8° Simpósio Brasil-Alemanha
8. Deutsch-Brasilianisches Symposium

Desenvolvimento **Sustentável**
Nachhaltige Entwicklung

Porto Alegre | 02 – 07 de outubro de 2017 | 02. – 07. Oktober 2017

FACING HUMAN IMPACTS:
THE CHALLENGES FOR SOCIETY AND FOR SCIENCE

- OCEAN RESEARCH
- AGRICULTURE AND FOOD SAFETY
- WATER
- SUSTAINABILITY IN EXPLORATION, MINING, AND RENEWABLE ENERGY
- GLOBAL CLIMATE CHANGE
- BIODIVERSITY, ECOLOGY, AND FORESTRY
- BIOECONOMY
- GLOBAL GEOPARKS
- DEVELOPMENT OF GREEN INFRASTRUCTURE IN URBAN AREAS
- SOCIAL AND ENVIRONMENTAL RESPONSIBILITY
- PUBLIC HEALTH
- ENVIRONMENTAL LAW AND ETHICS

BINATIONAL PROGRAMS AND COOPERATION

Impressum

Book of Abstracts of the 8th Brazil-Germany Symposium
Anais do 8º Simpósio Brasil-Alemanha
Porto Alegre, 02-07 October, 2017

Betina Blochtein, Gerti Weber Brun (Org/Ed)
Editing by Rosana Halinski

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Simpósio Brasil-Alemanha
Deutsch-Brasilianisches Symposium

Desenvolvimento **Sustentável**
Nachhaltige Entwicklung

8th Brazil-Germany Symposium for Sustainable Development

02-07 October 2017

Facing human impacts: The challenges for society and for science

Pontifical Catholic University of Rio Grande do Sul, Brazil

Book of Programme and Abstracts

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Foreword

Dear Participants,

It is with great honor that we present the Abstracts of the the 8th Brazil-Germany Symposium for Sustainable Development which took place from October 2nd to 7th in Porto Alegre, South of Brazil. The event will featur several parallel sessions, talks, discussions, poster sessions, and guided field trips.

The Symposium program is in line with THE SUSTAINABLE DEVELOPMENT AGENDA, the major goal of the UNITED NATIONS (UN), adopted in the 70/1 Resolution by the General Assembly of the UN in September 2015. In this edition, at the Pontifical Catholic University of Rio Grande do Sul (henceforth PUCRS), the motto is *Facing human impacts: the challenges for society and for science*. 217 scientific papers on topics such as Ocean, Agriculture and Food Safety, Water, Resource Management, Global Climate Change, Biodiversity, Ecology, and Forestry, Bioeconomy, Green Infrastructure in Urban Areas, Global Geoparks, Social and Environmental Responsibility, Public Health and Environmental Law and Ethics were presented. Additionally, the session on Binational Programs and Cooperation gives an overview e different binational programs and cooperation opportunities between Germany and Brazil.

The engagement of over 670 authors shows academic dedication within these areas and the motivation for scientific exchange between Germans and Brazilians, supported by public and private institutions. The biannual editions of the Symposium, promoted alternatively in Germany and Brazil have created the opportunity to include scientific novels and the participation of prominent researchers, which, alongside young researchers and students devoted to building knowledge in search for answers, strengthen the system with every new edition of this Symposium.

These Abstracts contain submitted and approved works for the Symposium and are organized in sequence according to its 14 sessions. At the end, the reader can find an author index.

Finally, we are grateful for the opportunity to host this edition of the Symposium at PUCRS, where our scientific community has embraced this opportunity with its strong engagement, along with German, Brazilian and other international institutions.

The structure of this 8th edition of the Symposium will mirror the previous editions, stemming from the close collaboration between the German and Brazilian organizing committees. The support from public and private institutions was essential to make this event possible, and with that in mind, we would like to show our gratitude to CAPES.

We wish all participants and guests a fruitful experience by the Symposium and a pleasant time in Porto Alegre.

Prof. Dr. Betina Blochtein

Content

Introduction

Since 2003, the Brazil-Germany Symposium for Sustainable Development has been taking place in both countries alternately every other year. The first Symposium was held in Tübingen, Germany. The purpose of the Symposium is to present and discuss the differences and similarities regarding the sustainable development of two societies in terms of their cultural identity with natural resources and its processes. The 2017 edition will be hosted at the Pontifical Catholic University of Rio Grande do Sul, in Porto Alegre, RS, Brazil. The theme of this edition will be “Facing human impacts: the challenges for society and for science”.

In this event, the scientific exchange between colleagues from Brazil and Germany in the field of technological innovation and sustainability comes in handy. The focus is mainly on issues related to energy, water, soil, climate, biodiversity, agriculture and forestry, politics, economics, resource management and future cities.

The sustainable development agenda

Since September 25th, 2015, Sustainability has been a major issue in the UNITED NATIONS agenda (Fig.1). This goal is called the agenda 2030 and was adopted as the Resolution 70/1 by the General Assembly of the UNITED NATIONS.

Fig. 1: Sustainable development goals
(http://nacoesunidas.org/pos2015/agenda2030/)

70/1. Transforming our world: the 2030 Agenda for Sustainable Development

"The General Assembly adopts the following outcome document of the United Nations summit for the adoption of the post-2015 development agenda: Transforming our world: the 2030 Agenda for Sustainable Development".

Preamble

"This Agenda is a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in larger freedom. We recognize that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an essential demand for sustainable development.

All countries and all stakeholders, acting in collaborative partnership, will be required to implement this plan. We are resolved to free the human race from the tyranny of poverty and want and to heal and secure our planet. We are determined to take the bold and transformative steps which are urgently needed to move the world towards a sustainable and resilient direction. As we embark on this collective journey, we pledge that no one will be left behind. The 17 Sustainable Development Goals and 169 targets which we are announcing today demonstrate the scale and ambition of this new universal Agenda. They seek to build on the Millennium Development Goals and complete what they failed to achieve. They seek to realize the human rights of all and to achieve gender equality and the empowerment of all women and girls. They are integrated and indivisible and incorporate the three dimensions of sustainable development: the economic, social and environmental.

The Goals and targets will foster actions over the next fifteen years in areas of critical importance for humanity and the planet". (United Nation Agenda 2030; https://sustainabledevelopment.un.org/post2015/transformingourworld)

General aim of the 8th Brazil-Germany Symposium on Sustainable Development

The aim of the 8th Brazil-Germany Symposium for Sustainable Development is to present and discuss the differences in sustainable development of two human societies in terms of their cultural identities within the frame of Earth resources and processes. The symposium will feature oral presentations, poster presentations, and guided tours to accomplish the general aim. The guided tours will provide human and natural examples of sustainable development. The term “sustainable development” is used in the sense of the early definition (March 20, 1987) by the Brundtland Commission of the United Nations: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. In general, sustainable is seen in the interaction of Environment, Social Actions, and Economics (Fig.2).

Fig. 2: Sustainability in the interaction of environment, social actions and economics (http://macaulay.cuny.edu/eportfolios/akurry/2011/12/21/sustainable--development/).

On the other hand, Environment (Earth resources and processes) relates to human societies (Social and Economic) as the terms “bearable” and “viable” are employed. These terms describe a possible means through which human societies can sustainably develop by living within the system Earth and using the resources of planet Earth. The focus of the symposium is to understand the Earth resources and processes, the cultural identities, and the unique conditions in Economy, Law, Politics, and Social actions between Europe and Latin America (Fig.3).

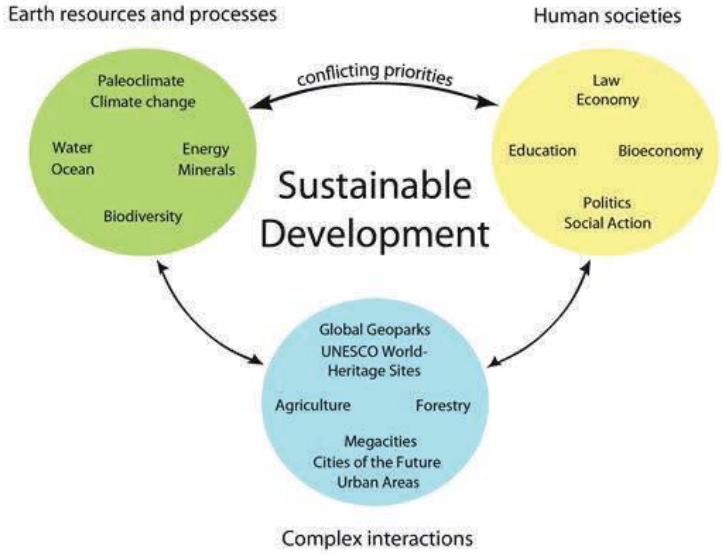

Fig. 3: Interaction between Earth resources and processes and Human societies.

The purpose of the Symposium is to discuss sustainability in view of cultural differences. Therefore, the symposium will focus on the cultural identities, the Earth resources and processes (Palaeoclimate/Climate change, Biodiversity, Bioeconomy, Energy, Minerals, Water, Oceans), and present the sustainable development in human society (Economics, Law, Politics, Social actions). Agriculture, Forestry, Cities of the Future, Megacities, and Urban areas are examples for fields of complex interactions between human society and natural resources. In addition, all themes related to Earth resources and processes will be discussed in the view of conflicting priorities of human needs. The topics of the Symposium were suggested by the central themes of the Pontifical Catholic University of Rio Grande do Sul (PUCRS), which supports the organisation of the symposium and the dissemination of its outcome. One outcome of the symposium could be a development scheme for sustainable actions within and between the different cultures. Furthermore, the symposium is strongly supported by the Baden-Württembergisches Brasilien-

Zentrum der Universität Tübingen and Baden-Württemberg International (bw-i) in Stuttgart.

Programme

Main theme: Facing human impacts: the challenges for society and for science.

The 8th German-Brazilian Symposium will be taking place from 02 October, 2017 until 07 October, 2017. Parallel sessions, talks, discussions, and poster sessions, and three days of guided field trips will be offered during the event's three days. activities begin every day at 8:30 AM and end at 6:00 PM. Two coffee breaks and one lunch break are included, which will give room for further discussions and networking.

	Oct 2 – Monday	Oct 3 – Tuesday		
		Main auditorium ground floor	**Auditorium 9th floor**	**Room 2nd Floor**
		Session 1	**Session 2**	**Session 3**
		Ocean Research	**Agriculture and Food Safety**	**Water**
08:30 am		Prof. Dr. Peter Hackspacher, UNESP	Prof. Dr. Leandro Astarita, PUCRS	Prof. Dr. Carlos André Bulhões Mendes, UFRGS
09:00 am		Prof. Dr. Martin Zimmer, University of Bremen	Prof. Dr. Georg Cadisch, University of Hohenheim	Prof. Dr. Jörg Metzger, University of Stuttgart
09:30 am		Oral presentations	Oral presentations	Prof. Dr. Peter Grathwohl, University of Tübingen
10:00 am	Registration	**Coffee break**	**Coffee break**	**Coffee break**
10:30 am		Oral presentations	Oral presentations	Oral presentations
11:30 am		**Poster Session (guided)**	**Poster Session (guided)**	**Poster Session (guided)**
12:30 pm	**Lunch**	**Lunch**		
		Session 4	**Session 5**	**Session 6**
		Sustainability in Exploration and Mining, and Renewable Energy	**Global Climate Change**	**Biodiversity, Ecology, and Forestry**
01:45 pm		Prof. Dr. Ulrich A. Glasmacher, Heidelberg University	Prof. Márcio Martins Pimentel, UnB	Prof. Dr. Gerhard Ernst Overbeck, UFRGS
02:15 pm		Prof. Dr. João Marcelo Ketzer, PUCRS	Prof. Dr. Jörg Matschullat, Technische Universität Bergakademie Freiberg	Dr. Marcus Giese, University Hohenheim
02:45 pm		Prof. Dr. Ana Olívia B. F. Magalhães, Unifal-MG	Oral presentations	Oral presentations
03:15 pm	Museum of Science and Technology of PUCRS. Guide: Prof. Carlos A. S. Lucena **From 2 pm to 4 pm**	**Coffee break**	**Coffee break**	**Coffee break**
03:45 pm		Oral presentations	Oral presentations	Oral presentations
05:00 pm		**Poster Session (guided)**	**Poster Session (guided)**	**Poster Session (guided)**
06:00 pm	Opening ceremony			
07:00 pm	Welcome Cocktail			

	Oct 4 – Wednesday			Oct 5 – Thursday		Oct 6 – Friday
	Main auditorium / ground floor	**Auditorium 9th floor**	**Room 2nd Floor**	**Main auditorium / ground floor**	**Room 2nd Floor**	
	Session 7	Session 8		**Session 11 B**	**Session 12**	
	Bioeconomy	**Global Geoparks**		**Public Health II - Academic Expertise in Drug Development**	**Environmental Law and Ethics**	**Visit:** Center and historical heritage of Porto Alegre. Guide: Prof. Me. Maturino S. S. da Luz 9 am to 4 pm
08:30 am	Prof. Dr. José Vitor B. Martins, UFRJ	Prof. Dr. José P. P. Melo, URCA		Prof. Dr. Eliezer Barreiro, UFRJ	Prof. Dr. Ricardo T. de Souza, PUCRS	
09:00 am	Dr. Dominik Patzelt, BIOPRO Baden-Württemberg GmbH	Dr. Jutta Weber, UNESCO		Dr. Otávio Sarmento Pieri, FIOCRUZ	Prof. Dr. Thomas Potthast, University of Tübingen	**Field trips:** Lagoa do Peixe National Park. Guide: Prof. Dr. Nelson F. Fontoura 8 am to 8 pm
09:30 am	Oral presentations	Me. Elizabeth Silva, UNESCO		Prof. Dr. Stefan Laufer, University of Tübingen	Oral presentations	
10:00 am	**Coffee break**	**Coffee break**		**Coffee break**	**Coffee break**	
10:30 am	Oral presentations	Prof. Dr. Artur Sá, UNESCO		Prof. Dr. Stela M. K. Rates, UFRGS/INCT Translacional em Medicina	Oral presentations	Coastline and archaeological sites. Guide: Prof. Dr. Klaus P. K. Hilbert 8 am to 8 pm
11:00 am		Oral presentations		Oral presentations		
11:30 am	**Poster Session (guided)**	**Poster Session (guided)**		**Poster Session (guided)**	**Poster Session (guided)**	
12:30 pm	**Lunch**					
	Session 9	**Session 10**	**Session 11 A**	**Session 13**		
	Development of Green Infrastructure in Urban Areas	**Social and Environmental Responsibility**	**Public Health I – Translational Medicine**	**Binational Programs and Cooperation**		Osório wind farm. Guide: Prof. Dr. Márcio Rosa D 'Avila from 8 am to 6 pm
01:45 pm	Prof. Dr. Paulo Renato M. Pellegrino, USP	Prof. Dr. Jose Rubens M. Leite, UFSC	Prof. Dr. Lars Zender, UniversityTübingen	Dr. Martina Schulze, DAAD		
02:15 pm	Dr.-Ing. Bernd Eisenberg, University of Stuttgart	Prof. Dr. Matthias Schmidt, Beuth Hochschule für Technik Berlin	Prof. Dr. Ghazaleh Tabatabai, University Hospital Tübingen	Prof. Dr. Abílio Baeta Neves, CAPES		Pró-Mata Research and Conservation Center / PUCRS. Guide: Prof. Dr. Pedro A. Ferreira / Dr. Rainer Radtke Oct 06 (8 am) to Oct 07 (8 pm)
02:45 pm	Oral presentations	Oral presentations	Prof. Dr. Fernanda B. Morrone, PUCRS	Oral presentations		
03:00 pm			Oral presentations			
03:15 pm	**Coffee break**	**Coffee break**	**Coffee break**	**Coffee break**		
03:45 pm	Oral presentations	Oral presentations	Oral presentations	Oral presentations		
05:00 pm	**Poster Session (guided)**	**Poster Session (guided)**	**Poster Session (guided)**	**Poster Session (guided)**		
06:00 pm				**Closing ceremony**		
07:00 pm						

Monday, Oct 2nd; 02:00 pm – 07:30 pm
Building 50 – ground floor

02:00-04:45 pm **Registration at welcome desk**
Pontifical Catholic University of Rio Grande do Sul
Av. Ipiranga, 6681, Porto Alegre

05:00-07:00 pm **Opening ceremony**
Pontifical Catholic University of Rio Grande do Sul
Av. Ipiranga, 6681, Porto Alegre
Main auditorium / Building 50 - ground floor

Musical frame by Youth orchestra of CESMAR (Marist Social Center Brother Antonio Bortolini)

05:20-05:40 pm **Opening remarks**
Prof. Dr. Jaderson Costa da Costa, Vice-President of Pontificial Catholic University of Rio Grande do Sul

Prof. Dr. Abílio Baeta Neves, President of the Coordination for the Improvement of Higher Education Personnel (CAPES), Ministry *of* Education in Brazil

Prof. Dr. Peter Grathwohl, Vice-President of Research of Tübingen University

05:40-05:50 pm **Welcome address**
Prof. Dr. Betina Blochtein, Director of the Institute of Environment, Pontificial Catholic University of Rio Grande do Sul

05:50-06:00 pm **Introductory statements**
Prof. Dr. Draiton Gonzaga de Souza, Vice-Director of the Center for European and German Studies (CDEA – UFRGS/PUCRS) and the Dean of the School of Humanities of PUCRS

Dr. Stefan Traumann, General Consul of Germany in Rio Grande do Sul and Santa Catarina

06:00-06:35 pm Opening lecture
Keynote Lecture M.Sc. Elizabeth Silva. – Coordinator of the National Platform for Education for Sustainable Development – Agenda 2030 by UNESCO "Sustainable Development Goals (SDGs) of the United Nations"

06:35-06:45 pm Musical frame
06:45 Welcome Cocktail
Building 50, ground floor – annex room

Monday, October 2nd; 02:00 – 04:00 pm

Visit

Scientific collections of Museum of Science and Technology of PUCRS

The visitation will be conducted in an area reserved for the scientific collections of PUCRS' Science and Technology Museum. The collection includes 13 exhibits – biological, archaeological and fossil -, each of which has been carefully preserved in order to keep its contents available to researchers and experts from their respective areas of expertise. Our collections make it possible for us to learn more about the Brazilian biodiversity, both of the past and of the present, as well as of the societies that inhabited the south of Brazil.

(http://www.pucrs.br/mct/colecoes/paleontologia/)

Tuesday, October 3th; 08:30 – 11:30 am; Building 50
Main auditorium / ground floor

Session 01 – Ocean

Chair: Prof. Dr. Peter Hackspacher and Prof. Dr. Martin Zimmer

08:30-09:00 **Keynote Lecture**

Prof. Dr. Peter Hackspacher

Instituto de Geociências e Ciências Exatas (UNESP), Brazil

Is exploitation of natural resources sustainable in coastal and oceanic regions? A geological perspective in Brazil.

Keynote Lecture

Prof. Dr. Martin Zimmer

09:00-09:30 Leibniz-Centre for Marine Tropical Research (ZMT) and University of Bremen

Borders of ocean research: the coasts

09:30-10:00 **Oral Presentations**

Squeff, TAFRC

UFRGS, Porto Alegre , RS, Brasil

The new implementing agreement under UNCLOS and the feasibility of global Marine Protected Areas

Fontes, RFC

Universidade Estadual Paulista (UNESP), São Vicente, Brazil

Lagrangian coherent structures applied on the coastal management of Santos Bight (SP, Brazil)

10:00-10:30 **Coffee break**

10:30-11:30 **Ketzer, JM**

Petroleum and Natural Resources Institute, Pontificia Universidade Catolica do Rio Grande do Sul, Porto Alegre, Brazil

Carbon leakage from the deep sea

Constantino, RR

Universidade Estadual Paulista (UNESP), SP, Brazil

Using public data for geophysical ocean research: South Atlantic Ocean

Simundi, CL

Institute of Petroleum and Natural Resources, Pontifical Catholic University of Rio Grande do Sul , Porto Alegre, Brazil

Investigation of magnetotactic bacteria in sediment samples from Brazilian aquatic environments

Melo, PT

Institute of Petroleum and Natural Resources, Pontifical Catholic University of Rio Grande do Sul , Porto Alegre, Brazil

Characterization of methanotrophic bacteria from deep sediment samples collected at the Foz do Amazonas Basin (Brazil)

Tuesday, October 3th; 11:30 am – 12:30 pm; Building 50
Poster
Annex Room / ground floor

Session 01 – Ocean

Chair: Prof. Dr. Peter Hackspacher, Prof. Dr. Martin Zimmer

11:30-12:30

Martinho, CT
Pontifical Catholic University of Rio Grande do Sul, Institute of Petroleum and Natural Resources, Porto Alegre, Brazil

Mineralogical variations and provenance of quaternary sediments from the Amapá continental slope, Foz do Amazonas Basin, Brazil

Oliveira, MM
Institute of Petroleum and Natural Resources, Pontifical Catholic University of Rio Grande do Sul , Porto Alegre, Brazil
Morphological and biochemical characterization of yeast isolates obtained from deep-sea sediment of the Pelotas Basin (RS, Brazil)

Tuesday, October 3th; 08:30 – 11:30 am; Building 50 Auditorium 9th floor

Session 02 – Agriculture and Food Safety

Chairs: Prof. Dr. Leandro Astarita and Prof. Dr. Georg Cadisch

08:30-09:00 **Keynote Lecture**

Prof. Dr. Leandro Astarita

School of Sciences, Laboratory of Plant Biotechnology, PUCRS, Porto Alegre, Brazil

Plant growth-promoting bacteria: a tool for agricultural management

09:00-09:30 **Keynote Lecture**

Prof. Dr. Georg Cadisch

Institute of Agricultural Sciences in the Tropics (Hans-Ruthenberg-Institute), University of Hohenheim, Stuttgart, Germany

Sustainable agricultural intensification: challenges and need for an integrated socio-ecological approach

09:30-10:00 **Oral Presentations**

Miola, AC

Zanella & Associates Lawyers, Porto Alegre, RS, Brazil

The handling of pesticides: lessons from Germany to Brazil

Neuwald, DA

Competence Centre for Fruit Growing at Lake Constance (KOB), Schuhmacherhof 6, Ravensburg, Germany

What are the possibilities for energy savings during fruit storage?

