater knowledge to participating group, which is a public with few knowledge about environmental education, reaching the goal of raising awareness about environment preservation and it can stimulate changing of habits and actions into day by day. Therefore, the conclusion is that environmental awareness held in direct contact with Nature can enable wide reflection and it changes in attitudes, being the focus for improving the quality of life and preservation of nature.

Keywords: dynamic, track, five senses.

**Calcifying phytoplankton in a changing ocean:
The effect of temperature and light on coccolithophores – an integrated
laboratory and modelling study**

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Coccolithophores are among the major contributors to oceanic primary production and play a major role in the global carbon cycle as one of the most important producers of calcium carbonate in the ocean. With the event of climate change affecting ecosystems worldwide it is therefore of special importance to study the effects that these changes might have on coccolithophores. Besides the effect of increasing CO₂ concentrations in the ocean, an issue which has been addressed in numerous studies, changes in temperature and light intensity are other important points that need to be understood. The temperature in large parts of the world's oceans will increase as a direct effect of climate change. This will enhance stratification between the surface ocean and the deep sea, reducing the range of the mixed layer where phytoplankton is active. As a result, coccolithophores will have to cope with higher growth irradiances in the future. To predict these changes and the effects on the phytoplankton community, global biogeochemical models are applied. During the last years there has been a push in the modelling community to refine the models and address different groups of plankton separately from each other. One such a model is PlankTOM10, a global biogeochemical model developed in the research group of Corinne Le Quéré at the University of East Anglia. This model includes 10 different groups of plankton, including coccolithophores, with an individual parameterisation. As this parameterisation of coccolithophores in PlankTOM10 is almost entirely based on a single species, *Emiliana huxleyi*, this study investigated the effects of light and temperature on a series of coccolithophore species to improve their parameterisation in PlankTOM10. Temperature experiments showed that *Emiliana huxleyi* had the highest optimum growth rates but also the lowest optimum temperature of tested coccolithophores. It was noticeably higher in *Calcidiscus leptoporus*, *Gephyrocapsa oceanica* and *Pleurochrysis carterae*, the first two species showing higher growth rates than *Emiliana huxleyi* at the high end of the experimental temperature range. Growth rates in *Pleurochrysis carterae* were significantly lower than in the other species. Light experiment revealed distinct biogeographical differences in growth under low light conditions but not in the optimum light conditions for growth. Under high light conditions, *Emiliana huxleyi* was the only coccolithophore that was not significantly inhibited in growth.

Ecology of the babassu palm and interactions with surrounding vegetation and soil in degraded NE-periphery of Amazonia, Maranhão State

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Babassu (*Orbignyia phalerata* Mart., Arecaceae) is a ruderal palm very widespread throughout peripheral Amazonia. Though native in low densities in primary forests, it turns dominant in frequently-burned degraded lands, ultimately forming monospecific dense stands ('babaçuais'). At the same time, babassu nut extractivism for palmoil and charcoal production continues to provide a valuable (low-)income source for the rural poor, especially during dry season. Theoretically, babassu management is even regulated by state law, allowing for thinning of babassu stands only above 256 adult palms ha⁻¹. Knowledge on the ecology of the babassu palm and its effects on surrounding vegetation and soil is urgently needed in order to develop sustainable management options within our pasture and shifting cultivation landscape. Our research group is centered in the MSc and PhD program in Agroecology of Maranhão State University, with researchers and students of a wide range of disciplines and different institutions. Key results are [a.o.](#) Spatial distribution of babassu palms is clustered in 6 secondary regrowth sites. Bivariate point pattern analyses indicate co-occurrence with the legume family, as a whole and for most of the abundant genera. Fine root biomass distribution of babassu is linearly correlated with all other fine roots down 1m soil profiles after 1,5 years shifting cultivation and in 3 year-old regrowth. Both results point to a lack of niche partitioning of babassu, contrary to the ideals of agroforestry. Litter-bag experiments suggest a very slow decomposition both of babassu leaves and fine roots, even compared to low-quality tissues of *Acacia mangium*. Possibly related to this finding is a positive association between babassu biomass share and low-density ('labile') topsoil organic matter over 24 plots. Babassu leaf and especially root extracts exert strong allelopathic effects on the growth of indicator crops and of key soil fungi. Allelopathic effects were predominantly belowground, most effects were inhibitive, though allelopathic stimulation (e.g. of mycorrhizal infection of brachiaria roots) occurred as well. Our current research on ecology and management of the babassu palm is concentrated in a double-field experiment in Pirapemas (central Maranhão), installed 2 yrs ago within a dense (now 5-yr-old) monospecific babassu secondary regrowth ('babaçal'). We test (i) 4 densities of babassu juvenile (stemless) palms (2500 - 625 ha⁻¹, corresponding to 100-25% of original palm density) and (ii) in alley-cropping subplots the effects of babassu leaf mulch on maize/bean agronomic performance, soil physicochemistry and microbial composition. This experiment is interdisciplinary and open for other researchers in a wide range of fields.

Keywords: Agroecology; allelopathy; arbuscular mycorrhiza; spatial patterns; plant:soil interactions.

Production and nutrient content through deposition litter in tropical forest ecosystems.