10:00-10:30 **Coffee break**

10:30-11:30 **Vale, WG**

Universidade Federal do Oeste do Pará, Instituto de Biodiversidade e Florestas, Santarém, Pará, Brazil
Livestock production in the Amazon: prospects on the use of new technologies for cattle and buffalo production

Michel, R

Institute of Biosciences, Federal University of Rio Grande do Sul, Porto Alegre, Brazil
Effectiveness of kaolin against Anastrepha fraterculus (Diptera: Tephritidae) on Satsuma var. Okitsu

Weirich Neto, PH

Laboratory of Agricultural Mechanization (Lama), Ponta Grossa State University (UEPG), Ponta Grossa, Brazil
Technical assistance and rural extension for rural sustainable development

Welz, B

Chemistry Department, Universidade Federal de Santa Catarina, Florianópolis - SC, Brazil

Development of a fast screening method for the direct determination of chlorinated persistent organic pollutants in fish oil by HR-CS GF MAS

Tuesday, October 3th; 11:30 am – 12:30 pm; Building 50
Poster
Annex Room / ground floor

Session 02 – Agriculture and Food Safety

Chairs: Prof. Dr. Leandro Astarita and Prof. Dr. Georg Cadisch

11:30-12:30

Venâncio, MD
Federal University of Santa Catarina, Florianopolis, Brazil
Rule of law for nature and sustainable agriculture: Pathways for mainstreaming agroecology in the Anthropocene

Etges, VE
UNISC, Santa Cruz do Sul, RS, Brazil
The Family Agroindustry in the context of the Colonial Agrarian System in Southern Brazil

Urriago Ospina, LM
Universidade Federal de Ouro Preto, DEGEO, Ouro Preto, Brazil
Rehabilitation of Canga Areas Using Traditional Knowledge and Technologies

Konrad, AC
Centro Universitário UNIVATES, Lajeado, Brazil
The exercise of environmental citizenship from an agroecological living mode

Marques, JGC
Federal Institute of Education, Science and Technology of Pernambuco, Recife, Brazil
Diagnosis of the reverse logistics of empty containers of agrochemicals by the center of receipt of empty packing containers of Carpina and Petrolina - PE, Brazil

Alves, ALS
University of Passo Fundo, Biological Sciences Institute, Passo Fundo, Brazil,
Prevalence of food insecurity in school children families in Passo Fundo- RS

Volpiano, CG
Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil
Rhizobial isolates from the common bean (Phaseolus vulgaris L.) as plant growth-promoting rhizobacteria (PGPR) and biological control agents (BCA) against the phytopathogenic fungus Sclerotium rolfsii

Lange, FS
University La Salle, Canoas, Brazil
Evaluation of efficient biocontrol gram positive Bacillus in the anthracnosis disease in Palmeira Juçara (Euterpe edulis MART.)

Castilho, C
Universidade Federal do Rio Grande de Sul, Porto Alegre, Brazil
Endophytic and rizospheric bacterial diversity in juçara palm (Euterpe edulis Mart.)

Tuesday, October 3th; 11:30 am – 12:30 pm; Building 50

Poster

Annex Room / ground floor

Session 02 – Agriculture and Food Safety

Chairs: Prof. Dr. Leandro Astarita and Prof. Dr. Georg Cadisch

11:30-12:30 **Lima, JSG**

Federal University of Sergipe State, São Cristovão, Brazil

Food security and sovereignty in tropical coastal zones: the role of traditional aquaculture practices at São Cristóvão, Sergipe, Brazil

Welz, B

Universidade Federal de Santa Catarina, Florianópolis, SC, Brazil

Determination of selenium in soil samples from 12 Brazilian states using high-resolution continuum source graphite furnace atomic absorption spectrometry and direct solid sample analysis

Tuesday, October 3th; 08:30 – 11:30 am; Building 50 Room 2nd floor

Session 03 – Water

Chairs: Prof. Dr. Carlos André Bulhões Mendes and Prof. Dr. Jörg Metzger

08:30-09:00 **Keynote Lecture**

Prof. Dr. Carlos André Bulhões Mendes

Instituto de Pesquisas Hidráulicas, UFRGS, Brazil

Keynote Lecture

Prof. Dr. Jörg Metzger

09:00-09:30 Institute for Sanitary Engineering, Water Quality and Solid Waste Management, University of Stuttgart

Organic micropollutants in the urban water cycle: occurrence, analysis and elimination strategies in sewage treatment plants

Keynote Lecture

09:30-10:00 **Grathwohl, P**

Department of Geosciences, University of Tübingen, Germany

Catchments as reactors: metabolism of pollutants on the landscape scale

10:00-10:30 **Coffee break**

10:30-11:30 **Oral Presentations**

Otto, N

Institute for Sanitary Engineering, Water Quality and Solid Waste Management, University of Stuttgart, Stuttgart, Germany

Potential of photocatalysis as sustainable technology for water treatment

Hilgert, S

Institute for Water and River Basin Management, Department of Aquatic Environmental Engineering, Karlsruhe Institute of Technology (KIT), Germany

How long will Brazil´s reservoirs last? - Long-term sediment mass validation by hydro acoustics and potential implications for the lifetime assessment of reservoirs in Brazil

Napp, L

UFRGS, Porto Alegre, RS, Brazil

The parameters of water potability in Brazil and in Europe

Tuesday, October 3th; 11:30 am – 12:30 pm; Building 50
Poster
Annex Room / ground floor

Session 03 – Water

Chairs: Prof. Dr. Carlos André Bulhões Mendes and Prof. Dr. Jörg Metzger

11:30-12:30

Peregovich, BG

UFOPA - Federal University of Western Pará, Santarém, Brazil

The role of soil air composition for noble gas paleotemperature reconstructions in Tropical Regions

Petry, CT

Universidade Feevale, Novo Hamburgo, Brazil

Nitrification of domestic solid waste landfill leachate with the use of Typha domingensis

Kochem, LH

Secretaria Municipal de Sustentabilidade, Trabalho e Desenvolvimento Econômico, Diretoria de Gestão Ambiental, Cachoeirinha, Brazil

The importance of technical participation on Envinronmental City Council – Initiative of participation in Chachoeirinha/RS Town Hall: Regulation COMDEMA n°030/2016

Gonçalves, CV

Núcleo de Sustentabilidade da Universidade do Vale do Taquari (UNIVATES), Lajeado, RS, Brazil

Volunteer Action "Viva o Taquari Vivo": 11 years of history

Marques, JGC

Federal Institute of Education, Science and Technology of Pernambuco, Professional Master in Environmental Management, Recife, Brazil

Evaluation of the water quality of the Capibaribe River by the release of residuals from the municipal slaughterhouse of São Lourenço da Mata - PE, Brazil

Marques, JGC

Federal Institute of Education, Science and Technology of Pernambuco, Academic Department of Environment, Health and Safety, Recife, Brazil,

Goss method to estimate the vulnerability to water contamination by agrochemicals in the city of Vitória de Santo Antão - Pernambuco, Brazil

Ávila, L

Federal University of Paraná (UFPR), Programa de Pós-Graduação em Meio Ambiente Urbano e Industrial (PPGMAUI), Department of Chemical Engineering, Curitiba, Brazil

Remediation of groundwater contaminated by chlorinated organic compounds (PCE/TCE) through activated carbon and potassium permanganate

Fernandes, AM

Universidade Estadual Paulista "Júlio de Mesquita Filho", Instituto de Geociências e Ciências Exatas, Rio Claro, SP, Brazil

Seasonality of total and dissolved metal concentrations in the Alto Sorocaba River Basin

Tuesday, October 3th; 11:30 am – 12:30 pm; Building 50
Poster
Annex Room / ground floor

Session 03 – Water

Chairs: Prof. Dr. Carlos André Bulhões Mendes and Prof. Dr. Jörg Metzger

11:30-12:30

Ceron, LP

Pontifical Catholic University of Rio Grande do Sul, Porto Alegre, Brazil

Use of polypropylene nonwoven as sorbent of oil

Pires, JCG

Pontifícia Universidade Católica do Rio Grande do Sul, PGETEMA, Porto Alegre, Brazil

Application of Refraction Seismic in the vulnerability of underground aquifers

Garcez, GR

Institute of Petroleum and Natural Resources, Pontifical Catholic University of Rio Grande do Sul , Porto Alegre, Brazil

Comparison of the water quality of a deep artesian well and a shallow cacimba water arranged in the same rural property

Santos, CAB

Institute of Petroleum and Natural Resources, Pontifical Catholic University of Rio Grande do Sul , Porto Alegre, Brazil

Obtainment of environmentally friendly coagulants/flocculants from tannins

Sotelo, DG

Pontifical University of Rio Grande do Sul, Institute of Petroleum and Natural Resources, Porto Alegre, Brazil

DC resistivity method for underground water evaluation

Paz, LV

Institute of Petroleum and Natural Resources, Pontifical Catholic University of Rio Grande do Sul , Porto Alegre, Brazil

Microbial life in water and mud samples from the Rio Doce (MG) collected in December 2015

Rempel, SSB

Universidade La Salle, Canoas, Brazil

Monitoring the quality of herbimix-contaminated water through the evaluation of physiological parameters at jundiá (Rhamdia quelen)

Rodrigues, VA

Universidade Estadual Paulista (UNESP) - Botucatu, São Paulo, Brazil

Conflicts and environmental fitness in nascents and area of permanent preservation of watershed

Caon, K

Universidade Feevale, Novo Hamburgo, Brazil

Investigation of the genotoxic effects of water from the Tega River, Caxias do Sul, Rio Grande do Sul

Ferreira, DC

Secretaria Municipal de Sustentabilidade, Trabalho e Desenvolvimento Econômico. Prefeitura Municipal de Cachoeirinha/RS. Brazil.

Sustainable development and challenges to water management in the municipality of Cachoeirinha (RS), Brazil

Tuesday, October 3th; 11:30 am – 12:30 pm; Building 50
Poster
Annex Room / ground floor

Session 03 – Water

Chairs: Prof. Dr. Carlos André Bulhões Mendes and Prof. Dr. Jörg Metzger

11:30-12:30

Serrão, BC

Institute of Engineering and Geosciences, Geology, Santarém, Brazil

Geochemical – sedimentological characterization of the urban igarapés of Santarém/PA, Brazilian Amazon

Demarco, CF

Federal University of Pelotas, Pelotas, RS, Brazil

Variation in water quality at Arroio Grande stream: comparison between sampling upstream and downstream the city in summer

Loebens, L

Federal University of Pelotas, Environmental and Sanitary Engineering, Pelotas - RS, Brazil

Critical review of sewage system in Arroio do Padre/RS

Afonso, TF

Federal University of Pelotas, Pelotas, RS, Brazil

Estimation of a Trophic State Index for Uruguay River in Jaguarão/RS

Tuesday, October 3th; 01:45 – 05:00 pm; Building 50

Main auditorium / ground floor

Session 04 - Sustainability in Exploration, Mining, and Renewable Energy

Chairs: Prof. Dr. Ulrich A. Glasmacher and Prof. Dr. João Marcelo Ketzer

01:45-02:15 **Keynote Lecture**

Prof. Dr. Ulrich A. Glasmacher

Institute of Earth Sciences, Heidelberg Center for the Environment, Heidelberg University

Sustainability in Exploration, Mining, and renewable Energy, important for and dependent on Human societies? Perspective from Planet Earth.

02:15-02:45 **Keynote Lecture**

Prof. Dr. João Marcelo Ketzer

Institute of Petroleum and Natural Resources, Pontifical Catholic University of Rio Grande do Sul , Porto Alegre, Brazil

02:45-03:15 **Keynote Lecture**

Prof. Dr. Ana Olívia Baruf Franco Magalhães

Instituto de Ciência e Tecnologia (Unifal-MG)

Mineral ores in Brazil with a focus on the resources for green energy

03:15-03:45 **Coffee break**

03:45-05:00 **Oral Presentations**

Deike, R

University Duisburg-Essen, Institute of Metals Engineering, Duisburg, Germany

Recycling of residual material from metallurgical processes towards a circular economy

Ferreira, FB

UFRGS, Metallurgy Department, Porto Alegre, Brazil

Characterization of self-reducing Electric Arc Furnace Dust and petroleum coke mixtures aiming their use in steel mill

Bassani, ML

UFRGS, Porto Alegre, Brazil

The goal of the ISO 50001 certifying system: cost reduction vs. environmental protection

Cardoso, FS

Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil

Development of a technology roadmap for biogas production from straw

Peregovich, BG

Federal University of Western Pará, Santarém, Brazil

Gold mining - output is not equal profit!

Duarte, OFP

PUCRS, Porto Alegre, Brazil

Renewable energies: utopia or reality?

Soares, RS

Universidade Estadual do Rio Grande do Sul, Novo Hamburgo, Brazil

Brazilian distributed energy policy and its contributions for UN's Sustainable Development Goals (SDGs)

Tuesday, October 3th; 05:00 – 06:00 pm; Building 50
Poster
Annex Room / ground floor

Session 04 - Sustainability in Exploration, Mining, and Renewable Energy

Chairs: Prof. Dr. Ulrich A. Glasmacher and Prof. Dr. João Marcelo Ketzer

05:00-06:00

Praeg, D

PUCRS, Institute of Petroleum and Natural Resources, Porto Alegre, Brazil

SEAGAS: fluid venting from gas hydrate systems on the Brazilian and Mediterranean ocean margins

Guimarães, LNMR

PhD in Law-Free University of Berlin. FGV/CERI, Vieira Rezende Law Firm, São Paulo-Brazil

A comparative analysis of the auto-suppliers' and the mini and microgeneration's legal regimes in german and brazilian energy law

. unzler, CB

PUCRS, Porto Alegre, Brazil

Physicochemical and microbiological analysis of soils on columns for simulation of CO2 leakage monitoring

Hasan, C

UNIVATES, Lajeado, RS, Brazil

Biomass atlas of Rio Grande do Sul: an incentive to the biogas production as a source of renewable energy

Ledra, N

Federal University of Santa Catarina, Araranguá, Brazil

The study and implementation of a low-cost biodigester in a small rural property in Araranguá, SC

Lopomo, MR

Federal University of Santa Catarina, Araranguá, Brazil

Public policies and energy storage in Brazil

Moraes, CD

Federal University of Santa Catarina, Araranguá, Brazil

Wind energy in the coastal zone of Brazil

Nacimento, RS

Federal University of Western Pará, Santarém, Brazil

Synthesis and characterization of pyroaurite-type material at room temperature employing bauxite residues from Amazon Region

Steiner, D

Federal University of Santa Catarina, Araranguá, Brazil

Studies of brazilian environmental legislation at federal level related to the energy power industry

Azevedo, TF

Federal University of Western Pará, Santarém, Brazil

Thermal stability of rubidium birnessite-type material synthesized from Mn residues from Amazon Region

Tuesday, October 3th; 05:00 – 06:00 pm; Building 50

Poster

Annex Room / ground floor

Session 04 - Sustainability in Exploration, Mining, and Renewable Energy

Chairs: Prof. Dr. Ulrich A. Glasmacher and Prof. Dr. João Marcelo Ketzer

05:00-06:00

Duarte, OFP

Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Porto Alegre, Brazil

Building 30 classroom's lighting energy efficiency

Duarte, OFP

Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Porto Alegre, Brazil

Energy wasting and economic potential in a university

Jeremias, TC

Federal University of Santa Catarina, Araranguá, Brazil

Use of rice husk and derivatives as a biosorbent for the remediation of mine-impacted water (MIW)

Bonetti, B

Pontifical University Catholic of Rio Grande do Sul (PUCRS), Porto Alegre, RS, Brazil

Ambient air characterization of underground coal mines in the southern Santa Catarina coal field and estimation of the emission of greenhouse gases

Hammerschmitt, ME

Pontifical University Catholic of Rio Grande do Sul (PUCRS), Porto Alegre, RS, Brazil

Pilot scale green zeolite synthesis using wastes

Santos, RCF

Federal University de Santa Catarina, Araranguá, Brazil

Public policies to promote the production of biogas from dairy farms in Santa Catarina: a study in São Miguel do Oeste

Silva, EB

Federal University of Western Pará, Santarém, Brazil

Synthesis of 13X molecular sieve employing Kaolin residues from Amazon Region

Schulze, S

Clausthal Institute of Environmental Technology, Department of Resource Technology, ClausthalZellerfeld, Germany

Recycling of Spent Pot Lining – A Contribution to Resource Efficiency in Primary Aluminium Making

Dittmar, A

Clausthal Institute of Enviromental Technology, Department of Ressource Technology Clausthal-Zellerfeld, Germany

REWITA – Recovery of high-tech resources from old mine deposits

Sabedot, S

UNILASALLE, Canoas, Brazil

Sustainable use of coal bottom ash in road paving

Tuesday, October 3th; 05:00 – 06:00 pm; Building 50
Poster
Annex Room / ground floor

Session 04 - Sustainability in Exploration, Mining, and Renewable Energy

Chairs: Prof. Dr. Ulrich A. Glasmacher and Prof. Dr. João Marcelo Ketzer

05:00-06:00

Hubert-Ribeiro, TM

Universidade Federal de Ciências da Saúde de Porto Alegre, Porto Alegre, Brazil

CHITIN - a sustainable alternative for synthetic microbeads

Giongo, A

Institute of Petroleum and Natural Resources, Pontifical Catholic University of Rio Grande do Sul , Porto Alegre, Brazil

Microbial communities from a solid-state anaerobic biodigester fed with cattle manure

Eifler Neto, E

Arvut Engenharia e Meio Ambiente, Departamento de Engenharia, Porto Alegre, Brazil

Spatial complementarity between thermal energy in the "meeting of waters" and water and wind resources in northeastern Brazil

Riegel, JMN

University Federal of Pampa, Caçapava do Sul, Brazil

Use of liquids in air quality monitoring in the municipality of Caçapava do Sul

Tuesday, October 3th; 01:45 – 05:00 pm; Building 50 Auditorium 9th floor

Session 05 - Global Climate Change

Chairs: Prof. Márcio Martins Pimentel and Prof. Dr. Jörg Matschullat

01:45-02:15 **Keynote Lecture**

Prof. Márcio Martins Pimentel

Instituto de Geociências (UnB), Brasília, Brazil

02:15-02:45 **Keynote Lecture**

Prof. Dr. Jörg Matschullat

Institut für Mineralogie, Technische Universität Bergakademie Freiberg

Who has the knowledge about climate change?

Amazon basin under climate change already?

02:45-03:15 **Oral Presentations**

Glasmacher, UA

Heidelberg University, Institute of Earth Sciences, Heidelberg, Germany

Climate change: geological and social properties

Toigo, CH

Pontifical Catholic University of Rio Grande do Sul, Porto Alegre, Brazil

Ecological intensity of human well-being: is economic development reducing environmental impact in Brazil?

03:15-03:45 **Coffee break**

03:45-05:00 **Michaelis, L**

University of Applied Forest Science Rottenburg, Rottenburg am Neckar, Germany

Environmental education and empowerment of children to mitigate the global climate change through community action with Plant for the Planet in Brazil: experiences in Irati, PR and Araranguá, SC

Brose, M

Universidade de Santa Cruz do Sul, RS, Brazil

Early movers on subnational adaptation: making sense of the partnership between Acre/Brazil and California/USA

Hilbert, K

Pontifical Catholic University of Rio Grande do Sul, Porto Alegre, Brazil

A history of knowledge of the Amazonian dark earths

Pscheidt, CE

UFSC, Campus de Joinville, Joinville, Brazil

Economic viability and dimensioning of photovoltaic panels to implementation in residencial buildings

Bleninger, T

Federal University of Paraná, Curitiba, PR, Brazil

Innovative techniques for gas bubble measurement from lakes: continuous record of bubble emissions from a subtropical reservoir using automated bubble traps

Tuesday, October 3th; 05:00 – 06:00 pm; Building 50
Poster
Annex Room / ground floor

Session 05 - Global Climate Change

Chairs: Prof. Márcio Martins Pimentel and Prof. Dr. Jörg Matschullat

05:00-06:00 **Melo, CL**

Institute of Petroleum and Natural Resources, Pontifical Catholic University of Rio Grande do Sul , Porto Alegre, Brazil

Near-surface CO_2 monitoring in Brazilian field experiments

Maffra, L

University of Seville, Department of Sociology, Seville, Spain

Food sovereignty, bioclimatic strategy and global equality

Assumpção, SSB

Federal University of Santa Catarina, Araranguá, Brazil

Plant for the Planet: engaging future energy engineers and children in climate justice

Philippi, M

Pontifical Catholic University of Rio Grande do Sul, Porto Alegre, Brazil

Synthesis and characterization of metal-organic framework NH2-MIL-53(Al) for CO2 capture

Polesso, BB

Pontifical Catholic University of Rio Grande do Sul, Porto Alegre, Brazil

Supported IL/silica extracted from rice husk: synthesis, characterization and CO2 sorption capacity

Rodrigues, DM

Pontifical Catholic University of Rio Grande do Sul Porto Alegre, Brazil

Cellulosic based poly-ionic liquids as heterogeneous catalyst in cyclic carbonates synthesis from epoxide and CO2

Duczinski, R

Pontifical Catholic University of Rio Grande do Sul Porto Alegre, Brazil

Synthesis and characterization of new CO_2 sorbents obtained from ionic liquids/ MCM silica produced from rice husk

Gonçalves, CV

Universidade do Vale do Taquari, Lajeado, RS, Brazil

Paleowildfires: usual events late Paleozoic of Gondwana

Melo, RHRQ

Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil

Climate change, analysis of heat islands in microscale

Melo, RHRQ

Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil

The importance of knowing the heat islands in face the global climate changes

Tuesday, October 3th; 01:45 – 05:00 pm; Building 50
Room 2nd floor

Session 06 - Biodiversity, Ecology, and Forestry

Chairs: Prof. Dr. Gerhard Ernst Overbeck and Dr. Marcus Giese

01:45-02:15 **Keynote Lecture**

Prof. Dr. Gerhard Ernst Overbeck

Universidade Federal do Rio Grande do Sul, Department of Botany, Porto Alegre, Brazil

Grassland restoration in Southern Brazil: Where are we, and where do we need to go?