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The input of organic matter is essential for the proper maintenance of nutrient levels and for cycling in terrestrial ecosystems. This organic matter released by plants is called litter, being composed mainly by leaves, twigs, flowers, fruits and seeds, as well as animal excrements. Their decomposition is conditioned by interactions between biotic and abiotic agents. Among the biotic agents has the detritivorous (Shredders) and decomposers (bacteria and fungi) organisms, mainly; and among the abiotic agents, the climatic factors, such as precipitation, temperature, photoperiod, humidity and others. The litter on the ground benefits the maintenance of the temperature and humidity and until even the establishment and the action of soils fauna, where through the decomposition of the material the nutrients are mineralized and reused by plants. The increased production of litter in tropical forest ecosystem is highly correlated with the dry period in these regions and due to retranslocation, capacity of plants in transporting essential nutrients from the leaves to other internal compartments before the abscission of same, the plants can keep part of the nutrients (biochemical cycle). This factor is considered an adaptive advantage in relation the competition, to use of nutrients and the productivity, especially in soils with little fertility and under adverse conditions of climate, showing that the set of meteorological variables influences the deposition and content of nutrients in the environment, considering that during the rainy season the nutrients tend to be leached. This process has a direct impact on nutrient cycling, because it interferes with its availability to the ground and changes the nutritional quality of litter deposited. In turn, the organic matter of the vegetation is the main energy source in terrestrial ecosystems, especially on soils poor in nutrients such as, for example, in the case of the Tapajós National Forest (TNF), where there is a predominance of Yellow Latosol Distrophic, characterized by acidity. The TNF covers the counties of Belterra, Placas and Rurópolis, in the State of Pará. So, as in other tropical forests, the TNF, has its production (Mg ha) and nutrient content (kg ha) constrained the amount of organic material deposited throughout the year. These oscillations are due, mainly, the climatic conditions, because it is known that forests in tropical regions, produces more biomass in the dry period, due mainly to hydric stress, however, the higher rates of decomposition, were observed by many researchers, most occurring in the rainy season, because of better conditions of temperature and humidity for multiplication of soils fauna. Thus, in soils of low natural fertility, such as the Latossolos and Argisols located in the Amazon, is possible see that the TNF has as main axis of support the production of litter and the subsequent availability of these nutrients from their decomposition/mineralization. This efficient maintenance is result from a balanced cycling of nutrients that occurs in this ecosystem.

Keywords: Contribution of litter, nutrient content, forest ecosystems, seasonality, weather variables.

Rating Qualitative Risk of Natural Disasters in the District of Miritituba, Itaituba/PA, Brazil.

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The landslides are natural phenomena that can occur in any area of steep slopes, during intense and prolonged rainfall. One might even say that, in a geological time scale (thousands of years), it is certain that some slip will occur on all slopes. However, removal of the original vegetation and urban settlements tend to become more brittle naturally precarious equilibrium, causing the slips start to occur in human time scale (tens of years or even yearly). On the morning of May 16, 2011, a slope that threatened to collapse long ago in Miritituba, slid the heavy rain that fell during the night and some houses were buried. The flooding hit neighborhoods Buritizal, Cacau, Batata, Jardim Amadeus, do Centro, Vila Industrial and Bela Vista. Near where there landslides in Miritituba, there are several homes that are at risk of being affected by other landslides. The State Government projects to the port to Miritituba, in the Tapajós River, opposite the city of Itaituba a cargo handling capacity of around 20 million tons within the next ten to fifteen years. To claim more modestly in the initial phase of operation, the idea is to start with a volume of four to five million tons, assuming thereafter, an upward trajectory which, in theory, make it one of the largest grain terminals and General cargo north. Given these facts, research was carried out in searching to analyze the real risks that can develop the best methodology that aim to prevent or minimize the risk of high-severity events involving population and industry. We evaluated the risk of landslides in areas disturbed District of Miritituba, especially the neighborhood Buritizal for having the largest number of inhabitants and is situated in the area where there were major landslides reported by the Municipal Civil Defense. To be able to implement contingency plans for periods of greater precipitation, thus breaking the cycle of tragedies that every rainy season reaches the inhabitants of the hills and slopes Urban District Miritituba using risk assessment. There were three campaigns, as a dry season and two in the rainy season, in which measurements were made of changes in the local relief, as well as the observation of changes in houses, trees and masts, in relation to the balance shaft of the soil. The results showed that the new district is prone to slippage presenting especially in the neighborhood of Buritizal areas of maximum risk of compromising the topography and there is occurrence of natural water sources in any district which makes the soil vulnerable landslides according to the same leaching and loss of stability and compactness. It is necessary to implement a control program in the area, since there is the eminence of new disasters that area.

Keywords: Natural Disasters, Landslides, Topographic Instability, Environmental Risks.

Environmental zoning and sustainable development in the semiarid of Ceará

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This article corresponds to the synthesis of the results obtained in the development of the project "Integrated Actions of Rural Extension in Traditional Communities of Semi-Arid and of Eastern Amazonia", sponsored by CNPq and developed by the Department of Geography of the Federal University of Ceará. As ultimate goal, had to promote and consolidate together with the community, environmental diagnosis and participatory, which resulted in a functional zoning proposal, along with the surrounding communities of Forquilha weir, in the semiarid of Ceará. The development of diagnosis and zoning was based on the principles of environmental sustainability, based on methodologically geocological landscapes from the perspective of a systems view. It was developed the following steps during the research: i) organization and inventory data, ii) integrated and systematic analysis of the landscape; iii) diagnosis with due environmental zoning (problems, limitations, potential), propositional functional zoning with plan management. A total of 10 communities, 872 families and 3,488 people were included in the theme of research and extension, developing courses and workshops in order to create a Participative Master Plan. From thematic workshops (sanitation, environmental education, thematic mapping, participatory appraisal, preparation of proposals), it was elaborated a synthesis features specifying the main environmental problems, their spatial locations and intensity (by maps theme) and proposed possible solutions, indicating competent agents and methodologies. Based on the result of joint actions, it was possible to draw up a map of functional zoning, in the scale of 1:50,000, along with its corresponding management plan. Delimited the following functional areas: a) Urban, b) Agriculture, c) Recovery Agrarian d) Cultural Protection, e) Extraction Plant, f) Mineral Extraction, g) Permanent Preservation, h) Environmental Recovery, i) Sustainable Use , j) Industrial Pole. The completion of the project allowed for a full integration between research and extension, with the merger of scientific knowledge with traditional knowledge, offering possibilities for community empowerment and participatory management.