02:15-02:45 **Keynote Lecture**

Dr. MarcusGiese

University of Hohenheim, Institute of Agricultural Sciences in the Tropics (Hans-Ruthenberg-Institute), Stuttgart, Germany

Towards the sustainable use of grassland ecosystems – a cross continental analysis for integrated solutions

02:45-03:15 **Oral Presentations**

Radtke, R

Baden-Württembergisches Brasilien-Zentrum der Universität, 72074 Tübingen, Germany

Educational sustainability of 28 years of biological classes of Tübingen University in Brazil

Silvano, RAM

Universidade Federal do Rio Grande do Sul, Instituto de Biociências, Department of Ecology, Porto Alegre, RS, Brazil

Economic opportunities, local people and extractive reserves in the Brazilian Amazon

Esser, LF

Federal University of Rio Grande do Sul, Department of Botany, Porto Alegre, Brazil

Loss of Atlantic Rain Forest's Protected Area Compromise Sustainable Development

Halinski, R

Faculty of Biosciences, Biodiversity and Ecology Department, Pontifical Catholic University of Rio Grande do Sul, Porto Alegre, Brazil

Influence of bees on canola productivity and its relation to climate change

Silveira, FS

Laboratory of Quantitative Ecology, Department of Ecology, UFRGS, Brazil

Seed dispersal in southern Brazilian forest-grassland mosaics: How far can the seeds achieve?

Matschullat, J

Interdisciplinary Environmental Research Centre, TU Bergakademie Freiberg, Freiberg, Germany

Terra firme: Soil respiration

Tuesday, October 3th; 05:00 – 06:00 pm; Building 50
Poster
Annex Room / ground floor

Session 06 - Biodiversity, Ecology, and Forestry

Chairs: Prof. Dr. Gerhard Ernst Overbeck and Dr. Marcus Giese

05:00-06:00 **Frommherz, A**

University of Applied Forest Sciences Rottenburg, Germany

Landowner behavior in relation to the natural forests in Paraná

Marin, TIS

Universidade Federal Rural da Amazônia, Ciências Contábeis, Capanema-PA, Brazil

Community forest management in protected areas in the Amazon: an impact assessment at Verde para Sempre Extractive RESERVE and at Rio Negro Sustainable Development Reserve

Falavigna, TJ

Universidade do Vale do Rio dos Sinos - UNISINOS, Laboratório de Ornitologia e Animais Marinhos – LOAM, São Leopoldo, RS, Brazil

Avifauna in the different phases of a wind farm

Pinheiro, JCP

Instituto de Biodiversidade e Florestas, Universidade Federal do Oeste do Pará, Santarém, Pará, Brazil

Income expectation with forest products in a settlement project in the lower Tapajós region, state of Pará, Brazil

Webber, CL

Institute of Geosciences, Graduate Program in Geography, Porto Alegre, Brazil

Characteristics of biological soil crusts in the southwest areas of Rio Grande do Sul, Brazil

Tuesday, October 3th; 05:00 – 06:00 pm; Building 50
Poster
Annex Room / ground floor

Session 06 - Biodiversity, Ecology, and Forestry

Chairs: Prof. Dr. Gerhard Ernst Overbeck and Dr. Marcus Giese

05:00-06:00 **Neves, MB**

Pontifícia Universidade Católica do Rio Grande do Sul, Departamento de Biodiversidade e Ecologia, Porto Alegre, Brazil

Influence of fragment isolation on mutualistic networks inserted in an urban matrix

Marcon, C

Universidade Feevale, Graduate Program in Environmental Quality, Laboratory of Plant Biotechnology, Novo Hamburgo, Brazil,

Application of biotecnology for the conservation of Elaphoglossum macrophyllum

Haas, ML

Universidade do Vale do Rio dos Sinos, Laboratório de Ictiologia, São Leopoldo, Brazil

Impact of land use on the ichthyofauna, in the buffer zone of National Parks in Rio Grande do Sul, Brazil

Lima, FC

Universidade do Vale do Rio dos Sinos, Laboratório de Ictiologia, São Leopoldo, Brazil

Application of a microscopy software to measure morphological characters of parasitic helminths of fish from the Tramandaí River Basin, Southern Brazil

Tuesday, October 3th; 05:00 – 06:00 pm; Building 50

Poster

Annex Room / ground floor

Session 06 - Biodiversity, Ecology, and Forestry

Chairs: Prof. Dr. Gerhard Ernst Overbeck and Dr. Marcus Giese

05:00-06:00

Nascimento, EV

Environmental Manager, Master in Natural Resources of the State University of Ceará (UECE)

Occurrences of the Ocotea Aubl. Genus, of the Lauraceae Family, in Atlantic Forest of Ceará State

Endres Júnior, D

Universidade Feevale, Graduate Program in Environmental Quality, Laboratory of Plant Biotechnology, Novo Hamburgo, Brazil

Relevant aspects for the development of a conservation project: case study of the reintroduction of an epiphytic orchid species

Sasamori, MH

Universidade Feevale, Graduate Program in Environmental Quality, Laboratory of Plant Biotechnology, Novo Hamburgo, Brazil

Biotechnology for plant conservation: in situ reintroduction of Vriesea incurvata propagated in vitro

Hofmann. GH

Universidade La Salle, Mestrado em Avaliação de Impactos Ambientais, Canoas, Brazil

Land conver changes between 2002 and 2009 in Rio Grande do Sul state

Wednesday, October 4th; 08:30 – 11:30 am; Building 50
Main auditorium / ground floor

Session 07 - Bioeconomy

Chairs: Prof. Dr. José Vitor Bomtempo Martins and Dr. Dominik Patzelt

08:30-09:00 **Keynote Lecture**

Prof. Dr. José Vitor Bomtempo Martins

Escola de Química (UFRJ), Brazil

Challenges and opportunities in bioeconomy: an innovation dynamics approach

09:00-09:30 **Keynote Lecture**

Dr. Dominik Patzelt

BIOPRO Baden-Württemberg GmbH

Bioeconomy in Germany

09:30-10:00 **Oral Presentations**

Kranert, M

Institute for Sanitary Engineering, Water Quality and Solid Waste Management, Waste Management and Emissions, University of Stuttgart, Stuttgart, Germany

Recovery of organic waste as a component of bioeconomy

10:00-10:30 **Coffee break**

Frank, AG

Organizational Engineering Research Group (Núcleo de Engenharia Organizacional – NEO), Department of Industrial Engineering, Universidade Federal do Rio Grande do Sul, Brazil

A study of German Municipalities' innovation policy criteria for renewable energy systems

Mössinger, J

Land Use Economics in the Tropics and Subtropics, Institute of Agric. Sciences in the Tropics (Hans-Ruthenberg-Institute) (490d), University of Hohenheim, Germany

Acrocomia as accelerator for integrated agricultural production systems for family-based peasant farms in Paraguay

Damian, RB

Jet Towers, Engineering Director, Santiago-RS, Brazil

Hi-tech farm project – an innovative, sustainable and profitable approach to beefproduction

Gonçalves, APR

Departament of Law, Federal University of Santa Catarina (UFSC), Florianópolis, Brazil

Payment for environmental services and agroecology: perspectives from ecological economics and the rule of law for nature

Wednesday, October 4th; 11:30 am – 12:30 pm; Building 50
Poster
Annex Room / ground floor

Session 07 - Bioeconomy

Chairs: Prof. Dr. José Vitor Bomtempo Martins and Dr. Dominik Patzelt

11:30-12:30

Bernardes, EM

São Paulo State University (Unesp), College of Agricultural and Technological Sciences, Dracena, Brazil.

Natural and Social capital interactions in the richest counties in the State of Sao Paulo, Brazil

Hilger, T

Agronomy in the Tropics and Subtropics, Institute of Agricultural Sciences in the Tropics (Hans-Ruthenberg-Institute) (490e), University of Hohenheim, Germany

Macaw palm and its potential for sustainable oil production

Cabral, JEO

Embrapa Agroindústria Tropical, Professor Da Universidade de Fortaleza, Fortaleza, CE, Brazil

Comparative economic analysis of irrigated production of castor bean, seed and ornamental sunflower, and ornamental pineapple with different water sources

Souza, MF

Universidade Federal do Rio de Janeiro – , Av. Athos da Silveira Ramos, 149, Centro de Tecnologia - Cidade Universitária, Rio de Janeiro, RJ, Brazil

Integrated processing of microalgae for recovery of sugars, pigments and a protein-rich residue

Migliavacca, VF

Quatro G Pesquisa & Desenvolvimento Ltda, Porto Alegre, Brazil

Production of recombinant β-galactosidase in bioreactors by fed batch culture using DO-stat and Linear control

Santos, KL

Feevale University, Institute of Exact and Technological Science - ICET, Novo Hamburgo, Brazil

Organic fraction of urban solid waste in the State of Rio Grande do Sul/Brazil: a business opportunity

Pandolfo, PM

Institute of Petroleum and Natural Resources, Pontifical Catholic University of Rio Grande do Sul , Porto Alegre, Brazil

The Lepidoptera Methona themisto as a source of microbial biocatalysts

Chaves, IR

Porto Alegre, Brazil

Biotechnology and primary growth in Brazil: economic aspects

Redecker, G

Institute of Petroleum and Natural Resources, Pontifical Catholic University of Rio Grande do Sul , Porto Alegre, Brazil

Manacá leaves as a source of microorganisms with biotechnological application

Wednesday, October 4th; 11:30 am – 12:30 pm; Building 50

Poster
Annex Room / ground floor

Session 07 - Bioeconomy

Chairs: Prof. Dr. José Vitor Bomtempo Martins and Dr. Dominik Patzelt

11:30-12:30

Palhano, PL

Institute of Petroleum and Natural Resources, Pontifical Catholic University of Rio Grande do Sul , Porto Alegre, Brazil

Microbial isolation of the genus Enhydrobacter from paper and cellulose industry waste samples

Farias, JP

Federal University of Pelotas, Environmental and Sanitary Engineering, Pelotas - RS, Brazil

Rice husk ash (RHA) as a precursor in production of chemically activated carbon

Dullius, A

Laboratório de Biotecnologia de Alimentos, Universidade UNIVATES, Lajeado, RS, Brazil

Valorization of cheese whey by the production of bioactive peptides for the food industry

Wednesday, October 4th; 08:30 – 11:30 am; Building 50

Auditorium 9th floor

Session 08 - Global Geoparks

Chairs: Prof. Dr. José Patricio Pereira Melo and Dr. Jutta Weber

08:30-09:00 **Keynote Lecture**

Prof. Dr. José Patricio Pereira Melo

Departamento de Direito (URCA)

Keynote Lecture

09:00-09:30 **Dr. Jutta Weber**

UNESCO Global Geopark Bergstrasse-Odenwald, Nibelungenstrasse 41, D-64653 Lorsch, Germany

UNESCO Global Geoparks as key territories for the implementation of the Sustainable Development Goals 2030: Case study from the UNESCO Global Geoparks in Germany

Keynote Lecture

09:30-10:00 **Silva, E**

Portuguese National Commission for UNESCO - Science, Ministry of Foreign Affairs, Lisbon, Portugal,
The Agenda 2030 of the United Nations for Sustainable Development: UNESCO Global Geoparks key-actors in its implementation of the 17 SDG's in these territories

10:00-10:30 **Coffee break**

10:30-11:00 Keynote Lecture

Sá, A

University of Trás-os-Montes and Alto Douro (UTAD), School of Life and Environment Sciences, Vila Real, Portugal

The UNESCO Chair "Geoparks, Regional Sustainable Development and Healthy Lifestyles" and the 1st International Summer University as a tool of sharing knowledge and capacity building on these topics

11:00-11:30 **Oral Presentations**

Costa F, JS

Department of Architecture and Urbanism, Federal University of Ceará, Fortaleza, Brazil

On the proper of an innovative urban geoapark on the banks of the Poti River in Teresina, Piauí state

Costa Filho, JS

Department of Architecture and Urbanism and Department of Geology, Federal University of Ceará, Fortaleza, Brazil

Geoparks as ancillary instruments for the furtherance of regional development policies in the state of Ceará, Brazil: the cases of Sertão Central and Ibiapaba planning regions as possible innovative territories embracing Geoparks.

Wednesday, October 4th; 11:30 am – 12:30 pm; Building 50
Poster
Annex Room / ground floor

Session 08 - Global Geoparks

Chairs: Prof. Dr. José Patricio Pereira Melo and Dr. Jutta Weber

11:30-12:30 **Fornaro, A**

Instituto Federal de Educação, Ciência e Tecnologia de Mato Grosso do Sul, Brazil
Geoparks for meaningful learning in geosciences

Souza-Fernandes, LC

School of Applied Sciences, UNICAMP, Limeira, São Paulo, Brazil

The Guarani Aquifer System as a inductive factor for the creation of a unesco global geopark in the hydrographic basin of the Corumbatiai River - São Paulo - Brazil

Wednesday, October 4th; 01:45 – 05:00 pm; Building 50
Main auditorium / ground floor

Session 09 - Development of Green Infrastructure in Urban Areas

Chairs: Prof. Dr. Paulo Renato Mesquita Pellegrino and Dr.-Ing. Bernd Eisenberg

01:45-02:15 **Keynote Lecture**

Prof. Dr. Paulo Renato Mesquita Pellegrino

Faculdade de Arquitetura, Urbanismo e Design (USP)

Landscapes in transition: opportunities for Green Infrastructure.

02:15-02:45 **Keynote Lecture**

Dr.-Ing. Bernd Eisenberg

Institute of Landscape Planning and Ecology, University of Stuttgart

Strengthening climate change adaptation through Integrated strategies for blue-green infrastructure

02:45-03:15 **Hintze, C**

LVG Heidelberg, Diebsweg 2, 69123 Heidelberg, Germany

Drones and cameras help monitoring urban trees

03:15-03:45 **Coffee break**

03:45-05:00 **Oral Presentations**

Berto, VZ

PhD student of the graduate program in Geography at the Federal University of Paraná (UFPR) and professor at the Federal Institute of Paraná (IFPR), Colombo campus. Curitiba (PR)-Brazil.

Mapping of the hemeroby of the northern part of the watershed of the River Belem, Curitiba – PR – Brazil

Ramires, S

Universidade Federal do Rio Grande do Sul, Escola de Engenharia, Porto Alegre, Brazil

Sustainable energy efficient hotspot

Crowley, D

UFPR, PPGMADE, Curitiba, Brazil

Greening the city & connecting communities. Curitiba's participation in the 2017 Ecocity World Summit

Peña, EJV

Universidade Federal de Minas Gerais, Departamento de Engenharia Mecânica, Belo Horizonte, Brazil

Methodology for an electric taxi powertrain design: a case study in ciudad Juarez

Pires, TB

Universidade de Passo Fundo, Faculdade de Engenharia e Arquitetura, Passo Fundo, Brazil

Biophilic cities and the Passo Fundo/RS case

Dalla Libera, LT

Universidade de Passo Fundo, Faculdade de Engenharia e Arquitetura, Passo Fundo, Brazil

Urban green infrastructure and the Banhado da Vergueiro Park case, in Passo Fundo/RS

Wednesday, October 4th; 01:45 – 05:00 pm; Building 50
Main auditorium / ground floor

Session 09 - Development of Green Infrastructure in Urban Areas

Chairs: Prof. Dr. Paulo Renato Mesquita Pellegrino and Dr.-Ing. Bernd Eisenberg

03:45-05:00 **Andrade, LMS**

Universidade do Estado do Mato Grosso, Departamento de fitotecnia, Alta Floresta, Brazil

Green infrastructure for smart cities in Amazon Matogressense

Wednesday, October 4th; 05:00 – 06:00 pm; Building 50

Poster

Annex Room / ground floor

Session 09 - Development of Green Infrastructure in Urban Areas

Chairs: Prof. Dr. Paulo Renato Mesquita Pellegrino and Dr.-Ing. Bernd Eisenberg

05:00-06:00

Simon, FW

Pontifical Catholic University of Rio Grande do Sul (PUCRS), Environment and Sustainability Program, Porto Alegre, Brazil

Socio-environmental perception of the Farroupilha Park (Porto Alegre - RS)

Mendes, MER

Architecture, Technology and City Graduate Program, School of Civil Engineering, Architecture and Urban Design, University of Campinas (UNICAMP), Brazil

Phytoremediation: an urban landscape strategy for sustainable and healthy cities

Coutinho, E

Instituto Federal Sul-Rio-Grandense, Química, *campus* Pelotas, Brazil

Production of substrates and organic fertilizers from tree pruning and their use in the production of food and vegetables

Freiberger Junior, J

UFSM, Departamento de Engenharia Rural, Santa Maria-RS, Brazil

"Urban Forest": university extension project to improve urban areas

Wednesday, October 4th; 01:45 – 05:00 pm; Building 50 Auditorium 9th floor

Session 10 - Social and Environmental Responsibility

Chairs: Prof. Dr. Jose Rubens Morato Leite and Prof. Dr. Matthias Schmidt

01:45-02:15 **Keynote Lecture**
Leite, JRM
Professor of Federal University of Santa Catarina, Member of Board of Academy of Environmental Law, IUCN
Payment for environmental services in the context of the National Waste Policy: the case of Florianopolis experience

Keynote Lecture
02:15-02:45 **Schmidt, M**
Beuth University of Applied Sciences - Berlin, Germany Faculty I - Economic and
02:15-02:45 Social Sciences Expert Group on Management and Ethics
Core organizational responsibilities in the context of societal challenges

Lisboa, MV
Pontifícia Universidade Católica, Departamento de Sociologia, São Paulo, Brazil
02:45-03:15 *How to improve environmental and social responsibility: listening to those affected*

03:15-03:45 **Coffe break**

03:45-05:00 **D'Aquino, LS**
Law School PhD student at Universidade Federal do Rio Grande do Sul, Faculdade de Direito, Porto Alegre, Brazil
Enviromental impacts caused by the replacement of breastmilk with synthetic formula: an analysis from the perspective of advertising in a society of consumption

Duarte, OFP
PUCRS, Energy Efficiency Laboratory, Porto Alegre, Brazil
Social and environmental responsability in superior education institutions: a case study of Programa Campus+Verde

Pietzsch,NP
Reciclo Compostagem Urbana, Porto Alegre, Brazil
Re-ciclo: organic waste composting as a solution for urban solid waste management

Henrique, VP
Prefeitura de Porto Alegre, Secretaria Municipal do Meio Ambiente e da Sustentabilidade, Porto Alegre, Brazil
Method for assessing the risk of soil contamination in urban areas

Matschullat, J
Interdisciplinary Environmental Research Centre, TU Bergakademie Freiberg, Freiberg, Germany
EcoRespira-Amazon, contribution to sustainability?

Santos, AP
UNIVATES University Center, CETEC, Lajeado, Brazil
The Plural Sector in the New Urban Agenda: assessing ZURB potential for best practices for independent community organizations

Wednesday, October 4th; 05:00 – 06:00 pm; Building 50
Poster
Annex Room / ground floor

Session 10 - Social and Environmental Responsibility

Chairs: Prof. Dr. Jose Rubens Morato Leite and Prof. Dr. Matthias Schmidt François, DE

05:00-06:00

Karlsruhe Institute of Technology, Institute for Technology Assessment and Systems Analysis, Karlsruhe, Germany

The energy-poverty nexus in rural areas of the Brazilian state of Ceará

Ferraçor, AAG

Universidade de Brasília – UnB, Mestrado em Direito "Internacionalização, Trabalho e Sustentabilidade", Brasília, Brazil

Corporate social responsibility as an institute for maximizing human rights

Benitez, GB

Federal University of Rio Grande do Sul, Department of Industrial Engineering and Transportation, Porto Alegre, Brazil

Industry 4.0 definition and impacts on the environment - a qualitative approach

Fonseca, LR

Fluminense Federal University, Master Degree in Environment Technology, Volta Redonda, Brazil

Tecno-economic evaluation of food waste disposers on a compact wastewater treatment system

Gomes, LA

UFOPA, PPGSND, Santarém-PA, Brazil

Sustainability and higher education in the Amazon: dialogue in construction

Azzolin, CR

Polytechnic of Milan, Urban Planning and Policy Design, Milan, Italy

Is the Porto Alegre sustainable innovation zone moving towards holacracy?

Averbeck, L

Movimento Roessler Para Defesa Ambiental, Novo Hamburgo, Brazil

Movimento Roessler para defesa ambiental - How an NOG is influencing the environmental, social and political life of the city of Novo Hamburgo in the south of Brazil

Squeff, TAFRC

UFRGS, PPG em Direito, Porto Alegre-RS, Brazil

The Brazilian Solid Waste Policy as a way of implementing the SDGs: reflections on sustainable consumption

Michaelis, L

University of Applied Forest Science Rottenburg, Department of Renewable Energy (Bachelor and Master), Rottenburg am Neckar, Germany

Technology without borders: students implement regional sustainability projects in Brazil

Osterkamp, IC

Secretaria do Meio Ambiente, Prefeitura Municipal de Lajeado, RS, Brazil

Environmental education activities in Lajeado, Rio Grande do Sul, Brazil

Wednesday, October 4th; 05:00 – 06:00 pm; Building 50
Poster
Annex Room / ground floor

Session 10 - Social and Environmental Responsibility

05:00-06:00

Chairs: Prof. Dr. Jose Rubens Morato Leite and Prof. Dr. Matthias Schmidt Schwambach, A

Instituto Ivoti, Ivoti, Brazil
Environmental consciousness and ecological consumption as an indicator for environmental projects at school

Helmicki Pedro, K

PUCRS, Faculty of Biosciences, Porto Alegre, Brazil
Training in agriculture and urban composting

Ito, APN

Universidade Estadual de Goiás, Pós Lato Senso em Engenharia, Tecnologias e Sustentabilidade Urbana, Anápolis, Brazil
Urban Sustainability: A discourse approach by spatial scales

Santos, RP

ULBRA - Lutheran University of Brazil, Canoas, Brazil
Urban welfare: going beyond socioeconomic status in school inequalities

Targino, RLO

Universidade Federal do Amazonas, Brazil
Philanthropic organizations in Manaus practical solidarity by population in street situation

Ceron, LP

Pontifícia Universidade Católica do Rio Grande do Sul, FENG, Engenharia Química, Porto Alegre, Brazil
Study of soil contamination by heavy metal derived from emissions from a battery industry

Ceron, LP

Pontifícia Universidade Católica do Rio Grande do Sul, FENG, Engenharia Química, Porto Alegre, Brazil
Energy efficiency in control systems of particulates in the furniture Pole of Ubá

Ceron, LP

Pontifícia Universidade Católica do Rio Grande do Sul, FENG, Engenharia Química, Porto Alegre, Brazil
Energy efficiency in powder collection systems in porcelain industry

Ceron, LP

Pontifícia Universidade Católica do Rio Grande do Sul, FENG, Engenharia Química, Porto Alegre, Brazil
Design of energy efficiency in filter of mangas in the fabrimóveis industry

Ceron, LP

Pontifícia Universidade Católica do Rio Grande do Sul, FENG, Engenharia Química, Porto Alegre, Brazil
Energy efficiency design in ceramic industry sleeves filter

Wednesday, October 4th; 05:00 – 06:00 pm; Building 50
Poster
Annex Room / ground floor

Session 10 - Social and Environmental Responsibility

Chairs: Prof. Dr. Jose Rubens Morato Leite and Prof. Dr. Matthias Schmidt

05:00-06:00 **Marques, JGC**

Federal Institute of Education, Science and Technology of Pernambuco, Professional Master in Environmental Management, Recife, Brazil

Socioenvironmental diagnosis of a ceramic located in the state of Pernambuco, Brazil

Rinaldi, D

PUCRS, Programa de Pós-Graduação em Ciências Sociais, Porto Alegre, Brazil

Labor and income generation in popular classes as in a group of waste pickers

Guth, MC

Federal University of Santa Catarina, Department of Energy and Sustainability, Study Group of Energy and Sustainability, Araranguá,SC, Brazil

Historic, destination and exploitation of urban solid residues in brazil: preliminary studies

Longhi, EM

ICET, Universidade Feevale, Novo Hamburgo, Brazil

The impact of irregular disposal of leather waste on local population: case study in Novo Hamburgo / RS - Brazil

Formighieri, GCJ

Pontifical Catholic University of Rio Grande do Sul (PUCRS), Business School, Porto Alegre, Brazil

Female entrepreneurship of PUCRS

Hoppe, L

Instituto do Meio Ambiente, PUCRS, Porto Alegre, Brazil

Mapping of the environmental behavior of the academic community of PUCRS

Santos, E

Business School, PUCRS, Porto Alegre, RS, Brazil

Female entrepreneurship: non-silent profile of maternal entrepreneurship

Duarte, OFP

PUCRS, Energy Efficiency Laboratory, Porto Alegre, Brazil

Projeto uso sustentável da energia

Duarte, OFP

PUCRS, Energy Efficiency Laboratory, Porto Alegre, Brazil

Energetic and environmental aspects in the replacement of lightning technologies

Duarte, OFP

PUCRS, Energy Efficiency Laboratory, Porto Alegre, Brazil

Measurements evaluation of thermal load reduction

Wednesday, October 4th; 05:00 – 06:00 pm; Building 50
Poster
Annex Room / ground floor

Session 10 - Social and Environmental Responsibility

Chairs: Prof. Dr. Jose Rubens Morato Leite and Prof. Dr. Matthias Schmidt

05:00-06:00 **Melo, SFS**

Pontifical Catholic University of Rio de Janeiro, Department of Civil Engineering, Rio de Janeiro, Brazil

Social and environmental responsibility in civil construction in Brazil: practices and impacts of large infrastructure projects

Blaya, MD

Universidade Federal de Santa Maria, Programa de Pós-Graduação Profissional em Patrimônio Cultural, Santa Maria, Brazil

Efficient measures for a historic future

Tapia, J

Universidade Federal de Santa Maria, GMAS/CTISM, Santa Maria, Brazil

I teach, but do I put it to use?

Kosciuk, VB

Pontifical Catholic University of Rio Grande do Sul (PUCRS) , School of Architecture and Urbanism, Porto Alegre, Brazil

Sustainability and social housing: integration of potential of innovative technology in the development of housing projects – container architecture

Rosa D´Avila, M

Pontifical Catholic University of Rio Grande do Sul, Porto Alegre, Brazil

Sustainability in architecture and urbanism: projects promoted by the Federal Government Program My Home, My Life (MCMV)

Wednesday, October 4th; 01:45 – 05:00 pm; Building 50 Room 2nd Floor

Session 11A - Public Health I: Translational Medicine

Chair: Prof. Dr. Fernanda Bueno Morrone

01:45-02:15 **Keynote Lecture**
Prof. Dr. Lars Zender

Department of Internal Medicine VIII, University Hospital Tübingen, 72076 Tübingen, Germany.

Functional genetic screening and academic drug discovery to improve treatment of patients with liver disease

02:15-02:45 **Keynote Lecture**
Prof. Dr. Ghazaleh Tabatabai

Interdisciplinary Division of Neuroncology, Departments of Neurology & Neurosurgery, Hertie Institute for Clinical Brain Research, Comprehensive Cancer Center Tübingen-Stuttgart, Germany,

Personalizing treatment strategies in Neuroncology

02:45-03:15 **Keynote Lecture**
Prof. Dr. Fernanda Bueno Morrone

Faculdade de Farmácia; Programa de Pós-graduação em Biologia Celular e Molecular; Programa de Pós-graduação em Medicina e Ciências da Saúde, Pontifícia Universidade Católica do RS, Porto Alegre, RS, Brazil

Effect of ATP and P2X7 receptor on gliomas progression

05:00-06:00 **Poster Presentations**

Bittencourt, MM
Centro de Saúde. Universidade Federal de Ouro Preto. Morro do Cruzeiro, Minas Gerais, Brasil

More health program: integrating research and extension: interventions in hypertension, diabetes and cancer

Thursday, October 5th; 08:30 – 11:30 am; Building 50

Main auditorium / ground floor

Session 11B - Public Health II: Academic Expertise in Drug Development

Chairs: Dr. Otávio Sarmento Pieri and Prof. Dr. Stefan Laufer

Keynote Lecture

08:30-09:00 **Prof. Dr. Eliezer Barreiro**

Laboratório de Avaliação e Síntese de Substâncias Bioativas (LASSBio), Instituto de Ciências Biomédicas, Universidade Federal do Rio de Janeiro, Centro de Ciências da Saúde, Rio de Janeiro, Brazil

INCT-INOFAR: a Brazilian Network to Drug Drug Discovery and Development

09:00-09:30 **Keynote Lecture**

Dr. Otávio Sarmento Pieri

Instituto Oswaldo Cruz (FIOCRUZ)

Developing a child-appropriate medicine for treating schistosomiasis: "leaving no one behind" under the Sustained Development Goals (SDG)

09:30-10:00 **Keynote Lecture**

Prof. Dr. Stefan Laufer

Director Baden-Württembergisches Brasilien-Zentrum, Dept. of Pharmacy and Biochemistry, University of Tübingen

Tübingen Center for Academic Drug Discovery TüCAD2

10:00-10:30 **Coffee break**

10:30-11:00 **Keynote Lecture**

Prof. Dr. Stela Maris Kuze Rates

Faculdade de Farmácia (UFRGS) e Instituto Nacional de Ciência e Tecnologia Translacional em Medicina

N-phenylpiperazine derivatives as prototypes for developing drugs for treating cognitive deficits found in schizophrenia and other central nervous system disorders

Oral Presentations

Sena Jr, DM

Universidade Regional do Cariri, Departamento de Química Biológica, Crato, Brasil

Urca and the bioprospection of new drugs within the Araripe Geopark

Barbosa, MLC

Faculty of Pharmacy, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil

Challenges and opportunities in the design of novel protein kinase inhibitors as antitumor drug candidates

Lima, LM

Laboratório de Avaliação e Síntese de Substâncias Bioativas (LASSBio), Instituto de Ciências Biomédicas, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil

Metabolism studies in drug discovery and development process

Thursday, October 5th; 05:00 – 06:00 pm; Building 50
Poster
Annex Room / ground floor

Session 11B - Public Health II: Academic Expertise in Drug Development

Chairs: Dr. Otávio Sarmento Pieri and Prof. Dr. Stefan Laufer

05:00-06:00

Vedovelli, K

Laboratory of Biology and Development of the Nervous System, Faculty of Biosciences, Pontifical catholic University of Rio Grande do Sul , Porto Alegre, RS, Brazil

Can a multimodal physical activity intervention modulate brain-derived neurotrophic factor levels and improve cognition in older women? An exploratory study.

Godoi, RS

Cell and Molecular Biology Laboratory, Biological Sciences Program, Universidade La Salle, RS, Brazil

Hovenia dulcis Thunberg compounds: the role in diabetes mellitus by system-biology approach

Kariuki, L

Institute of Biological, Chemistry and Nutritional science (140a), University of Hohenheim, Garbenstraße 30. 70599 , Stuttgart, Germany

Goettert, MI

Laboratório de Cultura de Células, Programa de Pós-graduação em Biotecnologia, Universidade do Vale do Taquari- UNIVATES, Lajeado, Brazil

Compound HPHY as a potent p38δ mapk inhibitor

Thursday, October 5th; 08:30 am – 06:00 pm; Building 50
Auditorium 9th floor

Session 12 - Environmental Law and Ethics

Chairs: Prof. Dr. Ricardo Timm de Souza and Prof. Dr. Ricardo Timm de Souza

08:30-09:00 **Keynote Lecture**

Prof. Dr. Ricardo Timm de Souza
School of Humanities (PUCRS)

09:00-09:30 **Keynote Lecture**

Prof. Dr. Thomas Potthast
International Centre for Ethics in the Sciences and Humanities (IZEW), University of Tübingen

Sustainable development, moral pluralism, and interdisciplinary ethics – challenges for theory and practice

09:30-10:00 **Oral presentations**

Waldman, RL
UniRitter – Laureate Internacional Universties, Master in Law Program and Pontifical Catholic University, School of Law. Porto Alegre, Rio Grande do Sul Brazil.
Human rights and the SDG

Moreira, RMC
Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Doctorate in Law, Porto Alegre, Brazil
The Judicial review of sustainability of administrative decisions

Marchesan, AMM
Federal University of Santa Catarina, Doctorate in Environmental Law, Florianópolis, Brazil
Resilience and sustainability – emerging principles of environmental law in the anthropocene epoch

10:00-10:30 **Coofee break**

10:30-11:30 **Oliveira, N**
PUCRS, Philosophy Dept, Porto Alegre, Brazil,
Biosafety, public health, and social environmental responsibility: a normative reconstruction of sustainability

Ferreira, LC
UFMG, Faculdade de Letras, Belo Horizonte, Brazil
"It's not just a planet, it's a womb. #maenatureza #naturemother" "She looks like me. Amidst the adversities of life. #MãeNatureza"

Fagundez, GT
Universidade Federal de Santa Catarina, Pós-Graduação em Direito, Florianópolis, Brazil
Scientific domination and transgenic animals: an analysis based on the oncomouse's patentability in Canada

Thursday, October 5th; 01:45 – 05:00; Building 50
Main auditorium / ground floor

Session 13. Binational Programs and Cooperation

Chair: Dr. Martina Schulze

Keynote Lecture

01:45-02:15 **Dr. Martina Schulze**

German Academic Exchange Service DAAD

DAAD's contribution to the german-brazilian academic exchange

02:15-05:00 **Oral Presentations**

Prof. Dr. Abilio Baeta Neves

CAPES

Winkler, K

German Research Foundation, DFG office Latin America, Sao Paulo, Brazil

Status quo and perspectives for bilateral research collaboration between Brazil and Germany

Marques, CL

UFRGS, Porto Alegre, Brazil

Center for German and European Studies - CDEA: an opportunity

Wasser, N

Merian Centre Conviviality in Unequal Societies, São Paulo, Brazil

The merian centre conviviality in unequal societies: perspectives from Latin America

Weichert, MA

German House for Research and Innovation – São Paulo (DWIH-SP), São Paulo, Brazil

The role of the german house for research and innovation in the german-brazilian cooperation

Jungbluth, K

Europa-Universität Viadrina, Department of Language Use and Contrastive Linguistics, Frankfurt (Oder), Germany

Ethnicity in motion. Converging GER-BRA PhD procedures

Lobo Netto, M

Escola Politécnica da USP, International Relations Commission, São Paulo, Brazil

EPUSP Double Degree Experiences with German Engineering Schools

Freitas, MS

Federal University of Rio de Janeiro (UFRJ), Medical Biochemistry Institute Leopoldo de Meis

Exzellenz verbindet – be part of a worldwide network

Fernandes, PRB

Federal University of Rio Grande do Sul, Chemical Engineering Department/Faculty of Engineering, Porto Alegre, Brazil

REBRALINT: An initiative to strengthen Brazilian-German academic cooperation

Seferin, M

Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Faculty of Chemistry,Porto Alegre, Brazil

Sustainable use of fish and seafood as well as efficient and safe processing for the food industry

Thursday, October 5th; 05:00 – 06:00; Building 50
Poster
Main auditorium / ground floor

Session 13. Binational Programs and Cooperation

Chair: Dr. Martina Schulze

05:00-06:00

Palheta, RP
Adriano Jorge Hospital Foundation, Department of Education and Research, Manaus, Brazil
International cooperation for the development of the amazon: study on german cooperation agencies in amazonas state

Novaes, AF
Institute of International Relations, University of Brasilia, Brasilia, Brazil
Cooperation for sustainable develpment between germany and Brazil: a critical approach.

Friday, October 6th; 10:30 am – 04:00 pm

Visit

Center and historical heritage of Porto Alegre

The Historic Center was created and designed in 1959, but its origin dates back to the beginning of the settlement of Porto Alegre. The establishment of the parish of Nossa Senhora da Madre de Deus in 1772 was very important to the settlement and development of the region, which includes Rua dos Andradas, which still today is called Rua da Praia, its original name. The stories and traditions of its inhabitants have played a major role in the conception of the region's churches. The construction works of the Metropolitan Cathedral began in 1794, but it was only completed in the 19th century, with the design of its two towers in 1846. In the so-called Parallel 30, at the Montevideo Square, lies the Porto Alegre Municipal Hall, the official seat of the government of Porto Alegre, whose construction began in 1898. In its surroundings, lies the Talavera Fountain, a fountain donated by the Spanish community through the Spanish Society of Mutual Aid, in tribute to the 100th anniversary of the Farroupilha Revolution. Across from the building, lies the Public Market, whose construction works began in 1844, as an area for trade and leisure for the population. The Center offers a wide variety of services and entertainment activities, most of which bringing history and culture together.

Friday, October 6th; 8:00 am – 7th – 08:00 am

Visit

Pró-Mata Center for Research and Nature Conservation/PUCRS

The Pró-Mata Project has been conceived from the need to create a natural reserve for research and nature conservation. The project began in 1991 at the Pontifical Catholic University of Rio Grande do Sul, in cooperation with the University of Tübingen, Germany. An area of primary and secondary Atlantic forests, with small patches of natural grasslands, has been chosen for the project. Despite many years of exploitation, most natural areas are well preserved. On October 5, 1994, a special event marked the laying of the cornerstone of the headquarters, in an area overlooking the coastal areas of the South of Brazil. In April 1996, the project was officially inaugurated by then PUCRS President, Norberto Francisco Rauch, under the name PRÓ-MATA Center for Research and Nature Conservation. From its inauguration up to now, the research center has received more than 500 researchers and countless students from many countries, who have developed nearly 200 research projects in the area, some of which are still in progress.

Friday, October 6th; 08:00 am – 08:00 pm

Visit

Lagoa do Peixe National Park

The Lagoa do Peixe National Park (LPNP) was created in 1986 on the coastal plains of the southernmost state of Rio Grande do Sul, in Brazil. This lagoon of very shallow waters (<1m) is around 35 km long and just 1 km wide (average). A channel, usually open during the winter, connects the lagoon to the sea. The level of salinity can vary from almost zero on the northern-southern tips of the lagoon, to highly saline waters (>35 mg/L) in central areas during the summer. The area very attractive for water birds due to the large number of invertebrates om exposed shores. It is regarded as one of the most important areas for migratory shorebirds in South America, with ± 200 species of birds identified, including terrestrial, marine and migratory ones.

(http://g1.globo.com/rs/rio-grande-do-sul/nossa-terra)

Friday, October 6th; 08:00 am – 08:00 pm

Visit

Coastline and archaeological sites

The archaeological sites (shell mounds) we are going to present to you in this trip are located at the coastal region of Rio Grande do Sul and are locally known as Sambaquis, their name in the Tupi language. They can be found in the coastal regions of the South and Southeast, from the coast of the State of Espírito Santo up to Rio Grande do Sul. The earliest findings were found in the states of Rio de Janeiro and São Paulo, and indicate that they have been around since as far back as the 6 BC. The Sambaquis can be found in coves, sandy plains dominated by beach-ridges, rocky outcrops, mangrove groves, lagoons, estuaries or large bays. This landscape variability is equally expressed both in the material culture and resource exploitation, which are characterized by a variety of adaptive strategies and diversity between the various cultural contexts.

(Prof. Dr. Klaus Peter Kristian Hilbert)

Friday, October 6th; 08:00 am – 06:00 pm

Visit

Osório wind farm

The field trip to the city of Osório aims to present cutting-edge experiences in the area of renewable energy generation. The complex of the Osório Wind Farm Project was inaugurated in 2006. It consists of three parks – Osório, Sangradouro and Índios – and is responsible for energy production estimated at 425 GW / year, which is equivalent to home consumption for 650,000 people. Environmental contributions (such as reduction of carbon dioxide emissions, compensatory measures and environmental education) and socioeconomic ones (such as an energy and food production consortium, increased tourism, collection of taxes for the local government, generation of income and professional staff development) are some of the positive aspects of the impact of the implementation of the Osório Wind Farm Project in the region.

(http://www.osorio.rs.gov.br)

Abstracts

Oral and Poster presentations

Session 01: Ocean Research

Conveners:

Prof. Dr. Peter Hackspacher[1], Prof. Dr. Martin Zimmer[2]

1: Instituto de Geociências e Ciências Exatas (UNESP)

2: Leibniz-Centre for Marine Tropical Research (ZMT) and University of Bremen

Oceans are resources, supplied by the natural environment and are used intensively by the human society. The rising awareness in Brazil of more than 8.000 km of coast combined with the latest findings of giant Oil and Gas deposits seeks for a sustainable development. Germany on the other hand is using the Ocean resources and has developed research programs, such as Future Oceans, that are concerned with the sustainable use of Oceans. The talks should describe the Ocean resources, their use in human societies, and provide information on the sustainable use in the future.

Oral presentations

Session 1

Is exploitation of natural resources sustainable in coastal and oceanic regions? A geological perspective in Brazil.

Hackspache, P

São Paulo State University (UNESP), Institute of Geosciences and Exact Sciences, Campus Rio Claro

Half the people on Earth live within 200 kilometers of coastal regions, are dependent on the massive saltwater ecosystem that covers nearly three-fourths of our planet. Sustainably in such context is understood as production of life's essentials, including water, food, and even the oxygen we breathe every day. The ocean helps create and regulate weather around the globe. How to discuss exploitation and manage geological raw materials in such a context? Three billion people whose livelihoods depend directly on coastal and marine eco- and geosystems. The sea's bio- and geodiversity is astounding. Some seafloor eco- and geosystems are remote and inaccessible and, on the other hand the natural resources are not inexhaustible . How to deplete the resources without affecting the weak ecosystem? Enric Sala, an ocean ecologist, said. "A healthy ocean means healthier humans, more food on our tables, more jobs, and a healthier economy." How to manage this? This complex algorithm has to consider the : i) Needs and technology in ore production and; ii) Sustainable explotation. **i) Needs and technology in ore production:** Besides the increasing demand for protein for the humanity we have to consider the necessity of energy and raw materials for the construction and tecnologycal uses. One side the advances in our technology are solving energetic (oil and gas) and constructions questions but introducing problems in the semiconductor and other areas. For this technology the answer come from the Rare Earths Elements (REE) coming from local mines in the continent, but with huge perspective in coastal and oceanic regions. Some studies estimate that the brazilian coast present huge amounts of such ore. How to use them? **ii) Sustainable explotation:** Today's ocean managers needs to challeng for cooperate internationally and use scientific knowledge for such explotation. Regulation and well-managed explotation of natural resources can support the needs of all inhabitants. This can be accomplished by implementing tools such as: strict explotation areas, marine reserves and protected areas of sensitive fauna and flora. **Exploitation of natural resources. The policy to be used:** The sustainable development in Brazilian coastal and oceanic regions needs to be observed with a political, social and an economic focus. The economic use of natural resource must be related to a sustainable development policy. Focusing geological resources as: REE, raw materials for the construction, oil and gas, sulfides, manganese oxides, hydrates and others. For a rational exploration we have to consider the Needs and Sustainable Use without compromising the ability of future generations to meet their own way. Sustainability has to consider the interaction of three items: environment, social and economics.