Keywords : Zoning; Semi-arid; Sustainable Development

Chemical analysis of rainfall and throughfall in primary forest in the Tapajós National Forest, Belterra, Pará, Brazil

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The Tapajós National Forest (FLONA Tapajós) has 600,000 ha of protected forest, and is situated 50 kilometers to the south of the city of Santarém, Pará, Brazil, a port city of 250,000 habitants situated at the confluence of the Tapajós and Amazon rivers. There are abundant agricultural lands in the region which offer many opportunities to study land use change, and one type of land use, selective harvest of timber, is particularly important for the economy of Santarém. In this region, natural atmospheric nutrient deposition is enhanced by frequent biomass burning which releases a large part of the nutrients in the aboveground biomass to the atmosphere. The objectives of this study were: 1- estimate total wet deposition in direct precipitation and throughfall, including dry deposition, 2- verify potential nutrient sources found in total wet deposition and dry deposition, and 3- verify possible effects of vegetation cover on nutrient content in precipitation and throughfall. This study was conducted in the FLONA Tapajós at kilometer 67 of the Santarém-Cuiabá highway to the south of the city of Santarém with geographical coordinates 02° 54' 23" south and 54° 57' 31" west. Collectors of precipitation incident (PD) on the canopy and of throughfall (PI) consisted of 2 L polyethylene bottles with a funnel of 115mm diameter. Samples were collected weekly during April 2003 to March 2006. Sample volume was recorded individually for each collector (25 collectors for throughfall and 4 for direct precipitation). The conclusions that can be drawn from this study are: 1- the dry season shows the largest variation in ion flux; 2- season exerts a strong influence on the concentration of basic cations; 3- throughfall through dry deposition is one of the most important paths for input of nutrients into the Flona Tapajós; 4- there is a significant input of macronutrients, Cl and Na from nearby intensive grain agriculture; 5- dry deposition is the most important process for the enrichment of water that reaches the forest floor; 6- principal components analysis facilitates the interpretation and characterization of rainwater and, in this study, shows the influence of anthropogenic sources such as agriculture, biomass burning, and dust.

Keywords: nutrient cycling, Amazon region, tropical Forest

Herpetological diversity in forest fragments in the region of Trans and Xingu

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The study of the herpetofauna is important for understanding patterns of diversification, evolution of Amazonian biota, as well as conservation and the use of this fauna, either as medicinal products, biological control and environmental indicators. This study aims to make an inventory in four forest fragments in northern municipality of Altamira, near the urban area, one in the Project Area for Sustainable Development-Virola Jatoba in the municipality of Anapu and two islands in the municipality of Senador Jose Porfirio. The fragments in Altamira were: Bethania Training Centre, located 8 km from Altamira, characterized by presenting a forest fragment semi preserved, Ramal dos Cocos, located at Km 5 highway Transamazonica Altamira, PA, with secondary vegetation and area burning and knocks, the 51st Batalhon de Infantaria de Selva (BIS), characterized by a fragment of forest semi-preserved, Fazenda Betel which is 17km north of Altamira, poultry and secondary forest and Tabuleiro de Embaubal which were studied two islands of the archipelago located in the lower Rio Xingu (Senador Jose Porfirio, PA). A team of seven people had sampling effort 25h in 3 days in Bethanea, 38h in 4 days in Ramal dos Cocos, 32h in 3 days at 51 BIS, 46 h in 5 days in Farm Bethel, 191 h and 20 min in 10 days in PDS Anapú and 176 h for 30 days in the tray, using the active search for visual-auditory track with a time limit during daytime and nighttime, and pitfall traps arranged in the shape of "Y", which were open for 30 days which accounted sampling effort for each AIQ 720h and a total of 2.880h. The captured animals were placed in plastic bags with substrate site, identified through field guides and articles. The specimens are deposited in the Herpetological Collection of the Laboratory of Zoology, Faculty of Biological Sciences Campus UFPa-Altamira. The herpetofauna of the region currently is represented by 85 species, distributed as follows: PDS Anapu were found 51 species, Bethania 16 species, Ramal dos Cocos 20 species, Fazenda Betel 14 species, 51 BIS 7 species and Tabuleiro do Embaubal 26 species. We note that the site with the highest species diversity was the area of the PDS Virola Jatoba in the municipality of Anapu, which corresponds to the location with the largest area of vegetation remains, a fact that confirms the theory that larger areas have more species. The relationship of species unique (unshared) was as follows: Anapu 28, the Board of Embaubal 15, Bethânea 4, Farm Bethel 4 species not shared by any of the other sites, Extension and The Coconuts 3 51 BIS 1. Even though they are more accurate surveys sites east of the Xingu River (Anapu and Tabuleiro do Embaubal) were the locations with the highest number of species not shared and various studies in the literature indicate that this river is a biogeographical barrier for fauna species, theory will be evaluated in future studies. Shared species showed the following pattern: two were shared by all sites (*Leptodactylus andreae* and *Gonatodes humeralis*). *Rhinella margaritifera* and *Chatogekko amazonicus*, which are species of terra firme forest were absent only in the Tabuleiro do Embaubal, a place suffering flooding some part of the year. Confirming the hypothesis of the Xingu River as a barrier and Anapu e

Tabuleiro de Embaubal, among all these places were most shared species together with five species (*Osteocephalus* sp., *Scinax ruber*, *Trachycephalus venulosus*, *Leptodactylus pentadactylus*, *Uranoscodon superciliosus*). On the other hand following the pattern found in the Amazon, the family Hylidae was the most represented in the sample, with 12 species. In general the results indicate that the diversity of the herpetofauna of transamazônica near the intercept with the Xingu river is high, hence its importance to their preservation, since the action of large enterprises, local populations of species of biotechnological interest are threatened. So despite some conservation efforts already in place, to increase supervision must be one of the goals in the short term, further protecting the species existing in the intercept transamazônica Xingu.