Borders of ocean research: the coasts

Zimmer, M[1]

1: Leibniz Centre for Tropical Marine Research, Dept. Ecology, Bremen, Germany, martin.zimmer@leibniz-zmt.de

"The ocean" does not only encompass the open sea, but also the shelf and the coastal zone. "Ocean Research", however, is commonly considered studying the open sea, and mostly so on large spatial scales. Prominent topics are waves and currents, such as the Benguela current off Southwest Africa (East Atlantic) or the North Brazil current, deflecting the huge amounts of the Amazon efflux at the Northern Brazilian Atlantic coast (West Atlantic) northwards and connection the southern and northern Atlantic. Marine resources, such as seafood, oil, minerals, etc., and their exploitation represent another field of interest to ocean research. Approaching the shelf, and particularly the coast, complicates many of the issues studied by ocean research. Currents become more difficult to model and predict; marine influences become increasingly counteracted by terrestrial influences; marine resource-use falls within national exclusive economic zones and under national legislation and jurisdiction; environmental impacts of any kind more directly affect human societies and settlements – in brief, when it comes to human needs: people live on the coast not the open sea! Coastal ecosystem –reefs, seagrass beds, saltmarshes and mangroves– provide numerous services to human societies, both locally and globally, by this contributing to human wellbeing and livelihood. Thus, they produce ample natural resources and buffer potential impacts of storm surges (along with buffering impacts of land-based human activities on the ocean), protecting coastlines from erosion. Maybe most importantly, they mitigate greenhouse gas-driven climate change by sequestering and storing huge amounts of carbon ("blue carbon") and nitrogen in their biomass and their sediments. These coastal ecosystems and stretches, on the other hand, are connected by coastal and oceanic currents – even beyond ocean basins (W-Africa and E-South America). Thus, understanding the ocean and how it may affect human wellbeing and livelihood requires a comprehensive approach of investigating all compartments and multiple disciplines, from physics to chemistry to biology to engineering to economy to social sciences and humanities.

The new implementing agreement under UNCLOS and the feasibility of global Marine Protected Areas

Squeff, TAFRC[1]; Loss, FB[2]

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It is known that in the last decades the fishing industry has been reducing the living resources of the sea to extremely fragile levels, threatening the habitat of several unique forms of life. Beyond doubt, the marine biodiversity is essential for the balance of the whole Earth's environment and, thus, for humankind. Aware of the existing gaps in the international regime concerning the 'conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction', a Working Group under the auspices of the UN General Assembly started to elaborate proposals for an additional implementing agreement under UNCLOS. Its intention is to readjust the Convention's general provisions on the protection of the marine environment to the currently growing threats to marine biodiversity. The main guidelines were defined in 2011, outlining a group of vital issues to be addressed, such as marine genetic resources, benefit-sharing, area-based management tools, environmental impact assessments, capacity-building, transfer of marine technology, and marine protected areas (MPAs). Even though some might claim that the role of a new agreement in relation to MPAs could be contentious, in part because several existing agreements already provide for the same kind of protection, the supporters of a new treaty argue that these agreements, frequently regional ones, are not sufficient to create a globally representative network of genuinely protective areas. Thus, those who are in favor of a new agreement affirm that new rules are needed to create a groundbreaking system, coordinating an international set of procedures for the designation of multi-purpose MPAs at the global level, and recognizing the adequacy of regional or sectorial protected areas as well. Moreover, this new framework must include an official criterion to guide existing competent bodies to identify, establish and manage MPAs. In this sense, it seems essential to focus on such debate, especially if it embraces the elaboration of a new binding treaty on the matter – a document that should consider four basic international law principles such as 'the benefit to humankind', 'the intergenerational equity', 'the common but differentiated responsibility' and 'sustainable development' to guide the application of its rules. This way, the international community would also fulfill adequately the 14th sustainable development goal, which relates to the conservancy and the sustainable use of oceans, seas and marine resources, directly working for the protection of the planet and the prosperity for all. After all, the careful management of this essential global common resource is undeniably a key feature of a sustainable future.

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Lagrangian coherent structures applied on the coastal management of Santos Bight (SP, Brazil)

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The region of interest consists of the inner continental shelf of Southeast Brazil roughly limited to the coastal zone off Santos, a region embracing state marine parks and sanctuaries for marine life conservation and management. It also shelters the largest port complex in Brazil, the Port of Santos, consisting of cargo and passengers terminals, steel works and a petrochemical industrial pole. Port related activities such as dredging operations, barge traffic and near shore berths impose permanent threatening on those sites. The rationale of this study is to analyze and interpret the adjacent coastal ocean circulation as an environmental management resource. On defining Lagrangian coherent patterns, one is capable of evaluating the major routes and gates where pollutants can disperse in the water, such as drifting oil, sediment plumes and others contaminants. For determination of those patterns, we applied the concept based on the kinematic dissimilarity of fluid trajectories (Schlueter-Kuck and Dabiri, 2016), an alternative method to those based on the ridges of finite-time Lyapunov exponents (Haller, 2001). The numerical modeling of the regional circulation was evaluated throughout the year 2015 and provided the Eulerian flow field from the global HYCOM+NCODA Ocean Reanalysis (U.S. Navy and the Modeling and Simulation Coordination Office). The patterns of coherent structures define some potentially endangered regions, as the State Marine Park of Laje de Santos, when considering paths traced from the berths. Coherent structures that emanate from the coastal area, under the influence of the port, have a mild link to the marine reserves, although they can impose relative risks to beaches and estuaries. The obtained Lagrangian structures can elucidate and subside the interpretation on water contamination of endangering and special interest sites.

Carbon leakage from the deep sea

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Marine sediments store large quantities of organic carbon derived both from the drainage basins of rivers on land and from life in the oceans. The Amazon is the world's largest river, from which sediment supply to the Atlantic Ocean has resulted over the last millions of years in the build-up of a vast deep-sea fan up to 10 km thick. Since the last glacial maximum (ca. 24,000 years before present), the fan has accumulated a mass of organic carbon comparable to that contained in the presentday Amazon Forest. Over geological timescales, the process of sedimentary burial in the Amazon and other marine depocentres sequesters organic carbon, but also allows microbial methanogenesis to convert some of it to mobile methane. Methane moving through sediments may be oxidized and converted into CO_2, trapped as dissolved or free gas or, where stability conditions permit (in water depths greater than 500 m), as gas hydrates. Reservoirs of gas hydrates are favoured by high sedimentation rates, and it has been suggested that the Amazon and other rapidly deposited deep-sea fans are net carbon sinks. Here we present evidence that carbon stored in and beneath gas hydrates is escaping to the ocean through seafloor venting features. The distribution of these features suggests them to form along faults created by the gravitational collapse of the fan, and along the upper limit of the gas hydrate stability zone in response to changes in pressure (depth) and/or temperatures influenced by climate. Our findings support recent studies suggesting that seafloor gas venting in deep-sea settings where gas hydrates are stable is a more widespread phenomenon than previously recognised, suggesting estimates of global methane emissions to be conservative. A more accurate knowledge of seafloor methane emissions is thus of paramount importance for our understanding of the effects of on-going climate-driven changes on ocean processes, as well as for the effective management of marine resources.

Using public data for geophysical ocean research: South Atlantic Ocean

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Multiple sources of public datasets can be find available on the internet. In relation to geophysics, these sources can be very usefull for oceanic researches. The main goal of these work is to show possibilities of applying public data in different geophysical methodologies, including for Pre-salt exploration and for investigation of the Rio Grande Rise. Although the examples are presented to the South Atlantic Ocean, the idea can be expanded also to other oceans. The advantages of focusing on the use of this type of date are manifold: to decrease coasts; to optimize the research time (since only computational tools are needed for this); and mainly, to reduce the impacts related to marine acquisitions. Constantino (2016) has presented an efficient method that provides valuable information of geophysical data in offshore regions with structures favourable to hydrocarbon accumulation. The author was able to determine salt structures in the Santos basin with only free data. Likewise, Constantino et al. (2017) have presented a model of the ocean basement using public gravity data from Sandwell et al. (2014), bathymetry measurements from ETOPO 1 (Amante and Eakins, 2009), and sediment thickness information from National Geophysical Data Center (NGDC) (Divins, 2003), all available online. In these work, we show the main results and scientific impacts from Constantino (2016) and Constantino at al. (2017) aiming to stimulate future academic works who not only use available data as the main source, but who also concerns with the sustainable use of the Oceans.

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Investigation of magnetotactic bacteria in sediment samples from Brazilian aquatic environments

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Magnetotactic bacteria (MTBs) are prokaryotes that have an ability to guide and migrate along the lines of an external magnetic field. Such skill is based on the existence of magnetosomes, magnetic nanocrystals arranged in chain formation, located in its cytoplasm (Blakemore ,1975). Novel discoveries have revealed the great potential of magnetotactic bacteria to several biotechnological applications (Bazylinski and Schübbe, 2007). In this sense, a discovery and isolation of new strains of MTB from different ecosystems of the planet has stimulated a search for more knowledge about their ecological role, environmental implications and the possible utilities of this biogeochemical process of orientation. The project proposes the investigation of MTBs in samples of distinctive locations in Brazil including deep marine and fresh water sediments. The microbial enrichments were performed applying a strong external magnetic field in order to concentrate MTBs from sediment samples. The color change of the sediment near the magnetic pole indicates de presence o bacteria driven by the external field. The concentrated sediment was then subjected to a race track purification. The purified fraction was submitted to observation under optical microscopy, extraction of total DNA, amplification of the 16S ribosomal gene, and deep sequencing analyses. The DNA extraction, amplification and deep sequencing steps of the first enriched samples (from Foz do Amazonas Basin) were successfully performed. It was possible to identify eleven operational taxonomic units (OTUs) occurring in the sediment, with the genera *Halomonas* and *Bacillus* as the most abundant. New experiments and subsequent molecular analyzes of these microbial communities, as well as from Rio Doce (MG) sediment samples, are being carried. MTB cultures and characterization of their nanocrystals by electron microscopy are also in progress. It is expected that the project results may present high scientific impact on areas such as biodiversity, environment and biotechnology.

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Characterization of methanotrophic bacteria from deep sediment samples collected at the Foz do Amazonas Basin (Brazil)

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Environments of deep marine sediment contain several microbial species that are metabolically active [1]. Methanotrophic bacteria are microorganisms able to oxidize methane and often reported as very frequent as taking part of these communities [2,3]. These species are essential for the cycling of methane, which is a gas with a great environmental relevance and also represents a rich energy source. In this context, the aim of the present study is to search for and characterize metanotrophic bacteria from samples of deep marine sediment (1,800 m of water column) collected at the Foz do Amazonas Basin in 2015 by the IPR/ PUCRS. The samples were cultured in NMS broth with a 50 mL methane injection (in 20 mL vials) and incubated for 22 days at 30ºC and 120 rpm. A dilution to extinction strategy was performed from these cultures and after 26 days the last dilutions were plated on NMS-agar with methane injection. All culture media had methane as the sole carbon source. The colonies obtained were evaluated morphologically and their individuals characterized under optical microscopy (1000x) after Gram staining. The enriched broth cultures were submitted total DNA extraction used for PCR amplifications of 16S ribosomal genes and methanotrophy markers. The employed culture system provided 14 isolates, most of them Gram-negative bacilli. Total DNA purifications from broth samples were successfully performed and the PCR reactions efficiently amplified the 16S rRNA genes from the bacterial species selected under this methane-based culture conditions. New PCRs are in progress, employing different primer pairs designed to search for genes coding for the enzyme methane monooxygenase (MMO), which are methanotrophy genetic markers. These preliminary data indicated an efficient achievement of microbial isolates from deep sediment samples of Foz do Amazonas Basin using the dilution to extinction strategy. Such isolates are putative methanotrophic bacteria that will be soon taxonomically identified. The results also showed the feasibility of total DNA extraction and PCR amplification from enrichment cultures performed with samples of this unexplored Brazilian marine environment.

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Poster presentations

Session 1

Mineralogical variations and provenance of quaternary sediments from the Amapá continental slope, Foz do Amazonas Basin, Brazil

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The mineralogical characterization of deep-water sediments, together with other analysis, enables the observation of possible variations in the source area, in the oceanographic patterns and in the climate of the studied area (Fagel, 2007). This work aims to characterize and quantify the mineral variations along sediment cores from Amapá continental slope, northernmost Brazilian continental margin, in the Foz do Amazonas basin. Since the study area is located beside the western border of the Amazon fan, and the predominant oceanographic currents flow westwards, the area has been influenced by the Amazon river discharge. Thus, variations in the sediment mineral content may reflect variations in the river discharge and in the inland climate through time. Sediment samples from piston cores are predominantly muddy and were collected in water depth of 1660m and 2200m. In order to identify the mineralogy, X-ray diffraction analysis were performed for the total sample and for the clay fraction (<4μm), including oriented slab, ethylene glycol solvation and 500°C heating analysis. Using the Rietveld quantification method, the mineral phases were quantified. Illite and chlorite (I+Ch) are typical clay minerals from low-weathering regions, and they are associated with Andean sources. Kaolinite and smectites (K+S) are typical high-weathering clay minerals and they are formed in the Amazon plains (Debrabant *et al.* 1997, Guyot *et al.* 2007). In the studied sediments kaolinite and smectite predominate, this is due to the proximity of the source area. Nevertheless, along the core the amount of clay mineral variates. The amounts of I+Ch and K+S show opposite patterns, when one is high, the other is low. Thus, the degree of source area weathering intensity varies along the core. This variation may be indicating climatic oscillations through time, represented by changes in the humidity inland, in the source areas. The next step of the study is to date the sediment to determine the age of these climatic changes.

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Morphological and biochemical characterization of yeast isolates obtained from deep-sea sediment of the Pelotas Basin (RS, Brazil)

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Different species of unicellular fungi, called yeasts, have been broadly used in fermentation processes along centuries. Most yeast species are still undescribed, especially in unexplored areas as deep-sea regions, which are considered hot spots for the discovery of new molecules. Between 2011 and 2013 the CONEGAS project (PETROBRAS-PUCRS) promoted four oceanographic campaigns that identified the occurrence of gas hydrates [1] and a methane-based chemosynthetic community [2] in a cold seep area located at the Pelotas Basin (Brazilian South western Atlantic). Several deep sediment samples (water depths from 800 to 1800 meters) were collected and used for microbiological analyses, from which 10 yeast isolates were obtained and evaluated morphologically and biochemically. The characterization of colonies (macroscopically) and yeast cells (under 1000x optic microscopy) was performed. Biochemical assays evaluated the assimilation of nine different carbohydrates, as well as the ability to grow in biodiesel-derived crude glycerol (2% and 5%) and in methanol (2%). Cultures were developed for 96 hours at 25°C, with observations of turbidity at 12h intervals. The obtained yeast colonies presented similar morphological characteristics and the microscopic observation indicated they all presented an oval shape with a unipolar budding pattern. Except for one single isolate in the Arabinose medium, all isolates were able to grow using all the different carbohydrates. Although none of the isolates survived in 2% methanol medium, eight of them presented an efficient growth using crude glycerol at 2% and 5% as sole carbon source. The biochemical data indicate wide metabolic abilities for these microorganisms, which may represent an interesting potential for future biotechnological applicability. In addition, most of the isolates presented different levels of carbohydrate and glycerol utilization, indicating they may represent different yeast species. Since marine yeasts are still poorly described, interesting novelties regarding the biochemical description of such microorganisms are of great interest. New biochemical experiments, with lower methanol concentrations, and the taxonomic identification of the isolates, using the sequencing of the large ribosome subunit (26S), are in progress.

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Session 02: Agriculture and Food Safety

Conveners:
Prof. Dr. Leandro Astarita, Faculdade de Biologia (PUCRS)
Prof. Dr. Georg Cadisch, Institute of Agricultural Sciences in the Tropics (Hans-Ruthenberg-Institute), University of Hohenheim

Bridging examples from the field of agriculture and food safety provide information on issues already established and studied by research projects of sustainable interaction between natural resources and processes and demands of human societies. The talks shall provide information on analytical tools that help to retrieve necessary information for decision makers that have to implant managing systems, define economic behaviours and formulate and change necessary judicial systems to initiate and provide the legal base for sustainable development.

Oral presentations

Session 2

Plant growth-promoting bacteria: a tool for agricultural management

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Plants can be attacked by a variety of organisms including viruses, bacteria, fungi, oomycetes, nematodes, and insects. Plants respond to infection/attack using the innate immune system that is able to protect plants and allow them to survive and growth. Interactions between plants and non-pathogenic microorganisms, such as rhizobacteria, lead to improve the plant immune system and plant growth. Detection of pathogen-associated molecular patterns is an important component of non-host resistance in plants and serves as an early warning system for the presence of pathogens. These elicitors induce resistance by enhancing the plant defensive capacity. In this context, a detailed understanding of plant immune function will underpin crop improvement for food, fiber and biofuels production. Rhizobacteria: A promising approach to assist in the management of plant diseases is the use of non-pathogenic rhizobacteria for plant protecting and growth. *Eucalyptus* are economically important woody species, especially as a raw material in many industrial sectors. Plants previously colonized with *Streptomyces* PM9 and then challenged with *B. cinerea* showed changes in the activities of polyphenol oxidase and peroxidase as well as in the levels of phenolic compounds. The establishment of gray mold was significantly delayed in *E. grandis* plants colonized by PM9. These results demonstrate the action of PM9 in inducing plant systemic resistance, making this organism a potential candidate for biological control in *Eucalyptus*. In another study, soybean seeds were bacterized with isolates for testing growth promotion. The *Streptomyces* CLV45 was the most efficient in IAA production. The compound Pyocyanin was detected in all rhizobacteria. CLV42, CLV44 and CLV45 were selected by their PGPR traits for the growth promotion assay. CLV45 significantly increased shoot growth and dry mass. This rhizobacterium is a promising candidate to be used as biofertilizer. The *Streptomyces* PM3 was the isolate showing efficient antagonism against the pathogen Pcb (*Pectobacterium carotovorum* subsp. *brasiliensis*). Treatment with *Streptomyces* spp. modulated the activity of defense-related enzymes and decreased the incidence of soft rot disease. PM5 was able to promote growth of tomato plants, although decreased incidence and mortality of plants were obtained with PM1, indicating that both strains could be used as PGPR. Elicitors: Another strategy to avoid crop losses and reduce the use of pesticides is the employment of biotic elicitors to stimulate the plant innate immunity. Our group has been working with biotic inducers showing the ability to promote plant resistance. The most promisor is a product named XTH (CN102256495A; US8932844B2). Formulations with XTH were capable of inducing defense responses in potato plants via both salicylic acid and jasmonate pathway. Afterwards, tests using an autoclaved extract of XTH showed that the defense responses triggered by this elicitor efficiently delay the progression of black leg disease caused by *Pectobacterium carotovorum*. Plants of potato were sprayed with XTH and inoculated with the pathogen *P. carotovorum*. Results showed that 78% of control plants sprayed with water were dead after 48 days. However, in the treatment with XTH, death symptoms were observed only 71 days after pathogen inoculation, resulting in only 20% of death. The XTH is a natural product of the bacterium *Xanthomonas* and this product increases the metabolism related to the natural plant defense. We envision the use of XTH as a tool for potato crop management.

Sustainable agricultural intensification: challenges and need for an integrated socio-ecological approach

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Global food demand is expected to increase 60% by 2050 compared with 2007. However, producing adequate food of sufficient quality to meet this global demand is a major challenge exacerbated by changes in food habits and future climate change impacts. Options to increase food production include expansion of agricultural area, agricultural intensification and recuperation of degraded land. However, expansion of agricultural land is limited due to available productive land. Thus, further agricultural intensification is needed to fill the food gap. Several studies argue that it is possible to meet projected global food demand on existing agricultural land by narrowing gaps between actual farm yields and yield potential of the corresponding sites. Particularly, in Sub-Saharan Africa (SSA) large yield gaps exist for several crops. However, recent studies estimate that it will not be feasible to meet future SSA cereal demand on existing production area by yield gap closure alone. Traditionally, a large part of the extension of agricultural area has been facilitated by deforestation. The shift from tropical forests and traditionally managed swidden agriculture to monocrop maize production in marginal areas and large-scale rubber or oil palm monoculture further has resulted in a loss of ecosystem services (ESS) and significant changes in ecological functions, socio-economic conditions and human welfare. For example, rubber cultivation represents a profitable opportunity for smallholders, but the abandonment of traditional land use systems in favour of a single tree crop implies a higher liability to climatic, disease and economic risks without flexibility for rapid adaptations. Furthermore, rubber monocultures reduce agrobiodiversity of traditional land use systems and affect pollinator services for relevant food crops, as well as enhancing erosion and greenhouse gas emissions. Thus, while the recent rapid expansion of rubber has greatly improved the livelihood of many smallholder farmers the impact of associated land use change and market price fluctuations have also affected their food security and let to trade-offs with environmental services. Furthermore, plantation crops, like rubber, are increasingly competing with upland food crop production areas. On the other hand, degradation of soils and the environment through erosion and sediment loads into streams is less severe for plantation crops, or other agroforestry options, compared to the severe impact from the current expansion of annual monocultures in humid tropical uplands. Thus, there is a need to develop sustainable intensification strategies which take into account the socio-agroecological conditions, and employ a critical ESS trade-off analysis taking into account a range of relevant ESS and a transdisciplinary approach.

The handling of pesticides: lessons from Germany to Brazil

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Brazil is the bigger pesticide consumer in the world. With the promise of fast economic growth and development, the country has exposed the population to great risks of chemicals contamination. The chain of contamination starts at the production, going through transport, retail, handling, application and consumption. It is discussed the excess of its use on agriculture, the importance of organic farming, food safety, etc. However, few debates has been conducted to define the best possible way of handling pesticides directly by farmers – a reality that needs to be faced, while national policies don't encourage alternative methods of production. Therefore, this study is proposed to analyze foreign legislation, experience and practices in this subject, and it is based in legislation changes made by the European Parliament and the Council of the European Union, in the Directive 128/2009/EC, followed by the German National Action Plan to Sustainable Use of Pesticides. The main goal of this proposal is to think over the rules in EU, especially in Germany, that regulate the handling of pesticides directly by farmers (with little or none protection). This analysis will also serve as an example to Brazil. Today, the law 7.802/1989 regulates the use of pesticides in Brazil. Nevertheless, this rule does not detail the cares and precautions requested when handling with pesticides. There is no specific legislation about this issue. Therefore, this study aspires to propose a suitable standard rule in Brazil, based on the international experience.

What are the possibilities for energy savings during fruit storage?

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Rapid cooling during the initial phase of storage is essential to maintain fruit quality. The highest energy usage is required during this phase. The effectiveness of fruit heat removal is highly dependent on the air flow volume of the cooling fans, room geometry, and cooling unit. However, during storage period the energy demand decreases to 10% compared to initial cooling. The development of new storage technologies like ultra-low oxygen, dynamic CA storage and 1-MCP treatment in combination with elevated storage temperatures allow significant energy savings during storage. These strategies ensure the maintenance of fruit quality at elevated storage temperatures (1 to 3°C). Elevated storage temperatures can enable a reduction of energy consumption of 20 to 40%. For 'Pinova' apples, elevated storage temperatures additionally might be an effective way to reduce the occurrence of postharvest *Gloeosporium spp.* The optimization of airflow with air deflectors and evaporator sealing-off did not enable reduced energy consumption during fruit storage. Changing the stacking plan in an apple storage room showed ~10 to 15% energy savings with 10cm gaps compared to block stacking during initial cooling to remove field heat. After initial cooling, the effect of stacking plan on the energy consumption was lower. Alternating current compared to electronically commutated motorized cooling fans showed a >20% reduction in energy usage at full power (100%). This difference increased to 27% if the fans operated at partial load (50%). Open questions remain about the interactions of room isolation and room position within the packinghouse system. Advances in isolation materials for storage room doors have a promising potential to save energy. Legislation for environmentally friendly cooling refrigerants raises further scientific issues and the need to find appropriate refrigerants and cooling systems. Potential energy savings due to the optimization of cooling systems in commercial storage facilities are described.

Livestock production in the Amazon: prospects on the use of new technologies for cattle and buffalo production

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Livestock production in the Amazon basin in the last decade has strongly contributed to the expansionary scenario of animal production in Brazil. The bovines' herd of the Legal Amazon represents 36.95% of the national herd of 210 million of bovine. In order to show the local changes in livestock activity, four (4) studies were carried out focusing on the municipalities of Monte Alegre, Santarém and Itaituba. The first study focuses on the spatial analysis of land use and land cover based on two periods, the years 2001 and 2014 and the changes in land use and land cover in this interregnum, associated with the analysis of deforestation in the period, and the correlation between economic data and deforestation. The second study investigated the way cattle farming is practiced in the Lower Amazon region of Pará, considering three (three) strata of breeders: small, medium and large. The third study sought to verify the behaviour of soil fertility and microbiological attributes in five (5) different types of soil use. Livestock production increased from 21,897.29 ha in 2001 to 39,429.20 ha in 2014, with a percentage increase of 80.06% and agriculture 16,717.95 ha in 2001 to 22,353.97 ha in 2014 with a percentage increase of 33.71%. Deforestation in the municipality of Santarém in the period studied was 889.5 km2, in Belterra it was 139.7 Km2 and in Monte Alegre it was 305.2 Km2. By associating the deforestation values of the three (3) municipalities and comparing them with the sum of the herds, the r value was 0.1431, the r2 value was 0.0205, with p = 0.3666, the variable Deforestation in the studied period had no influence on the herd population, which continued to increase, despite the decline in deforestation rates. The analysis of the municipal GDP of the three municipalities of the Lower Amazon reflects the need for diversification of the economic matrix, except for the municipality of Santarém, with a GDP where the service sector places the municipality as a regional pole, the other Municipalities are mostly dependent on the GDP generated by the agricultural sector. In the present study, there was a moderate to strongly negative trend in the correlations between deforestation rate and GDP. In the experiment II, of the breeders interviewed in the municipality of Santarém, 51.55% have livestock production on the mainland and 48.45% in the várzea/floodplain region and in the municipality of Monte Alegre. 83.93% of the farms are located in the mainland and 16, 07% in the várzea region. Regarding the use of biotechnologies, it was verified that 12.18% of the farmers of Santarém and 10.71% of Monte Alegre used biotechnologies in the reproduction of their herd. The birth rate varied according to the size of the breeding stock in the three (3) strata surveyed. In the municipality of Santarém, the average birth rate was 56.92%, being 51.55% in the small, 58.23% In the middle and 60.99% in the big breeders. The use of artificial insemination, through the FTAI method showed to be very useful for the breeding and genetic development in the herds used and the results are similar as in the other parts of the country.

Effectiveness of kaolin against *Anastrepha fraterculus* (Diptera: Tephritidae) on Satsuma var. Okitsu

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Satsumas are exotic fruits of *Citrus* genus, corresponding to 5% of all mandarine trees grown in the State of Rio Grande do Sul. The South American fruit fly, *Anastrepha fraterculus* (Wiedemann) is an important pest, which causes damage on fruits through oviposition punctures and through the comsuption of pulp by larvae. Synthetic inseticides are still the main tool used on *A. fraterculus* control; however, they may lead to contamination of fruits and of environment. An alternative method would the be the use of a clay mineral, which has been showing efficiency on preventing oviposition by females of many tephritids in other fruit varieties (Glenn *et. al*., 2001; Mazor & Erez, 2004; Braham *et. al*., 2007). The aim of this study was to evaluate the effect of kaolin-based products on South American fruit fly control on a satsuma orchard located at the Experimental Station of Agronomic of the Federal University of Rio Grande do Sul, on the harvesting of 2016/2017. Four treatments were evaluated: no application (control), kaolin (10%), SurroundWP® (5%) (commercial product made of kaolin + hydrophobic spreader) and Imidan (phosmete;150g.100L^{-1}), applied in six occasions, every 21 days. In harvesting, 10 fruits from each tree were collected, individualized in plastic pots with sand on the bottom, covered with voile fabric and kept for 25 days in a greenhouse. After, the fruits were cut and opened to verify the presence and the amount of larvae and pupae of *A. fraterculus*. The results were analyzed by Kruskal-Wallis and Student-Newman-Keuls tests, using 5% significance. The infestation rates by *A. fraterculus* did not differ between fruits treated with kaolin (1%) and SurroundWP® (4%) (p=0.4911) and were inferior to control (42%) and inseticide (24%), which were similar (p = 0.1357). Kaolin-based products prevented oviposition by *A. fraterculus*, decreasing infestation rates and represent a safer alternative for consumers and for the environment.

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Technical assistance and rural extension for rural sustainable development

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In the last 15 years, the Lama/UEPG has developed activities of technical assistance and rural extension at 50 cities in Paraná state. The regional landscape comprises the headwaters of the Tibagi, Iguaçu, Ivaí, Cinzas (Paraná river watershed) and Ribeira (Atlantic watershed) watershed, whose protection is vital for the maintenance and quality of water resources throughout the state. The Lama/UEPG working group believes in networking with smallholder farmers, rural communities and their representative bodies. This integration, which makes it possible to attract resources to public, private and civil society institutions, aimed at the ecological transformation of the family-based rural landscape. To this end, in recent years the Lama/UEPG has approved several research and extension projects whose premise is the sustainable rural development of smallholder farming. In all the achievements, the starting point is the construction of water conservation, soil and biodiversity. With this in mind, a pool of production actions was developed; Production of quality food (agroecological), certification of organic products, rescue and socialization of landrace seeds, ecological management of pasture, fair trade, family agroindustries, meeting of rural youth, among others. In its history, the group carried out more than 400 environmental suitability in small farms, more than 300 protections of water sources for human consumption, directly assisted in the production and certification of organic products of more than 300 producers, idealized and made more than 30 reporting units in ecological pasture management, directly assisted more than 30 fair trade groups, held two youth meetings, among other activities of technical assistance and rural extension.

Development of a fast screening method for the direct determination of chlorinated persistent organic pollutants in fish oil by HR-CS GF MAS

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The occurrence of persistent organic pollutants (POPs), mainly organochlorine pesticides and polychlorinated biphenyls, was directly associated with several diseases and environmental endocrine disrupting. In the aquatic environment, POPs can accumulate in fish lipoid tissues due to their high hydrophobicity, and become this way one of the main sources of human exposure to POPs through the consumption of fish meat and oil as Omega-3 source. Chlorine might serve as a proxy for the presence of POPs, and a fast screening of chlorine in a complex matrix, such as fish oil, could provide substantial information about the contamination with POPs. Therefore, a method has been developed in this work for the determination of total chlorine in fish oil samples via molecular absorption of the strontium monochloride molecule in the gas phase using high-resolution continuum source graphite furnace molecular absorption spectrometry. The effect of zirconium as permanent chemical modifier in the pyrolysis and vaporization stages was optimized in order to avoid the need for any kind of sample preparation prior to the determination of total chlorine, using just a dilution with 1-propanol. The accuracy has been evaluated using micro-coulometric titration after sample combustion, and the values were statistically in agreement (95% confidence level) between both techniques. The method has been applied for the determination of total chlorine in five different fractions of a commercial pooled marine fish oil sample collected from the Pacific Ocean, where the majority of the fish is Peruvian anchovy (*Engraulis ringens*), two commercial oils from Brazil and three Omega-3 supplements acquired in Germany. The limit of detection of the procedure is 1.8 ng Cl absolute or 0.9 μg g^{-1} Cl in the fish oil. The time required for a single determination is less than 5 min, and less than 15 min for a triplicate determination.

Poster presentations

Session 2

Rule of law for nature and sustainable agriculture: Pathways for mainstreaming agroecology in the Anthropocene

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According to the GEO-5 Report, global drivers have been promoting unprecedented changes in our environment, leading environmental systems to destabilization[1]. In this context, social, economic and environmental problems have become increasingly complex in a world society affected by the so-called global risks, which are incalculable, non-compensable and delocalized[2]. These are characteristics of an era in which humanity has become one of the major driving forces shaping our planet, negatively impacting it, known as the Anthropocene. Within this scenario, the challenges of establishing and designing sustainable food systems stand out as a major issue. Given this background, this research paper seeks to investigate the interconnections between the rule of law for nature and sustainable agriculture, stressing the new legal developments and approaches related to the latter and focusing on the recent inputs that agroecology has been bringing into the legal and political world. To achieve that, the paper is divided into three sections. First, it aims at contextualizing the research object to the Anthropocene and the World Risk Society theory. Also, it seeks to define what the rule of law for nature is and to highlight its prospective and the many challenges regarding its strengthening. The second section aims at addressing the interconnections between the rule of law for nature's aspects (good legislation, its strong and unbiased implementation-enforcement, and a stronger protection of natural values) and sustainable agriculture, pointing out the environmental law guidelines and principles which should orient decision and policy making in the field (e.g. principles of responsibility to protect nature, resilience, intra and intergerational equity). At last, the third section focuses on Agroecology as a new paradigm for food production, and the establishment and consolidation of a legal and political framework designed to mainstream it, consolidating the environmental rule of law for nature. This section therefore discusses the examples of the Brazilian agroecological public policies and the Latin American new constitutionalism, as innovative approaches towards transitioning to a more sustainable food production system.

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The Family Agroindustry in the context of the Colonial Agrarian System in Southern Brazil

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The rural territory configuration in Southern Brazil was strongly influenced by European immigration throughout the 21st century, focused on the occupation of the woods in the Rio Grande do Sul territory. The colonial agrarian system, byproduct of this process, is characterized by the small rural property, organized in a regime of family labour, with production focused on the family group subsistence and the selling of surplus. Aiming to preserve the food, especially those from seasonal cultures, such as fruit and vegetables, or meat products, such as sausages, pork meat (fried and preserved by immersion in lard-filled containers), and other products, food-preserving practices present in the origin of current family agroindustry were disseminated. The partial data here presented is a result of the research which has as goal to analyze the process of constitution and functioning of family-run agroindustries and its implications in the dynamics of territorial organization in the Vale do Rio Pardo region. Through an analytic-explicative investigation, we aim to understand the interaction between endogenous (horizontalities) and exogenous (verticalities) factors in territory, once the region is hegemonized by big national and transnational industrial complexes, which use the territory in a selective way, promoting social exclusion and environmental degradation. Contradictorily, in the same territory are found resistances, understood as an alternative to the hegemonic power, anchored in the diversifying of activities, amongst those, family-run agroindustries. The data collected shows difficulty in formalizing the agroindustries because of legal requirements. Of all businesses identified in the region, around 40% are formal and 60% are in the process of formalization or are informal, a condition that limit the access to formal markets for product commercialization. This situation, however, has been altered by the new state legislation, in force since 2011, along with the enhancement of the ways the producers are organized, which has contributed in the qualification of family-run agroindustries in southern Brazil.

Rehabilitation of Canga Areas Using Traditional Knowledge and Technologies

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Since the beginning of civilization, men have altered the ecosystems to implement processes for resources extraction to supply the demands for goods and services of population, and one of the controversies activities of extraction is mining. In Brazil, mining activity represents a significant part of national PIB and there are specific regions where the extraction, mostly of iron and aluminium, contributes widely to economic development, which is the case of Quadrilátero Ferrífero, in the state of Minas Gerais. However, the extraction causes a series of impacts on the ferruginous geosystems, that reduces the longevity of natural resources and limits the establishment of agronomic and forest species. Moreover, extraction processes hinder the feasibility of rehabilitation of affected areas and the diversification of uses on canga regions. In view of the aforementioned, this study investigates how the local community have adapted their knowledge and soil management techniques for the agronomic and forest use of ferruginous soils on the "backyards" (vegetable gardens) in the city of Ouro Preto, Minas Gerais. For this purpose, the methodological approach will be mixed and will deal with ethnobotanical techniques (Snowball), semi-structured questionnaires, home visits, floristic surveys and data analysis with statistical software. Therefore, it is expected to find traditional techniques capable of improving soil fertility, enabling the establishment of species in degraded areas, to propose alternatives for soil improvement, mitigating the fragmentation of ecosystems due to mining processes.

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The exercise of environmental citizenship from an agroecological living mode

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The presence of a wide range of socio-environmental conflicts makes relevant the formation of a new subject that has, at its origin, a citizen capable of understanding its role in society and that, based on ethical principles and in the idea of otherness, assuming its responsibilities towards others (Baggio, 2010; Turatti, 2010, Morin, 2005). To this subject it's given the name of environmental citizen. The objective of this research is to identify if and to what extent the living mode used in agroecology approaches the theoretical assumptions that shape the concept of environmental citizenship, in order to present parameters/ assumptions that contribute to the formation of environmental citizens. Methodologically the research has a qualitative bias, since it parts from the construction of a solid theoretical framework capable of sustaining the field analysis and encouraging the construction of the results. Among the main references that underpin the analysis of results of the field research, stand out Hans Jonas, Gilles Lipovetsky, Zygmunt Bauman, François Ost, and Leonardo Boff. The method also predicts the application of interviews with the target-public and field observations, with ethnographic inspiration, thus making possible to extract from the processes the representations and common meanings presented about the theme. The analysis of the interviews conducted until now, indicate a strong presence of a community spirit, sense of solidarity, and otherness, which are premises that demonstrate the presence of environmental citizenship in the agroecological ambit. At the end of the field research, after the realization of the content analysis of the interviews and based on the theoretical foundation, it is intended to elaborate parameters/ assumptions that help in the formation of the environmental citizen.

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Diagnosis of the reverse logistics of empty containers of agrochemicals by the center of receipt of empty packing containers of Carpina and Petrolina - PE, Brazil

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The production and consumption of pesticides in Brazil grew quite significantly since the 1970s with the National Plan for Agricultural Defenses and, in the same period, it began to be noticed that this product caused great environmental degradation by the incorrect handling of the agrochemical and its packaging. This last factor was the subject of this study, since these solid wastes are classified as hazardous waste when presenting toxicity to the several environmental matrices. Law No. 12,305/2010 provides that this type of waste should be returned in a way that does not contaminate the environment and can be recycled. On the other hand, Federal Law No. 7.802/89 indicated the obligation of this return to make the correct final destination and, in addition, it was created the National Institute for the Processing of Empty Packages (inpEV) to manage this reverse chain. With all this legal and institutional framework, Barbosa (2009) points out that, Brazil has assumed the position of world leader in the return of these packages. The aim of this research was to diagnose the return of this type of waste to the two centers receiving empty agrochemical containers in the state of Pernambuco located in the municipalities of Carpina and Petrolina, between 2009 and 2012, in view of the high agricultural production levels. In the period 2009-2011, the Petrolina receiving center showed a 28.62% increase in the return of agrochemicals packages and for the year 2012 indicated a decrease of 10.32%, varying between averages of 104-120 tons. In turn, the Carpina plant showed a decrease of 52.71% between 2009-2012, with fluctuation of approximately 190-91 tons. This decrease can be justified by the decrease in the use of agrochemicals in the region due to the drought that caused crop losses. But going further, these numbers also represent the difficulty encountered by small farmers to make a return, and some enterprises that do not do so with due regularity. Besides that fact, it was verified that some of these packages are returned without post-use washing care, making recycling unfeasible. This is a national reality represented in the state of Pernambuco. It is important that, despite the progress made at the national level, there is a growing investment in environmental education and inspection so that there are no more setbacks as seen in Carpina.

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Prevalence of food insecurity in school children families in Passo fundo- RS

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The food security refers to the constant access and continued high-quality food in adequate quantities and not only the absence of hunger. It is a fundamental right which enables to achieve the potential of human development, the promotion and protection of the health and better living conditions. A cross-sectional study was developed in two municipal kindergarten schools, located in the city of Passo Fundo/RS in the year of 2016. The sample consisted of 100 families with children aged 6 to 59 months assisted in schools. It was made an individualized interview with a representative of the family of each child, being applied a socioeconomic questionnaire and the Brazilian Food Insecurity Scale (BEIA). The majority of respondents were female, aged between 19 and 39 years old (77%), 84% were father/mother of the child, 71% lived with four people or more, 73% were married or were in a stable union and 72% with white-skinned. In terms of the schooling level, 98% could read and write and 51% indicated that they were illiterate or have incomplete elementary school. From the respondents 64% reported work formal, informal and autonomous. As the characteristics of the domicile, 73% reported that the responsibility of the home is more of a resident, the economic class more prevalent was the Class C (53%), 22% are benefited by the income transfer programs and 88% have paid their own house or they are paying. The results of the Food Insecurity (FI) show that 51% are in a situation of FI light, 16% would be moderated and 2% would be severe. The association among the presence of FI and the demographic and socioeconomic variables were tested. It is observed a higher prevalence of FI in domiciles that one of the parents live without a partner (85,2%; p=0,026), pertaining to D and E economic classes (83,9%; p<0,05), with lower level of education (78,4%; p=0,013) and with access to income transfer programs (86,4%; p=0,037). Although the low income could be the most relevant factor in the determination of food insecurity, other factors are associated with this condition and need to be considered. The family agriculture represents an important industry in food production for domestic consumption, representing more than 80% of agricultural properties in Brazil, thus it is necessary to encourage the delineation and strengthening of structural public policies, which stimulate and enhance domicile production and agro-ecological sustainable development contributing to food security.

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Rhizobial isolates from the common bean (*Phaseolus vulgaris* L.) as plant growth-promoting rhizobacteria (PGPR) and biological control agents (BCA) against the phytopathogenic fungus *Sclerotium rolfsii*

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Sclerotium rolfsii is a worldwide pathogenic fungus known to attack over 200 different plant species. *S. rolfsii*-promoted disease on common bean (*Phaseolus vulgaris* L.) is one of the most important bean diseases in Rio Grande do Sul state and it can induce production losses up to 50%. Rhizobia are a group of bacteria that act as plant growth-promoting rhizobacteria (PGPR) stimulating plant development through nitrogen fixation, phytohormones secretion and mineral solubilization, and/or indirectly as biocontrol agents (BCA) by inhibiting the growth of pathogens via siderophores and secondary metabolites secretion. The aim of this work is evaluate common bean rhizobial isolates from SEMIA/FEPAGRO culture collection regarding their capacity and mechanisms to inhibit *S. rolfsii*. In an initial screening among 151 rhizobial isolates, 30 were able to inhibit fungal mycelial growth in dual culture – 10 inhibited more than 90%. The isolates produced 34.7 – 2.1 $\mu g.mL^{-1}$ of indole-acetic acid (IAA) – a phytohormone best known to promote plant growth than to direct inhibit fungal pathogens growth. However, a determination coefficient (Spearman's R^2) of 0.126 ($p = 0.016$) was obtained between rhizobial IAA production and the ability to inhibit *S. rolfsii* mycelium growth. The rhizobial isolates were also tested for other BCA action mechanisms – four were siderophore producers, three and one produced protease and cellulose enzymes, respectively. In addition, three isolates demonstrated ability to inhibit fungus mycelial growth by up to 45% through volatile compounds production. For pot culture assays employing *S. rolfsii*-infected soil, 11 rhizobial isolates were selected for inoculation on common bean plants. Data from disease severity percentage and shoot dry masses from six isolates treatments do not differ statistically (Scott-Knott test at 5% probability) from the treatment without *S. rolfsii* (negative control). Until now, we have found six rhizobial isolates with great perspectives to be used as PGPR and BCA against *S. rolfsii* on common bean, two of them have already their genomes sequenced. The complete genome sequence of the other four rhizobial isolates will be performed in order to search for antimicrobial-related sequences. To a better validation in plant, germination and greenhouse tests will also be performed.

Evaluation of efficient biocontrol gram positive Bacillus in the anthracnosis disease in Palmeira Juçara (*Euterpe edulis* MART.)

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Euterpe edulis Martius (juçara palm) belonging to Arecaceae family is a native species of the Atlantic Forest. It is well known for the intense extraction of palm heart, owing to its commercial value. Phytopathogen known as *Colletotrichum sp*. is the cause of anthracnose, a disease that affects juçara fruits. Previous Gram-positive bacteria isolated from palm rhizosphere collected in a region of Atlantic Forest, located in Fepagro Litoral Norte (Maquiné/RS, Brasil), with characteristics of plant growth promotion and/or biocontrol were used in this study. For isolation of the pathogen *Colletotrichum* sp., fruit samples of juçara palm were taken and placed in BDA medium for fungus growth and characterization. Biocontrol tests were done by antagonism, inserting the isolates at plates extremities, in duplicates, arranged in a strip form, where the pathogen was placed in the plate center in form of disc. A plate containing only *Colletrotrichum* sp., without any bacterial isolate, served as control. In the seven day period, the pathogen grew on the plate surface and served to indicate when to assess the inhibition. In total, twenty-three bacterial isolates with anthracnose biocontrol potential were obtained, which twelve were characterized as the most promising ones. Thereafter, the most promising bacterial isolates will be identified through 16S rRNA gene sequencing.