Keywords: herpetofauna, biodiversity, Xingu River, conservation

Growth ring analysis in planted and native trees of *Araucaria angustifolia* (Bertol.) Kuntze in different heights of the frustum

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The study aimed to analyze the differences in height growth between native and planted trees, by dendrochronological techniques, of *Araucaria angustifolia* species, popularly known as the Paraná pine, as well an endangered species, with greater distribution in southern Brazil. The trees were collected in the municipality of Camanducaia, Minas Gerais - Brazil. To do this, was felled Five trees of the species, where two was native and three was from plantations. The discs were taken from different Heights, being the minimum height of the base set for all individuals was 1.30 m and 17.30 m the maximum height, collecting an total of 14 disks. Later, was made the polishing, the demarcation and control of the growths rings for all disks. To verify the accuracy dated, the result of the growth ring time series was controlled and compared among the other collected trees with cross-dating technique application by COFECHA software. From the results, it was found that the natural trees showed a greater growth rate in height in the firsts years. These results corroborate with the ecological strategy of natural specimens, which were greater effect on competition and intra-species, mainly by the need of receiving light and invest more energy into vertical growth.

Keywords: paraná pinus, dendrochronology, growth rings, dendroecologic technique.

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Energetic characterization of three most abundant species in the second forest management cycle in the National Tapajós Forest, Para state, Brazil

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About 70% of the wood used in Brazil is intended for power generation in different sectors. In this way, the charcoal produced is consumed mainly by the steel industry due to its energetic and bio-reducer characteristics. In this way, the objective of the study was to determine the yield of charcoal production from the *Bixa arborea* (urucum da mata), *Protium apiculatum* (breu amarelo) and *Rinorea guianensis* (acariquarana) species, which has high abundance and frequency in the vegetation of the second management cycle of the Tapajós National Forest. For this purpose, were collected, in a forest management area, five trees of each species, and subsequently removed disks in a height of 2 meters from the ground, dividing them into smaller samples, used in the yield determination. The samples were placed in a muffle furnace at a maximum temperature of 450 ° C, carbonization rate of 1 ° C / min, with carbonization time of one hour. For statistical analysis, was used the Scott-Knott test ($p \leq .05$). The yield of the produced charcoal ranged between 39.5 and 40.15 percent, with no significant differences between the species. *Rinorea guianensis* had a higher percentage of non-condensable gases and lower pyrolytic rate. It is concluded that the species have potential for the production of charcoal due the similar yields to those found for eucalyptus charcoal, therefore, the wood density of the studied species are within or exceed the range of eucalyptus, which may form charcoal with better energy properties, as in the case of *Rinorea guianensis* and *Protium apiculatum*.

Keywords : Amazon woods, amazon species utilization, amazon forest management, native charcoal.

Protected areas and traditional coastal Communities: institutional interaction in the sustainability of mangrove resources in Northern coastal region of Brazil

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The coastal area of the state of Pará in Brazil is part of Coastal Macro Tidal area of Amazon, where 2.176,78 km² of mangrove is located (Souza Filho, 2001, p. 219). Many traditional communities live based on extractive activities using the natural resources from these mangroves areas. During the last 10 years, several protected areas have been created by the government to maintain the sustainability of mangroves. The objective of this research was to examine the activities of governmental and non-governmental institutions which work in the protection and the governance of mangrove resources. This study was done based on the legislation and field work. Two communities, São Caetano de Odivelas and Curuçá, situated in the northern coast area of Brazil were chosen. Focal group was organized with the objective of getting the views of leaders of the communities involved in the areas. The results showed that the institutions in these areas studied live in a dilemma with regard to strategies to reconcile the goals of participatory governance and the rationality of the market. The majority of the focal group (81%) pointed out that rationality of the market which aims at profit confronts with the rationality of the local communities which try to protect the mangroves. Both the Protected Extractives Area Mãe Grande of Curuçá as in the municipality of São Caetano de Odivelas, the traditional communities are vulnerable to pressure from the State to shape social and economic relations to the rationality of national and international market powers. The interviews in the institutions such as IBAMA, ICMBio, Association of Community and Association of Fishermen show that the conflict between logic of market and the protection of mangroves is present in their relationship within and between the institutions. The relationship between local actors and governmental institutions that operate in the region is important and it depends on the interest of the each actors and institutions. These can effectively influence the sustainability or destruction of natural resources in the region. The sustainable development of mangrove areas is only possible through effective participation of traditional communities together with the governmental institutions.

Keywords: Institutions, Local Community, Mangroves, Sustainability.

Metadata and Data – An important alliance for the provision of scientific knowledge in the long term

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The competence centre **InBioVeritas** (www.inbioveritas.net) understands as one of its genuine tasks to reliably provide information about the Brazilian Atlantic Forest for scientists, conservation unit managers, regional decision-makers and the interested public. While an increasing number of scientific studies produces a huge amount of information, beside publication of a usually small part of the data, most data are held in many different databases. In times of worldwide interconnectedness many of these databases may become accessible, but nonetheless the data sets are still widely distributed as well as strongly individually organized. This complicates summarizing data evaluations (Meta analyses) and therewith necessary modeling and up-scaling approaches. At this point in particular dataset- and project-specific metadata become important. InBioVeritas is therefore at the moment working on an interdisciplinary database, primarily targeted at a data recall and storage of categorized and standardized metadata on published and unpublished studies realized in its main acting region - the southern part of the Brazilian Atlantic Forest (São Paulo, Paraná, region Lagamar).

Keywords: metadata, interdisciplinary database, Atlantic Forest, Brazil, scientific knowledge

InBioVeritas – Competence Center for the Conservation of Biodiversity in the Atlantic Forest of Brazil

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InBioVeritas is the approach to generating, assembling and aggregating knowledge, in benefit of preservation and conservation of the biological diversity of the Brazilian coastal rainforests (Mata Atlântica). Experts are being capacitated and action is being fostered, scientific and educational information is being delivered, in order to form InBioVeritas to be a reference in matters of conservation of the Mata Atlântica's biological diversity.

Members of InBioVeritas are: Federal University of Paraná (UFPR); Society for Wildlife Research and Environmental Education (SPVS); Boticário Group Foundation; State Museum of Natural History Karlsruhe (SMNK, Germany) and ECT Oekotoxikologie GmbH (Germany). The Mata Atlântica biome is one of the five most important biotopes on earth in terms of inventory and necessity for conservation, including high ratios in endemism. Around 70% of the Brazilians live in this region implying an anthropogenic threat. The need of scientific knowledge on biodiversity, being expressed by the Parties of CBD, is one of the main challenges of mega diverse countries. There is urgent need to harmonize the specifications of action plans for conservation of biodiversity with those to mitigate and adapt to climate change. Robust scientific knowledge for proving the necessity of safeguarding biodiversity in favour of maintenance of ecosystem services is required – in benefit of human welfare and combined with their economic valuation. It is important to bring social groups together for acquiring knowledge, which is handed over to the public and private sectors, NGO and others. This is a precondition for aligning common action plans in the sense of conservation of biodiversity. Further, it is important to offer systematization and dissemination of knowledge in specific, didactic language, in order to enable access for specific publics. There is need in capacity building of human resources, as these participate in interdisciplinary studies on Protected Areas (PAs), ecosystem services, climate change and others. Objectives are to produce, integrate and disseminate scientific knowledge for the development of models for a rational use of natural resources and for subsidizing public politics in conservation of the biological diversity of the Mata Atlântica. Further ongoing initiatives on surveying biodiversity should be identified and consolidated for defining a National Base for Knowledge Administration on Mata Atlântica's biological diversity, serving as a basis for compilation, analysis and the offering of knowledge generated by scientific research. InBioVeritas is developing projects like: the monitoring of restoration activities in degraded areas, a database for metadata for research, the mapping of habitats in the coastal region of Paraná state, the evaluation of tree species growth related to Mata Atlântica climate data, capacity building related to evaluation and conservation of biodiversity.

Keywords: Mata Atlantica, biodiversity, research, knowledge administration, capacity building

Seeds of Change: Plant Genetic Resources and People's Livelihoods

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Since the dawn of mankind people explore the cornucopia of the plant kingdom to obtain food, feed, fuel and fibre. Some thousand years ago man used approximately 7000 plant species for these purposes. Many of them vanished already, whereas others have become minor or even major crops. Higher numbers of vascular plants are often found in humid tropics or subtropics and in regions rich in orographic structure or high in geo-diversity and, no wonder, most of our crops originate from these regions. Currently, our well-being is based on 30 crops which supply 95% of our daily caloric intake. Only four crops, i.e. rice, wheat, maize and potatoes, deliver 60% of that. Nevertheless, minor crops are still important at a local, regional and national level but are often neglected at an international level. They are staple foods, contributing to food supply in certain periods and to a nutritionally well-balanced diet. Sometimes they are well adapted to marginal conditions, an important feature in face of Global Change. Plant genetic resources also supply raw materials such as oils, fibres and dyes, providing options for income generation at a local level. Anthropogenic influence altered our biomes strongly. The area of untouched terrestrial biosphere has halved since the industrial revolution and only less than 20% of the earth's surface still faces low impact by agriculture or settlements. This poses a tremendous pressure not only on our planet in general but also on sensitive biomes such as tropical forests and biodiversity hotspots specifically. Consequently, there is high coincidence of biodiversity, people and concerns over watershed functions. The worldwide increasing demand for food, feed, fuel and fibre asks for solutions as fossil fuels are decreasing and available land resources are declining without compromising the resource base of future generations. Newcomers such as physic nut (*Jatropha curcas*) and curauá (*Ananas lucidus*) received public attention but never fulfilled people's partly exaggerated expectations. Often, there is lack of proper long-term research on feasibility, trade-offs and environmental consequences contributing to a better acceptance as well as public and private sector commitments for understanding needs of rural communities. There are still many promising examples such as the oil-producing macaw palm (*Acrocomia aculeata*) which recently gained economic importance in Paraguay and Brazil. This paper discusses the framework for developing alternatives for sustainable vegetable oil and food supply systems as well as bioproduct and bioenergy value chains and the necessity

of a value chain analysis to address both trade-offs and consequences for environmental services, It also considers development of proper production systems for smallholder farmers in Brazil. The gaining economic interest on plant genetic resources and their sustainable use will contribute to a better recognition and esteem of biomes hosting them. As Robert Green Ingersoll once said: “In nature there are neither rewards nor punishments – there are consequences” or in other words: Either we use them or we lose them.

Keywords: biodiversity, bioenergy, bioproducts, minor crops, value chain analysis

Butterflies and Spiders: Two relevant groups of the Amazonian scenery promoting scientific and cultural exchange

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Within the context of "Quando as ideias se encontram" we present our activities in the project "Amazon Spiders and Butterflies". The initiative is funded by the Federal Cultural Foundation of Germany (Kulturstiftung des Bundes) in the "International Museum Fellowship Programm" and enables a Brazilian scientist to work at the State Museum of Natural History Karlsruhe in Germany during 18 months. The project's main focus is in curatorial work in zoological collections and one end product will be a field guide for Amazonian butterflies in a printed and a digital version. Together with several other activities this aims at improving and providing knowledge on biodiversity on an interdisciplinary and intercultural line, and lastly at the conservation of species. So far two main activities took place in Germany at the State Museum of Natural History Karlsruhe: 1. "Brasilianisch-Deutsche Netzwerker: Kinder auf 3 Kontinenten gestalten Schmetterlinge". Groups of children in different places at three continents were involved in creative activities with attention to their local butterfly species. Their work and products were recorded and will be presented at the "museums night" (KAMUNA) in Karlsruhe. This year the KAMUNA motto is "Kultur Vernetzt - Culture Network". During the same event we will also give information about tropical spiders, occasionally arriving with banana shipments in Germany. Children (and their parents) are thus invited to know biodiversity science and get an insight into scientific cooperation, sharing experiences from different realities. 2. As a first visible step to a field guide, based on the collection of butterflies of the National Institute of Amazonian Research (INPA) the website Amazonian-Butterflies.net is a pioneering initiative for identification of species of Central Amazonia. The site is in English and Portuguese and developed with Typo3® (4.5.25) within the SMNK web environment. This tool will contribute to the visibility of the research institutions and to education and management of Protected Areas around Manaus. Later, a printed version will be extracted from the website database and be available for interested scientists and the international ecotourism.

Keywords: Amazonian butterflies, biodiversity, "conservation of species".