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Endophytic and rizospheric bacterial diversity in juçara palm (*Euterpe edulis* Mart.)

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Juçara palm (*Euterpe edulis* Mart.) is a species of great ecological and economic importance and for these reasons it is widely used for extraction of the palm heart, it generates a high clandestine extraction, affecting the state of conservation of the species, classified as endangered (EN). This research aims to study the cultivable bacterial community of the Juçara palm. At first, six samples were collected in Atlantic forest located in the municipality of Maquiné/RS. For the bacterial isolation process, 10g of rhizospheric soil and root (previously disinfected) were transferred to vials containing 90ml of saline solution (0.85%) and kept under stirring. Subsequently, serial dilutions were performed in triplicates, and these were inoculated in flasks containing semi-solid selective medium without addition of nitrogen source, NFb and LGI-P and incubated at 28ºC for 7 days. Growth promoter characteristics were analyzed, such as phosphate solubilization, siderophores and indole-acetic acid (IAA) production. A germination test was performed with isolates producing IAA above 10µg /ml. For the genetic characterization and identification of the isolates, they were subjected to 16S rRNA and RFLP gene amplification using restriction enzymes EcoRI and MspI. The generated banding pattern was used for dendrograms construction in PAST software. The genetic similarity between the isolates was measured by the Jaccard index and the analyzed clusters had similarity greater than 70%. Based on the dendrograms an isolate representative of each cluster was sequenced and identified by BLAST. In total, 231 isolates were obtained, 133 rhizospheric and 98 endophytic of root of Juçara, all characterized as Gram negative bacilli. Phosphate solubilization test showed that 52 endophytic and 60 rhizospheric isolates solubilize phosphate. From 231 isolates, 40 were able to produce siderophores. The isolate used for the germination test was Dr32N, identified as *Pseudomonas palleroniana,* was able to accelerate the initial growth about 66%. In the dendrograms analysis, the sample that presented the greatest genetic diversity was that of young plants, of dry place with low density of seedlings. On the other hand, the group with the lowest diversity was related to the adult plant and humid site sample. The bacterial isolated identified to date has shown a predominance of the genus *Pseudomonas* sp., which are bacteria known to promote plant growth. In this context, it is suggested that the bacterial isolated from the soil and root of the Juçara palm has potential for initial growth stimulation, besides being nitrogen fixers, they are auxin producers, some produce siderophores and solubilize phosphate.

Food security and sovereignty in tropical coastal zones: the role of traditional aquaculture practices at São Cristóvão, Sergipe, Brazil

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Approximately half of the world's population lives on the coast due to a variety of reasons, including the wealth of natural resources and diversity of both ecological and economic niches that support coastal populations. Food security and sovereignty is a challenge for tropical coastal zones due to the high density population of these areas and the existence of traditional populations that depend directly on natural resources for survival. Such reality can be observed in Sergipe State's coastal zone in Brazil where aquaculture has expanded intensively in recent years. In order to analyze the role of aquaculture systems for food security and sovereignty in the coastal region of the state of Sergipe, this study was carried out between 2008 and 2016 in family-based shrimp farms that rearing the marine shrimp *Penaeus vannamei*, located in the Vaza-Barris river estuary. Direct observations, semi-structured interviews and informal dialogues were applied to shrimp farmers and local people directly or indirectly involved with the local aquaculture systems. In order to better understand typical local management practices, in 2014 the studies were focused on a typical local extensive shrimp farm. The local extensive aquaculture systems observed, in general, show high aquatic biodiversity when compared to the semi-intensive and intensive marine shrimp monocultures in the state of Sergipe. The extensive and traditional systems that allow the entry of native aquatic species from the adjacent estuary into the marine shrimp ponds during the rearing cycle, together with low intensity management and the use of low shrimp density, create favorable conditions for the increase of biomass and biodiversity through methods of ecological intensification. The aquatic biodiversity and aquatic biomass of the local extensive shrimp farms have a positive impact on food security and sovereignty at Vaza-Barris river estuary by providing food of high nutritional value and easy access to low-income local populations. Although the contemporary agricultural revolution has allowed a significant increase in the volume of food produced in the world, one of the most direct and fatal consequences of the modern agrifood system is the continued hunger of millions of people. Aquaculture is an activity recognized for its great potential to generate high nutritional value food, however, the ability of aquaculture to contribute to food and nutritional security can be questioned. In this scenario, this study concluded that the traditional extensive shrimp farms of the Vaza-Barris estuary have a positive regional social impact and could be considered by public policies as a form of territory occupation to guarantee food security and sovereignty of the local population. This study is especially relevant considering the traditional population that depends on local aquatic biodiversity for survival and inhabit Sergipe State's coastal zones.

Determination of selenium in soil samples from 12 Brazilian states using high-resolution continuum source graphite furnace atomic absorption spectrometry and direct solid sample analysis

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A method has been developed for the determination of Se in soil samples using high-resolution continuum source graphite furnace atomic absorption spectrometry and direct solid sample analysis. The most sensitive absorption line at 196.026 nm has been used for all determinations. Ruthenium, apart from being deposited on the platform as permanent modifier, was also added in solution on top of each solid sample. All soil samples exhibited a fine structured background caused primarily by the NO and PO molecules. Reference spectra of these molecules were recorded using nitric and phosphoric acid, respectively, which were used for least squares background correction. The limits of detection and quantification were 30 ng g^{-1} Se and 100 ng g^{-1} Se, respectively. Soil samples were collected from untreated experimental farming areas (without addition of fertilizers) in order to obtain representative values of natural selenium distribution. Appropriate areas for sampling were selected in 12 of the 27 Brazilian states, covering 61% of the total area of the country. The results of the Certified Reference Material MURST-ISS-A1, “Antarctic marine sediment”, confirmed the validity of the proposed method. The selenium content found in the soil samples varied between 130±10 ng g^{-1} and 630±15 ng g^{-1}. The repeatability of the measurements was between 3% and 10% (n = 5).

Session 03. Water

Conveners:
Prof. Dr. Carlos André Bulhões Mendes, Instituto de Pesquisas Hidráulicas (UFRGS)
Prof. Dr. Jörg Metzger, Institute for Sanitary Engineering, Water Quality and Solid Waste Management, University of Stuttgart

Freshwater is a resource supplied by natural environment and is used intensively by human activities. Aquatic ecosystems accommodate a large biodiversity and are important to build up biomass as a base for alimentation of other species and finally for humankind. According to the UN-General Assembly for Human Rights people are entitled to water and sanitation. Based on the considerations mentioned above, a reliable water treatment and distribution as well as a secure wastewater draw-off and treatment before discharging it to the water body are inevitable. The talks/posters describe water resources, their use by human activities and provide information of sustainable use in the future. Furthermore, this session accepts also papers on all aspects related to sustainability of water supply and handling wastewater.

Keynote Lecture:
Prof. Dr. Peter Grathwohl, Department of Geosciences, University of Tübingen

Oral presentations

Session 3

Organic micropollutants in the urban water cycle: occurrence, analysis and elimination strategies in sewage treatment plants

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A wide variety of structurally different organic substances which occur in low concentrations, but nevertheless have a negative effect on the environment are subsumed under the term *organic micropollutants*. They belong to different groups of application, such as personal care products, pharmaceutical drugs and hormones, sweeteners, pesticides or flame retardants and can differ to a large extent with regard to persistence, tendency to adsorb to particulate matter and biodegradability. Low degradability and tendency to adsorb usually results in elevated concentrations in treated wastewater and surface waters and in the case of substances with low water solubility also to bioaccumulation. Thus, the elimination strategy ideally has to be adapted to the individual properties (water solubility/polarity, lipophilicity, abiotic and biodegradability) of the various micropollutants present in the water to be treated. The assessment of micropollutants at these low environmental concentration requires sophisticated analytical methods (mainly GC- and HPLC-MS, but also bioassays), the differentiation of solute and particulate matter bound fractions and suitable sampling strategies. The presentation gives an overview on the kinds of micropollutants and indicative parameters aiming at finding correlations with them in wastewater, practical aspects of elimination by treatment with activated carbon, UV and ozon and by sandfiltration, and analytical strategies to encounter the temporal and spatial concentration dynamics of micropollutants in surface and wastewater. It is shown how elimination efficiencies of hormones can be assessed by using a combination of instrumental analysis and bioassay (E-screen assay).

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Catchments as reactors: metabolism of pollutants on the landscape scale

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One of the greatest enigmas confronting environmental sciences is the fate and behavior of anthropogenic pollutants on the landscape scale. The past decade of research has highlighted that pollutant transformation rates determined in laboratory experiments are often in stark contrast with rates documented in natural systems. This disparity stems from our incomplete knowledge of the relevant processes governing pollutant turnover on the catchment scale. An unfortunate consequence of this is our inability to predict future trends in soil and water quality. The collaborative research center CAMPOS addresses this challenge by testing the hypothesis that processes become effective in the field which are elusive on the laboratory scale. Many compounds undergoing comparably quick microbial degradation in laboratory experiments show unexpected persistence in nature; they are stored in soils and aquifers over extended time periods and are found even long after anthropogenic input has ceased. While laboratory research may miss slow but essential processes, conventional monitoring campaigns in the field are hampered by the dynamics of hydrology that triggers shifts of biogeochemical gradients at which significant pollutant transformations occur. CAMPOS aims at identifying reactive landscape elements and quantifying process dynamics with detailed field studies on biogeochemical pollutant transformations at unprecedented resolution. This has become possible through the enormous recent progress in analytical and sensing techniques (e.g., compound-specific isotope and enantiomer analyses, non-target screening, bioanalysis, *in-situ* sensors, molecular-biological techniques including omics), which have not yet been combined in targeted field research. Studied landscape elements follow the reversed water flow from rivers via the stream-groundwater interface to groundwater and finally soil plots. Rivers are the big integrators of pollutant fluxes in landscapes, they collect runoff from different landscape elements and receive a vast variety of anthropogenic pollutants from urban space via treated wastewater or stormwater runoff. Sediments in rivers contain legacy compounds and may be remobilized during floods. River tributaries draining subcatchments are characterized by different land uses and mainly export agrochemicals. Because of the relatively large ratio of sediment surface to water volume, processes at the groundwater/surface-water interface and their dynamics become more relevant than in larger rivers. Floodplains typically comprise young sediments (sand and gravel as well as peat and loam) with steep biogeochemical gradients and potentially fast solute turnover. Large scale fractured aquifers are able to store pollutants in the rock matrix for decades and centuries; these large residence times allow slow biotic turnover processes to become effective; such - so far - elusive processes may be identified by new molecular biological methods. Finally, soils receive direct input of atmospheric pollutants and agrochemicals. Although soil microbes are in principle able to rapidly transform pollutants, these seem to persist at low concentrations and are sporadically leaching towards groundwater.

Potential of photocatalysis as sustainable technology for water treatment

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The effect of photo-assisted catalysis using UV or visible light has already been described for more than 100 years [1]. Photocatalysts are semi-conductors, reaching an excited state when stimulated by photons. The hereby generated electrons (e^-) and holes (h^+) are able to decompose water into hydrogen and hydroxyl radicals at the catalyst surface. With increasing costs of fuel, there has been an increasing interest in the development and investigation of photocatalysts for the production of sustainable fuel [2]. However, the generated active hydroxyl radicals can also be used for oxidation of problematic chemical compounds, e. g. in water and wastewater. Unlike comparable established technologies, such as activated carbon adsorption, membrane filtration or flocculation respectively, photocatalysis actually decomposes substances instead of just separating them. Other advanced oxidation processes like ozonization or dosing of hydrogen peroxide are often considered to be expensive, complex in handling or critical in matters of operational safety. Photocatalysts on the contrary can be reused multiple times with almost no activity loss. When using solar light for irradiation, photocatalysis has the potential of being one of the most cost-efficient and sustainable water treatment technologies for persistent organic pollutants. Two principal operation concepts exist: Dosing of photocatalysts into water to create a suspension, or immobilization of photocatalysts onto carrier material. Whereas suspensions usually achieve faster kinetic reaction rates, the benefit of immobilization is the low maintenance effort and no requirement for post-process filtration. In both cases, however, water turbidity is one of the most crucial limitation factors for a practical application and poses a challenge in terms of reactor design. Thus, for turbid water it is essential to implement a proper pre-treatment to remove solids and colloids. Alternatively, immobilized photocatalysts can be activated by artificial irradiation from the backside through the carrier. Laboratory scale experiments with LED-modules showed promising results opening new application potentials. Not least, the material development plays an important role in enhancing catalyst properties and efficiencies, e. g. by selective doping to exploit a broader wavelength range for better light absorption.

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How long will Brazil´s reservoirs last? - Long-term sediment mass validation by hydro acoustics and potential implications for the lifetime assessment of reservoirs in Brazil

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Hydropower generation and the supply of drinking water as well as water for irrigation represent the most important purposes of reservoirs. Since Brazil is producing large shares of the used electricity through hydropower and the water supply is covered mostly by surface water, the dependence on the functioning of the national reservoirs is high. For many reservoirs the real lifetime cannot be precisely assessed because the real storage capacity and/or the mass flux of sediment from the catchment to the reservoir in unknown. For the operators and consumers of electricity or fresh water this could lead to severe problems especially under the perspective of changing climate patterns. We modelled the sediment input into three Brazilian reservoirs using the open source tool InVest. In order to allow for a transfer to further parts of Brazil only open accessible data was used as input data. A central part of the input data is based on high-resolution satellite imagery as a basis for the land-use classification maps. A time series of land use information allowed for the derivation of a long-term trend to account for the temporal changes in the catchment and therefor to optimize the mass flux results. A previously developed hydro acoustic measurement technique produced sediment magnitudes for the investigated reservoirs. Based on these magnitude maps the overall accumulation of sediment mass was calculated. The accumulation rate per year served as a robust validation for the input model. It was shown that the lifetime of some reservoirs might be shorter than expected by the operators. The presented approach could help to identify the most threatened reservoirs and reduce risk to the society.

The parameters of water potability in Brazil and in Europe

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The oral presentation aims to discuss the potability of water distributed by the systems of supply to the urban population in Brazil, currently foreseen at the national level in Ordinance n. 2.914/2011 of the Ministry of Health1. The focus of the exposition will be on verifying the adequacy of parameters related to pesticides, especially regarding aspects related to the analytical and sample collection methodologies currently used in Brazil, the periodicity of the analyzes, the maximum allowed value (MAV) for each parameter, the absence of parameters that should be included in the Ordinance, the absence of total MAV (sum of each MAV) for each group of parameters, comparison with similar foreign normative acts such as the European Union Directive 98/83/EC2 etc. It should be emphasized that the limits established by the brazilian infra-legal normative act are, above all, much higher than MAVs settled by the Directive 98/83/EC. The risks to human health and the environment are quite serious, as well as the possible non-compliance with the fundamental rights related to them, deserving a qualified debate by the law experts, without forgetting the other branches of knowledge that are linked to the present theme.

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Poster presentation

Session 3

The role of soil air composition for noble gas paleotemperature reconstructions in Tropical Regions

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Dissolved noble gases (NGs) in groundwater provide a well-established tool for paleo-temperature reconstruction. Although most noble gas temperature (NGT) studies have been conducted in northern temperate latitudes, the few results from the tropics, in particular a study from Brazil, have provided important proofs of a significant glacial – interglacial temperature change in tropical regions. However, reliable NGT determination requires a detailed understanding of the dynamics of reactive and inert gases in the soil air with which the infiltrating water equilibrates. Due to microbial gas consumption and production, the NG partial pressures in soil air can deviate from atmospheric air, an effect that could offset NGT estimates if not taken into account. Because biological activity is expected to be particularly strong in humid tropical soils, we studied NGs in soil air as well as young groundwater at different sites near Santarém (Pará, Brazil) and for comparison near Heidelberg (Germany). Soil air data confirm a correlation between the sum value of O_2+CO_2 and NG partial pressures. We find significant NG enhancements in soil air by up to 7%. The strongest increase is observed in tropical Santarém. The determination of reliable absolute NGTs also requires a correct accounting for bubbles of soil air that are entrapped and (partly) dissolved in the water during groundwater table fluctuations. The resulting excess air component is reasonably well described by the closed system equilibration (CE) model for excess air. A corresponding NGT determination was performed for the groundwater data from Santarém. A systematic underestimation of the expected recharge groundwater temperature is found under the assumption of atmospheric NG contents in soil air, while a good agreement is reached if the enhanced NG partial pressures in the local soil air are taken into account. These findings allow for more reliable NG paleo-temperature records, in particular in humid tropical areas such as the Brazilian Amazon region.

Nitrification of domestic solid waste landfill leachate with the use of *Typha domingensis*

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Urban solid waste disposed in landfill produces leachate, a highly polluting effluent that requires treatment (Gouveia, 2012). Ammoniacal nitrogen is a typical pollutant of this type of effluent and in excess in a water body causes algal bloom and depletion of dissolved oxygen, becoming toxic to the aquatic environment (Wojciechowska et al., 2010). *Typha* species are considered efficient for the removal of ions in effluents and their use consists in a low-cost method of effluent treatment (Escosteguy et al., 2008). Reducing concentrations of ammoniacal nitrogen is often the most important and the most difficult objective to achieve in effluent treatment, thus, the study evaluated the nitrification potential of *Typha domingensis* in different leachate concentrations of domestic solid waste. Plants were exposed for 35 days to leachate (100 and 75%) and to rainwater with N:P:K (control) (5 plants/pot, 10 pots/treatment). Dissolved oxygen (DO) was measured periodically *in situ*, and before and after exposure, ammoniacal nitrogen, nitrite and nitrate were analyzed in the treatments. On the first day of exposure, DO differed significantly among all treatments, when the control presented the highest value (10.5 mg L^{-1}) and the concentration 100%, the lowest value (3.2 mg L^{-1}). After only two weeks, DO increased twice in the control, four times in the leachate 75% and eight times in the leachate 100%. Before exposure, ammoniacal nitrogen showed decreasing values from the highest concentration of leachate (36.30 mg L^{-1}) to the lowest (28.23 mg L^{-1}), and was not detected in the control. At the end of the experiment, in all treatments this compound was no longer detected. In all treatments containing leachate, there was a significant reduction of nitrite after exposure in relation to the beginning of the experiment and it was not detected in the control, unlike nitrate, which after exposure presented significantly higher concentrations in all treatments containing leachate at the end of the experiment in relation to the beginning. These results indicate the occurrence of nitrification process in which the oxygen provided by the plant roots contributed to the development of nitrifying bacteria in the treatments and, thus, ammonia was oxidized to nitrite and then to nitrate. The study showed that *Typha domingensis* has the potential to nitrify domestic solid waste leachate.

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The importance of technical participation on Envinronmental City Council – Initiative of participation in Chachoeirinha/RS Town Hall: Regulation COMDEMA n°030/2016

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The main objective of this work is to present an example of participation's initiative, which was used by technicists from environmental licensing section of Cachoeirinha town hall, and in consequence, emphasize the importance of the technical official's involvement together with the community. By the municipal environmental Council intended the technicists doing regulation for some proceedings, in order to fill gaps of environmental legislation inclusively, which are about disposal of industrial wastewater in the soil, and policies to monitoring industrial wastewater treatment systems and domestic wastewater systems. Since this initiative, the COMDEMA n° 030/2016 city's Regulation was approved and is in force since 18th January (2017). The secondary objectives from this work are: make public the Resolution to the people of these event, inform the technical motivations and the importance of these issue, present systematically the Resolution context, motivate the technical participation together with city's council and collect critics and suggestions to this work and the Regulation.

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Volunteer Action “Viva o Taquari Vivo”: 11 years of history

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This paper aims to present a report on a case where, based on the orderly action of volunteers linked to various organizations, it was possible to begin a process of recognition of the Taquari River as a water heritage. During the year, the Action “Viva o Taquari Vivo” develops different activities of environmental awareness in school and business environments (lectures, seminars, technical day, photographic show), but the action that triggers the others is the cleaning of the banks of the Taquari River. The annual cleaning of the banks of the Taquari River has been taking place since 2007. For 7 years only two municipalities (Lajeado and Estrela) participated in the joint effort, from 2014 more municipalities engaged in the movement and today it occurs simultaneously in 6 municipalities (Lajeado, Estrela, Arroio Do Meio, Cruzeiro do Sul, Bom Retiro do Sul and Venâncio Aires). During an autumn morning, the volunteers walk along the banks of the Taquari River and collect the visible rubbish. Another group of volunteers receive the garbage collected and classify them into large groups. All material is heavy and forwarded for recycling or reuse. In this way, it is possible to compare one year with the other and from the materials found, carry out specific information campaigns. Considering the 11 editions of the Action, there were more than 35,800 kg of garbage collected with the average participation of 900 volunteers in each of them. The action is effective when the change of types of waste is observed during the period (indicating that the educational campaigns are important) and the reduction of the quantity collected.

Evaluation of the water quality of the Capibaribe River by the release of residuals from the municipal slaughterhouse of São Lourenço da Mata - PE, Brazil

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The water resource is an important environmental matrix that is being threatened by the increasingly degrading lifestyle of society, putting at risk the survival of life on earth. The Capibaribe River, located in the state of Pernambuco, stands out for its great extent and the fact of draining many municipalities. However, it has been polluted at several points along its route due to several factors, among which the launch of domestic and industrial sewages. In this way, the present study was carried out in the Capibaribe river, in the municipality of São Lourenço da Mata - PE, aiming to identify its degradation situation by the discharge of liquid effluents and solid residuals from the municipal slaughterhouse. Therefore, in addition to a visit to the slaughterhouse, water samples were analyzed at two points in May 2014, namely: one located 100 meters before the point of mixing the tailings with the water course and another 100 meters later (BOD_5), hydrogenation potential (pH), turbidity, electrical conductivity, ammonia and total phosphorus as indicated in the Standard Methods of Examination of Water and Wastewaters (APHA, 1998) and compared with Conama Resolution n. 357 of 2005 for class II. Thus, in the visit it was observed that the municipal slaughterhouse has not correctly treated its residues and through river water that presented considerable differences among the samples in several parameters such as COD that indicated increase of 9.0 mg/L and BOD_5 which increased 4.1 mg/L among the samples and, in the case of the last, still showed in the two units collected a higher value than the proposed in the legislation. Among the seven parameters, two are not predicted in the legislation, and of the remaining five, only two showed values above that allowed (BOD_5 and total phosphorus). Despite this, it is known that these are good indicators of eutrophication and river pollution. Therefore, it is necessary to intensify the preventive actions as environmental education actions in the company that manages the municipal slaughterhouse in addition to more effective supervision so that this scenario can be modified, aiming at a socio-environmental sustainability.