**Nutritional implications based in different intensities
of *Eucalyptus urophylla* x *Eucalyptus globulus* biomass harvesting
in south Brazil**

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Nutrients available for future plantation is main related with harvest system applied. Based on this, this study aimed to assess the nutritional implications caused by difference biomass harvest intensities in the *Eucalyptus urophylla* x *Eucalyptus globulus* 10 years-old in Eldorado do Sul - RS. Allocated four experimental plots (35 m x 20 m) where the forestry inventory was conducted and the definition of diametric classes stand (five classes). In each diametric class were harvested three trees for biomass and nutrients quantification. Understory biomass and nutrients was quantified in five plots of 25 m² each. *Eucalyptus* biomass was estimated using regression equations by Stepwise procedure. Nutritional implications assessment was analyzed take into account: nutrients balance between soil-plant system; harvest effects of the different aboveground components in the nutrients removal; rotation numbers and nutrients removal rate in relation to harvest system used and nutrients biological utilization rate. Equations obtained with regression analysis showed good prediction of the variables due to the high determination coefficient and low standard error estimates. *Eucalyptus* biomass was allocated predominantly to stem (wood + bark) with 93.7%. These same components, also had the largest nutrients stock. Understory biomass comprises a small aboveground fraction (1.4%), but had 7.0 and 8.6% of nitrogen and sulfur from the total stock. Biomass components had different chemical composition, being generally higher in leaves and bark and smaller in wood and branches biomass. With the harvest of wood with the bark all the nutrients removal would suffer more than 45% of the total amount accumulated in aboveground biomass. However, removed just the wood, which has the highest nutrients utilization rate, the nutrients removed percentage, except by Cu and Zn, will be less than 50% and up to 10% in the case of Ca in relation the total biomass contained. Phosphorus and calcium can be the main nutrients became limiting in next rotation productivity, because the potential rotation estimates are close to one, when in the harvest of wood with the bark.

Keywords: forestry production, nutrients stock, nutrients available

Performance of a eucalyptus harvesting system with different trail spacings

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The aim of this study was to evaluate a harvesting system and compare three different trail spacings, with three, four and five lines. Data were collected in Lençóis Paulista, SP, Brazil in a *Eucalyptus grandis* plantation, 7 years old, with 1850 trees per hectare. The site was of relatively flat terrain, with slopes ranging from up to 5 percent. A Caterpillar 320 BL with 138 HP, equipped with a harvester head model 965 BR Partek was used. The study was carried out with the same conditions of soil, relief, machine, work shift, operator, type and condition of the forest and mean tree volume, comparing three trail spacings: 9, 12 and 15 meters respectively with three, four and five lines of trees. Productivities were not significantly different between 9 and 12 meters trail spacing. However increasing to 15 meters productivity decreases 15.29%. The advantage with 12 meters trail spacing was shorter operating time on the edge of the field, the less compacted area and less number of stumps damaged. The best choice, from operational, economic and environmental viewpoint is twelve meter.

Keywords: Eucalipto, logging, productivity.

Ergonomic assessment of the cabin of four forest machines

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The study was carried out to evaluate the cabins and work conditions of four different logging machines: feller-buncher, bundle bucking, loader and forwarder in a forestry enterprise located in Botucatu, SP, Brazil. Qualitative and quantitative data were analyzed according to Fernandes et al. (2010). All machines analyzed have adjustment in the back, armrest and seat. The feller buncher noise levels varied from 88,6 to 105,3 dB (A) and exceeded the limits established by NR 15 for 8 hours per day. All machines cabins had climate control. The results showed that improvements are needed to provide healthy work conditions at feller buncher.

Keywords: Eucalipto, layout, logging, noise.

Ergonomic assessment of a joinery

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Purpose of this study was to evaluate layout and ergonomic conditions of a joinery located at the Faculty of Agricultural Sciences, UNESP - Univ Estadual Paulista, Botucatu, SP, Brazil. Qualitative and quantitative data were analyzed according to Fiedler et al. (2009). Air humidity and temperature were 73.4% and 26.2oC respectively, considered appropriate by Regulatory Norm (NR) 15, for moderate activities. The noise levels ranged between 85 and 104 dB (A) and exceeded the limits established by NR 15 for 8 hours per day. Light conditions ranged from 235 to 702 lux, below the minimum range of illumination recommended for these activities (NBR 5413/92). There are no appropriate painting rooms and raw materials and finished products deposit. Workplace improvements are necessary to providing better ergonomic and health conditions for employees and to enhance the performance.

Keywords: layout, machinery, noise ,wood.

Biometry and predation of *Hymenaea parvifolia* Huber seeds

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Hymenaea parvifolia Huber is a tropical Leguminosae-Caesalpinioideae tree occurring in forest areas of Amazonian, commonly used as medicine plant and in urban landscaping. However, there are few basic studies to understand its predation of seeds. The objective of this work was to study the biometrical characteristics and predation of *H. parvifolia* Huber seeds. It was measured the length, width and thickness of the seeds and the number of seeds per fruit. The damaged seeds were carried in Laboratory of Forest Seeds (University of Amapá State - UEAP) for rearing larvae, pupae and adults. For intact seeds and predated seeds it was measured the percentages and index speed of germination. The length, width and diameter were 8,5cm, 4,1 cm and 3,2 cm, respectively. The fruits had 3,9 seed/fruit and the percentage of damaged seeds by insects (33.1%) was high. The predated seeds had germination percentages of 3,8% and index speed of germination of 0,0328 dias⁻¹. *Rhinochenus stigma* (L.) (Coleoptera: Curculionidae) is an important predator of *H. parvifolia* Huber seeds.

Keywords: seed germination, forest seed, Curculionidae, Fabaceae.

Surrogate-based optimization of 3D biogeochemical ecosystem models

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Simulating natural processes usually necessitates the incorporation of a number of parameters in the course of modelling. Those are often unknown or just estimated. To ensure a reasonable use of models, these parameters must be reliably calibrated what is frequently done by data assimilation techniques. Model output $y(u)$, where u is the unknown parameter set, is fitted to given measurement data y_d , what can be seen as an optimization problem where the difference between model output and given data is minimized. However, directly solving such an optimization problem can be computationally expensive, especially when non-linearities are included in the model. Thus, it is desirable to reduce these computational costs which can be realized using so-called *surrogates*. Here, such a parameter optimization is presented for two models of the marine ecosystem that are used in the context of climate change research at the Helmholtz Centre of Ocean research GEOMAR, Kiel.

VIII. BINATIONAL PROGRAMS

Brazil - Germany and environmental projects: cooperation and dissemination of biodiversity in the Amazon

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Upon completing 50 years of technical cooperation between Brazil and Germany (1963-2013) and being in the commemorative year of Germany Brazil (2013-2014) where the slogan is "When ideas are" it is important to discuss aspects of this experience in refers to the environment, especially the social and environmental projects and dissemination of biodiversity in the Amazon. This article is part of an exploratory research under the Project: Mediation and discourses of international cooperation agencies: Analysis of communication for biodiversity knowledge of environmental projects in the State of Pará, funded by the National Council for Scientific and Technological Development - CNPq (Notice MCTI / CNPq / MEC / CAPES No. 18/2012) which aims to identify how environmental projects funded and advised by international cooperation agencies are spreading the biodiversity in the Amazon. The study finds that since the implementation of the Pilot Program for the Protection of Tropical Forests in Brazil (PPG7) - (1995 -2009), the development of environmental projects in the Amazon began to be mediated by shared actions of international scientific and technical cooperation, representing the interests of the G7 countries based on agreements and diplomatic support of national and local institutions in Brazil. Thus, international cooperation agencies assisted in studies on Amazonian environmental issues, combining the knowledge of financial and technological resources, cooperating in the implementation of socio-environmental projects. This project aims to examine the role of communication in relation to the dissemination of knowledge on biodiversity in the State of Pará (Amazon), particularly in the design and impacts of environmental projects for capacity building, income generation and promotion of sustainable practices of agents Social sites such as forms of environmental preservation. The project has the support of a group of researchers from the Master Program in Communication, Language and Culture Research members of the Superintendency (SUPES) University of Amazonia (UNAMA). According to the period of the research, from 01/12/2012 to 01/12/2014 (24 months), it is focused on local social actors and the main bilateral agency (Deutsche Gesellschaft für Internationale Zusammenarbeit - (GIZ - German Technical Cooperation) and other German development organizations working in the Amazon state of Pará.

Keywords: environment, cooperation, biodiversity, Amazon

Partnership between government and third sector: Icmbio & Amiparna

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The third sector gained prominence in society due to their actions which, at times, supply the lack of State. After years of struggle, this segment presented some advances in laws supporting non-governmental organizations (NGOs), such as waiver of bids and the possibility of partnership between NGOs and public institutions with the previous existence of titles to qualify them as responsible and/or competent. These partnerships are great for organizations with no diversified duties, but with limited structure and staff such as ICMBio, expressively active regarding the large area of Conservation Unities distributed throughout Brazil. Among these unities, there is the Amazônia National Park, one of the oldest ones in Brazil and the first to be created in the north region of the country, in February 19, 1974. This research was aimed at highlighting the existence of partnership between the third sector and environmental organizations in Itaituba, Pará state (PA). In order to do so, it was carried out a search on Chico Mendes Biodiversity Conservation Institute and the Association of Friends of the Amazônia National Park (in Portuguese, ICMBio e Amiparna, respectively). According to some subjects interviewed, it was developed partnerships with city environmental organizations, and one of them was Conservación Internacional(CI). While conducting some workshops for the review of management planning of the National Park (Parna), CI realized that costs would decrease if they were also based in Itaituba, PA, since they used to commute from Santa Catarina state to perform these activities. Soon the NGO Amiparna was created; CI supported the activities while Amparna carried them out. The results of this partnership were some benefits for Parna. However, there were also actions with no participation of CI, such as the training of environmental managers financed by United Nation programs towards development. The NGO is still active on the government records, but it does not hold any titles and faces some management mishaps. During an interview, it stated that Parnada Amazônia is little visited, especially by locals, and some disharmonies were presented, such as the conflict between wildlife preservation and the use of the park, which houses many fauna samples, such as jaguars and golden parakeets. Another issue concerns poor facilities, and the solution was to ask the visitors to enjoy the natural beauty of the park and to stay at Maloquinha farm resort, since it offers better accommodations. It was also claimed some difficulty when carrying the activities, since there are only three servers at the unity. There is no fund transfer from Amiparna to ICMBio, and their partnership is based on the authorizations granted to the ONG to conduct visits to the Parna. The managing office did not express any interest in establishing partnerships to develop activities at the Parna due to environmental damages of other parks resulting from these management strategies, according to their reasons. It is noticed that both entities do not have any appropriated structure to develop satisfactory work, and do not use of the possibilities presented by the Government, thus refusing the benefits these partnerships bring along when correctly and responsibly used.

Keywords: Third Sector; Government; Partnership

Binational research projects and education programs in environmental engineering in Brazil

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The Institute of Sanitary Engineering, Water Quality and Solid Waste Management, which belongs to the University of Stuttgart, Germany, is among one of the biggest Europe-wide. The Working Group “Industrial Water and Wastewater Technology (IWT)” of ISWA has been active in Brazil for twelve years now. At the beginning of their work in Brazil, the University of Stuttgart established an advanced training course in the area of technical environmental protection. From 2002 to 2005, the working group IWT offered the so called “Summer School”, a three week programme which taught the topics “Industrial Waste Water Treatment” and “Solid Waste Management and Treatment”. The courses took place in several Brazilian cities, including São Paulo, Curitiba, Belo Horizonte and Recife. A great amount of interest was shown for the Summer School’s courses and the high demand resulted in this project ending as a great success. In July 2007 the post-graduate specialization course “Environmental Engineering” was introduced at the *Universidade Federal do Parana* (UFPR) in Curitiba, Brazil. The IWT worked on the project “Export-Oriented Research and Development in the Field of Water Supply and Waste Water Treatment”, which was supported by the Federal Ministry of Education and Research (BMBF). The project was initiated in order to create an inventory of the actual environmental situation of different countries world-wide. In particular the University of Stuttgart focused on the topic of “waste water treatment and recycling” in the South American country Brazil. This inquisition had to be done in order to be used as a basis for prospective resolutions which resulted from the “Earth Summit 2002” in Johannesburg. In July 2007 the post-graduate specialization course “Environmental Engineering” was introduced at the *national university* “*Universidade Federal do Parana – UFPR*” in Curitiba, Brazil. In the year 2008, the company ThyssenKrupp Steel assigned the working group IWT to assess the water treatment plants and facilities of the new designed steelwork in the federal Brazilian state of Rio de Janeiro. As a result two expert opinions have been written, which made crucial propositions in order to improve the operation and the efficiency of the plant. Furthermore, as result of the great success of the Brazilian Summer Schools and due to the experiences with the project “Export-Oriented Research and Development in the Field of Water Supply and Waste Water Treatment” it was possible to create the new masters programme MAUI “*Meio Ambiente Urbano e Industrial*” (Municipal and Industrial Environmental Protection) under German and Brazilian management and standards. The course was established with the cooperation of the *Universidade Federal do Paraná* (UFPR) and the National Service of Industrial Learning (Serviço Nacional de Aprendizagem Industrial, SENAI/ PR) in Curitiba, Brazil. The goal was to create a M.Sc. programme, which would be accepted in Brazil or alternatively in Germany and Brazil, and to achieve an accreditation. The master programme is supported by the

“German Academic Exchange Service (DAAD)”. The new masters programme MAUI has been approved by the Brazilian organization CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) and by the University of Stuttgart. In the year 2008 the first course successfully started with more than 15 students from different industry sectors and federal Brazilian states. The course has recently been accredited by the DAAD with the predicate “excellent” and is rated as the best programme evaluated by the DAAD worldwide. For more information please visit the study course website www.edubras-maui.uni-stuttgart.de or www.ppgmaui.ufpr.br. Actually the working group IWT initiated consultancy projects in the States of Santa Catarina and Paraná financed by the German Investment Corporation. (DEG-Deutsche Investitions- und Entwicklungsgesellschaft). The project is called “Resource and Energy Efficiency Network – Cost Effectiveness through Environmental Management” Furthermore a Memorandum of Understanding (MOU) was signed by the “National Environmental Protection Centre of the Industry (Serviço Nacional de Aprendizagem Industrial - Departamento Nacional, SENAI-DN) in Brasilia and the University of Stuttgart. In its endeavor to bring vocational education to every corner of Brazil, even to those regions with inefficient infrastructures, SENAI will develop a school-boat- called SAMAÚMA II for the Amazon region. The school-boat will be the first high performance technical and vocational education unit considering the requirements of sustainability, efficiency and applicability to local realities. Based on the MOU the working group IWT was responsible for the design and implementation of a compact and highly efficient wastewater treatment system for the school boat in the Amazon region. In May 2013 SENAI-DN asked the working group IWT to send a specialist in Sustainable Development to support an Observatory project in Mato Grosso do Sul. This Observatory aims to foster activities on sustainable development within local Industries and will be placed at Bonito. The external IWT specialist should support the local team of SESI to focus on product- and process-integrated environmental measures and strategies for Sustainable Development and to talk directly to industry leaders in order to convince of the relevance of implementing sustainable strategies.

German Academic Exchange Service-Program (DAAD) and BMBF

Keywords: Binational programs, Cooperation projects

Brazilian-German scientific co-operation in tropical ecology, human impact on forests and sustainable regional development

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A new phase of Brazilian-German scientific co-operation started in 1989. A growing preoccupation about the destruction of tropical ecosystems and deterioration of the environment led politicians and scientists to think about possibilities for a more intensive bilateral co-operation, organizing a long term research program in tropical ecology.

Five research programs had been installed:

- SHIFT-Program (1990-2002): Studies on human impact on forests and floodplains in the tropics.
Three regions were selected: The Amazon Basin, the Mata Atlântica, the Pantanal and the catchment area of the Upper Rio Paraguai
- MADAM-Program (1995-2005): Sustainable management of mangrove forests and its resources in the Belém coastal region
- JOPS I and II (1991-95): Studies on fertility and ecological processes in coastal waters of Eastern and Northeastern Brazil
- Science and Technology for the Mata Atlântica (2002-2009):
 - Biocasp: Diversity in fragmented landscapes in São Paulo
 - Solobioma: Soil biota and biochemistry in coastal forests of South Brazil
 - Relations of bromeliae and fauna in Brazilian coastal forests
 - Fragmentation and regeneration of the Mata Atlântica in Pernambuco
- WAVES Program (1996-2001): Water availability and vulnerability of ecosystems and society in semi-arid Northeastern Brazil

The main objectives of the most complex SHIFT-Program will be analyzed in detail as well as its connections with the “International Pilot Program for the conservation of the Brazilian rain forests” (PPG7) of the Brazilian Government, the G7 countries and the World Bank. In 2011 a new research program started within the program “Interaction between land management and climate change”: The CARBIOICIAL Program analyzes carbon sequestration, biodiversity and social structures in Southern Amazonia, models and implementation of carbon optimized land management strategies. The main goal of this multi- and interdisciplinary approach of German-Brazilian co-operation are viable C-optimized land management strategies mitigating GHG emissions and maintaining ecosystem services (ESS) under changing climate conditions. Three case studies along the Cuiabá - Santarém highway were selected: Southern Pará (most active deforestation), Northern Mato Grosso (young soy bean production in Cerradão transition forests) and Central Mato Grosso (adapted mechanical no till production in the Cerrado).

Keywords: research programs, scientific co-operation, tropical ecology



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DEUTSCHLAND + BRASILIEN

Wo Ideen sich verbinden

ALEMANHA + BRASIL

Quando ideias se encontram



CAPES