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Goss method to estimate the vulnerability to water contamination by agrochemicals in the city of Vitória de Santo Antão - Pernambuco, Brazil

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The environmental contamination by pesticides has been raising attention of the scientific environment as function of the harmful consequences that come from its inadequate use. This is a reality in the municipality of Vitória de Santo Antão-PE that plays a key role in the production and supply of vegetables in the state. Therefore, the present study aimed to mathematically model the transport potential of the active principles of these products used in that city. Altogether there are 38 products used according to a survey done by Nascimento (2013) totaling 35 different active ingredients involved in the formulation. For this, the method proposed by Goss (1992) was used to estimate the transport capacity of pesticides dissolved in the water or associated to the sediment, using some physical-chemical parameters obtained in the Pesticides Properties DataBase database (LEWIS et al., 2016) and the Pesticide Action Network (KEGLEY et al., 2016). The parameters are: the organic carbon adsorption coefficient (Koc in mL.g-1), soil half-life (t1/2 in days) and the solubility in water (µg.mL-1). Among the active principles analyzed, three did not have all the data found in the literature, reducing the work to 32 ingredients. As a result, it was observed that 25% of the active ingredients presented high transport potential associated with sediment and 46.87% potential medium. In turn, 28.12% presented high transport potential dissolved in water and 40.62% potential medium. Alarmingly, two of them registered a high aptitude in both cases, namely: tebuconazole (presented in the brands "Folicur 200 EC" and "Nativo") and difenoconazole ("Score"), requiring a greater control over its use In the study region. Thus, it can be concluded that if the use of agrochemicals is not controlled in Vitória de Santo Antão, water contamination is very probable and latent, and public policies are needed to modify this scenario.

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Remediation of groundwater contaminated by chlorinated organic compounds (PCE/TCE) through activated carbon and potassium permanganate

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The present study was on the remediation of groundwater contaminated mainly by tetrachloroethene (PCE)(1) and trichloroethene (TCE)(2), in an area of an old chemical industry. The development was in three distinct steps: remediation through activated carbon, laboratory studies to evaluate the degradability of PCE/TCE with potassium permanganate(3) and use of potassium permanganate directly on groundwater in the industry´s area. The on-site remediation involved the pumping of groundwater from nine wells through an activated carbon column. Laboratory scale experiments were carried out with synthetic and original samples taken from the most contaminated monitoring well. The initial contamination diagnosed was of 89.234 µg/L for PCE and of 65.567 µg/L for TCE. The potassium permanganate was applied directly in the most contaminated wells in ten campaigns and in concentrations that varied from 1,4 to 10%. The granulated activated carbon adsorption was very efficient in the first months of operation and reached a removal of 95% of PCE and of 90% of TCE. The use of potassium permanganate was efficient for TCE removal but non effective for PCE. During the on-site applications it was concluded the need for pressurized injection and that there is a limit on the influence radius of the oxidant in clay soils. The results obtained were successful on the treatment of groundwater contaminated by PCE and TCE through granulated activated carbon and potassium permanganate oxidation.

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Seasonality of total and dissolved metal concentrations in the Alto Sorocaba River Basin

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One of the major environmental concerns is currently associated with the impact of metals on water resources, since they are non-biodegradable inorganic substances and in many cases are toxic at very low concentrations. The total and dissolved concentrations of Fe^{2+}, Al^{3+}, Ni^{2+}, Mn^{2+}, Pb^{2+} and Zn^{2+} were evaluated in the fluvial waters of the Alto Sorocaba River Basin, before and after the Itupararanga Reservoir, an important source of water supply of c.a. 1,000,000 inhabitants in the municipalities of Ibiúna, Sorocaba, Mairinque and Votorantim, all in the state of São Paulo, Brazil. Surface water samples were collected, representative for dry and rainy periods, and analyzed by atomic absorption spectrometry (AAS - Varian 240-FS). A similar behavior was observed for the concentrations of the analyzed metals, with higher values in the total load in relation to the dissolved load. The highest concentrations of total and dissolved loads were related to the rainy season. The Itupararanga Reservoir had a retention effect, with probable sedimentation, complexation or absorption and subsequent precipitation of these metals, due to the lower concentrations observed downstream of the dam, independent of the metal or period analyzed. The waters of Alto Sorocaba are classified as Class 2 (São Paulo, 1977, Brasil, 2005). Al^{3+}, Fe^{3+} and Pb^{2+} showed higher concentrations than the maximum reference values for this class in both periods, while Mn^{2+}, Ni^{2+} and Zn^{2+} remained within reference values. A policy that prioritizes socioeconomic development with social justice and in harmony with the environment must be exercised in the Alto Sorocaba River Basin, in order to protect and maintain the quality of this important source of water supply for the municipalities of the region

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Use of polypropylene nonwoven as sorbent of oil

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Oil spills are critical because they are urgent and unexpected because of the enormous damage they cause to aquatic environments and marine life, so they must be contained quickly before they cause long-term disasters. Reinforced nonwoven barriers are used to inhibit the spread of oil in larger areas and prevent it from reaching sensitive coastal areas. In this work the mechanical properties of tensile and elongation and of flammability in polypropylene nonwoven with variations of weights were compared, compared to nonwoven prepared with thermo film and TNT, for applications such as geotextile in the sorption of oils in water spills. The results showed high values of tensile strength for non - woven fabric prepared for application as a geotextile, improving the mechanical properties of rupture.

Application of Refraction Seismic in the vulnerability of underground aquifers

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Multichannel seismic survey consists of a geophysical technique of indirect quantification, whose principles are based on the interaction of acoustic waves with underground rocks. This environmental technique, when used with the sledgehammer, presents as main advantages the lack of any impact during the exploration, the low cost and a quick way of obtaining results. The seismic waves are mechanical vibrations which are propagated in geological layers (Anomohanran, 2013). The propagation of seismic waves obeys the law of Snell-Descartes, which implies that when a wave reaches an interface within two layers with different acoustic impedances, two different waves are created: a reflected wave and refracted wave. A seismic uplift is based on the analysis of seismograms, that is, a graphical representation of the distance of the receivers by the signal travel time until it returns to the surface. With this graph it is possible to draw lines, which represent the transit times of the seismic wave in the geological environment, which are commonly known as "travel time" (Kearey, 2002). In this research the ABC reciprocal method were applied, whose processing relies on 5 shoot points (Hagedoorn, 1958). The aim is to reveal acoustic characteristics of the geological environment, such as the velocity of propagation of the P wave, in order to estimate the type of rock that constitutes the subsurface (EMPRAPA, 2006). The determination of the layer thicknesses also depends on the estimated velocities in the data analysis (Michel, 2015). This information contributes to determine the degree of vulnerability of underground water reserves. Our area of study was the Santa Cruz do Sul region due to the growing process of agricultural and urban exploration. The intemperism mantle has regolitic origin and is of small thickness. Thus, it can be easily damaged by compromising local underground reservoirs. The results suggest the presence of geological formations with potential for water storage at 10 m depth. In this case, the fragility of the free aquifers of the region is evidenced by contamination by pollutants.

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Comparison of the water quality of a deep artesian well and a shallow cacimba water arranged in the same rural property

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Knowledge of groundwater quality is of extreme importance, especially in rural areas, where drilling wells to supply domestic use is managed without monitoring the quality of water consumed by the community. In this study, the differentiation between two wells in the same property, located in the rural area of the city of Santa Cruz do Sul (central Rio Grande do Sul) was carried out. The first, an artesian well of 117 m depth, and the second, a cacimba well that reaches less than 2 m of static level, presented values of pH 9.0 and 6.4, respectively. The concentration of fluoride found in the artesian well water was 5.3 ppm, being above the stipulated for human consumption by CONAMA (2008), which is up to 1.5 ppm. In the cacimba the concentration of fluoride got bellow the detection limit of the analytical instrument. Fluoride can occur naturally in waters and its determination is important for the practice of fluoridation of water as a preventive measure of public health (Parron, 2011). An increase in the amount of nitrate in groundwater has been reported due to the use of fertilizers on the soil surface (Melo et al, 1998). Regarding the studied wells, although not exceeding the potability limit nitrate concentration (as N) in the cacimba was much higher than in the artesian well, about ten times. Nonetheless, phosphate was absent which may be related to natural processes, such as rock dissolution, or associated with the use of fertilizers and pesticides (Parron, 2011). Sulfate values for the artesian well were found to be high, but within the limits of the legislation. Sulfates can also occur in groundwater through the dissolution of soils and rocks or oxidation of sulfides (Magalhães, 2006). Chloride is the main inorganic anion present in water. Its concentration in both wells were similar, around 3.6 ppm. Wastewater containing sanitary sewage could have chloride concentrations higher than 15 mg/L (Parron, 2011). The zone where the wells are located is near rice plantations and the measured anions concentrations may be related to the use of fertilizers or pesticides in the area (CEVS/SES, 2010; Parron, 2011).

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Obtainment of environmentally friendly coagulants/flocculants from tannins

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Coagulation and flocculation are processes applied in wastewater treatment. Several studies have focused in developing non-pollutant coagulants to replace conventional toxic coagulants (RENAULT *et al*., 2009). A possibility is the cationization of tannins, which are water-soluble polyphenolic compounds presenting a polyhydroxylated aromatic ring in their structure. These compounds are plant secondary metabolites that have the ability of precipitating macromolecules (SANTOS *et al.*, 2017). The conventional process for cationization of tannins occurs by addition of ammonium hydroxide with formaldehyde, a toxic compound, through Mannich reaction (HAMEED *et al*., 2016). Thus, in this work it is proposed a method to obtain flocculants based on tannins in which formaldehyde is not involved. Commercial tannin samples from *Acacia mearnsii* were used. The method of cationization, an amination reaction, was adapted from Braghiroli *et al.* (2013). In the coagulant synthesis experiments, the parameters evaluated were different proportions and methods of addition of the reagents, as well as, reaction time. The reaction products were used to prepare flocculant solutions, which were tested in jar tests to evaluate their efficiency in coagulation and flocculation processes, when compared to Tanfloc®, a commercial coagulant/flocculant based on tannins. Two methods of reagents addition were tested, bubbling and slowly adding NH4OH to tannin aqueous solution. The second method had positive results in jar tests, allowing flocks formation. Two reaction times were tested, 1h and 24h, the first one showed positive results in jar tests; 24h reaction time led to gelification and was not successful in jar tests. Two proportions of NH4OH to tannin were tested, 5:1 and 1:1, both allowed flock formation, however the amount of flocculant solution needed was much higher (2000 ppm for 5:1 and 2200 ppm for 1:1) when compared to Tanfloc® (50 ppm). Thus, it is possible to obtain flocculants/coagulants from tannins without using formaldehyde; however, the process needs to be optimized.

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DC resistivity method for underground water evaluation

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Climatic changes and the fast growing of water requirements put pressure on the natural resources available. The poorest population will be strongly affected by the decrease of potable water offering and this will intensify the economical differences between countries and regions. Farming is responsible for 92% of the global water footprint and until 2050, the world food needs will increase around 70%. Thus, water management is essential to guarantee water resources in the planet. The state of Rio Grande do Sul (RS), whose economy is based on agriculture and livestock, has faced prolonged droughts. The industrial sector linked to the primary sector is very dependent on water resources for food processing. In order to produce 1 kg of grain approximately 1,500 liters of water are required whilst 1 kg of beef requires 15,000 liters. Changes in the rainfall pattern lead to broken crops, resulting in impoverishment of population and state. In 2012, RS government estimated that the drought would have already caused a loss of R$ 2.2 billion. One possible solution to overcome the lack of meteoric water is the exploration of ground water. It is proposed the use of a geophysical method to determine the depth and the quality of underground water reservoirs. Special attention is given to the recharge zones. Electrical resistivity sounding (ER) is a geophysical method that allows the identification of geological materials found in subsurface. This method avoids excavations which require more time and higher costs. The usual configuration is formed by four electrodes. One pair is used to inject the electric current in the subsoil, while the other one is used to measure the electrical potential difference generated as a result of the current flow. Geophysical surveys were performed in Santa Cruz do Sul city. The DC resistivity method was carried out in a line with 80 m long, with a unit electrodes spacing of 5 m, applying the dipole-dipole array. After acquisition, data were processed and inverted using the software Res2Dinv®. Layers of clay soil and sandstone were identified. It is believed that the sandstone layer has the potential to store water. This characteristic allows the reservoir recharging, but shows its vulnerability for external contaminants. It is expected to compare geophysical information to data from other wells to perform a calibration and to include in the study regions where there are no wells drilled so far.

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Microbial life in water and mud samples from the Rio Doce (MG) collected in December 2015

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Two dams of iron mine waste disrupted in November 2015 in Minas Gerais (Brazil), burying the city of Bento Rodrigues with 50 million cubic meters of water and mining tailings. This accident generated a serious impact on rivers and cities up to 500 kilometers away. The main river of the region, the Rio Doce, was the most injured and transported high volumes of this mine waste until the marine environment. Analyzes of samples from the muddy sediment of different points of this river revealed that metals like Fe, Mn and Zn reached levels far above the Brazilian acceptable values. Studies of microbial communities based on deep DNA sequencing are very robust strategies that can be applied to characterize the composition and dynamics of altered environments, since they allow large-scale characterizations of microorganisms occurring in any water or sediment sample. Additionally, the culture of microorganisms from impacted areas is also important to achieve a global characterization of life forms that persist in adverse environmental conditions. This work aims to evaluate the microbial life that persisted in samples of water and mud from Rio Doce collected at Governador Valadares (MG) one month after the disruption of the iron mine dams (Dec/2015). The samples were collected aseptically, stored in plastic bottles and then transported adequately to the IPR/PUCRS. For DNA sequencing analyzes the total DNA was successfully extracted from samples and used for PCR amplifications of 16S (prokaryotic) and 18S (eukaryotic) ribosomal genes. The PCR products were then subjected to deep sequencing in Ion Torrent platform. Samples were also used to isolate microorganisms in culture media with high levels of Fe, Mn and Zn to select for metallotolerant microbial species. The results to date indicate a high level of prokaryotic diversity, revealed by a total of 227,790 16S gene sequences that were identified in 26 phyla, 65 classes, 125 orders, 224 families and 332 genera. The phylum Proteobacteria was the most frequent in both water and mud samples (more than 47% of total reads), although the second phyla in importance differed between samples (Bacteroidetes in mud at 18%, and Actinobatcteria in water at 12.2%). In both samples a very high occurrence of unclassified OTUs (from 20% to 30%) was detected. Sequencing analyses of the eukaryotic diversity, as well as the microbial isolations are in progress. Moreover, a new group of samples was obtained one year after the first collection (Dec/2016) and will be soon submitted to the same analyses. The data collected by this project will bring important information about the surviving microbial communities from Rio Doce, which is an important biological indicative of the water and sediment quality of this highly impacted Brazilian environment.

Monitoring the quality of herbimix-contaminated water through the evaluation of physiological parameters at jundiá (*Rhamdia quelen*)

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INTRODUCTION: Contamination of rivers, streams and dams by pesticides derived from agricultural practices is a major problem worldwide. Herbimix is a selective pesticide for maize. Fishes at the top of the food chain can be used as a bioindicator of water quality. Thus, this work proposes the use of jundiá (Ramdia quelen) as an environmental bioindicator since we found this species in water reservoirs interspersed with agricultural crops. To evaluate the effect of this contamination on the carbohydrate metabolism of this species, the liver tissue analysis was performed. Naturally, fish perform physiological adaptations to external interference. However, when the mechanisms of adaptation are very intense, they can be harmful to the health of these animals (BARCELLOS; FAGUNDES, 2012). Therefore, the objective of this work was to investigate glycogen alterations in the hepatic tissue of jundias exposed to Herbimix and to stress METHODOLOGY: The fish were submitted to acute intoxication with 50% LC50 (5.25 mg/L) for 96 hours. These animals were divided into different groups (T1-control, T2- defensive, T3-defensive + stress and T4-stress). Each group had n = 10. After the period of exposure to the contaminant, the fish were captured and anesthetized (MS222 Finquel® 300 mg / L). Later they were slaughtered by medullary section and dissected for collection of liver. Glycogen extraction follows the Van Handel method (1965), with glycogen being quantified as glucose after acid hydrolysis and neutralization. The determination of hepatic glycogen was performed using the glucose kit (Labtest). The results were analyzed by ANOVA statistical treatment, followed by the Tukey test, with a significance level of $P < 0.05$. RESULTS / DISCUSSION: The results of liver glycogen for acute intoxication were as follows: (T1: 99.21 ± 27.17, T2: 13.01 ± 2.17, T3: 19.22 ± 3.4 and T4: 134.2 ± 47.16). Glycogen in liver tissue had a decrease ($P < 0.05$) both for the group exposed to agrochemical (± 87%) and for the agrochemical group + stress (± 81%). CONCLUSION: The jundiá presented a mobilization of the glycogen reserves against the contamination by the agrochemical, as well as in the association of this to the stress. Thus, we can conclude that the contaminant led to the change in the aquatic environment, implying a probable change in the water quality of this medium confirming the importance of the use of a bioindicator in the monitoring of water quality.

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Conflicts and environmental fitness in nascents and area of permanent preservation of watershed

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Global climate change will affect people and the environment, being water cycle highly altered, with deleterious consequences to ecosystems and the production of water from watersheds. The objectives were to quantify the area of permanent preservation (APP), o infer about the environmental suitability of springs in the areas of permanent preservation (APP), forest cover and the area of land use conflict in front of Cuesta the watershed Ribeirão São Pedro, at 920 meters altitude in Botucatu – SP. These parameters were obtained in the map (IBGE) scale 1: 50.000, using ArcGIS version 9.2. The front of the Cuesta, with 42% slope, presents a steep relief with roughness coefficient indicating favorable lands for reforestation. The conservation area of 582.2 hectares with permanent showed only 30% forest cover. It was concluded that the areas of conflicting use in high relief with slope absence of 70% of the native forest, substantially change the environmental equilibrium of ecosystems, with biodiversity losses, the microclimate and regulating the water of the watershed system. When there is a conflict of use of the APPs around the springs and rivers, it is necessary the environmental adequacy according to the Forest Code Brazilian.

Investigation of the genotoxic effects of water from the Tega River, Caxias do Sul, Rio Grande do Sul

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Hydrographic basins with increasing urbanization are subject to a set of anthropic impacts that can compromise the quality of water resources and their sustainability (Cassanego and Droste, 2017). The presence of sources of pollution, such as industrial, domestic and agricultural, introduced into rivers changes the physicochemical composition of water, forming complex mixtures that can cause toxic and genotoxic effects on living organisms (Merlo *et al*., 2011). This study evaluated the genotoxicity of the Tega river in the municipality of Caxias do Sul, located in the state of Rio Grande do Sul, Brazil. *Tradescantia pallida* var. *purpurea* cuttings with flower buds were exposed in the summer and winter of 2016 to water samples from three sites of the Tega river: near the spring (S1), upstream (S2) and downstream (S3) of a water treatment plant. Simultaneously, negative controls (flower buds exposed to distilled water) were analyzed. Micronuclei (MCN) frequencies were determined in pollen mother cell tetrads. Concentrations of aluminum (Al), cadmium (Cd), lead (Pb), cupper (Cu), chromium (Cr), nickel (Ni) and zinc (Zn) were analyzed. In summer, MCN frequencies of 5.2, 2.7 and 3.7 were recorded for S1, S2 and S3, respectively. In winter, the frequencies were, respectively, 2.4, 3.2 and 3.8. The MCN frequencies of the control were significantly lower than those recorded for S1 and S3 in summer ($H=21.0107$, $P<0.001$), and for S2 and S3 in winter ($H=12.5419$, $P=0.005$), according to the Kruskal-Wallis test, followed by the Student-Newman-Keuls test, at 5% probability. Metals at concentrations above the Brazilian legal limits in summer were: Zn, Cu, Al, Cr and Ni at S1, ZN, Cu and Ni at S2, and Cu, Cd and Al at S3. In winter, Cu and Ni were above the legal limit at the three sites. Disposal of industrial waste is a major source of contamination of rivers with heavy metals. Caxias do Sul is the second metalworking pole of the country and has many metallurgical industries that use these metals, and once thrown irregularly in the sewers, contaminate the watercourses. The biological and chemical parameters assessed in this study will be monitored for a long-time period, to contribute to an integrated environmental diagnosis of the scenario of the studied area.

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Sustainable development and challenges to water management in the municipality of Cachoeirinha (RS). Brazil.

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The municipality of Cachoeirinha is located in the metropolitan area of Porto Alegre, in the state of Rio Grande do Sul, Brazil. It belongs to the natural Pampas region and is located within two watersheds of high complexity: The watersheds of Gravataí River and Sinos River, where the most polluted rivers in the country are located. The city is divided by four sub-watersheds: Brigadeiro Stream, Passinhos Stream, Barnabé Stream, and Sapucaia Stream. It has a 44,018 km^2 area and 125,246 inhabitants, with a 2,687/ km^2 (IBGE, 2015) population density. High Human Development Index ranking (HDI, 2010): 0.757 points, above the state average. The Environment Municipal Secretary (SMMA) seeks to implement an environmental management policy based on the principles and guidelines of the Brazilian Agenda 21, the Eight Millennium Goals, based on Environmental, Basic Sanitation, and Director of Urban Development plans. As part of Social-Environmental Education, the SMMA establishes strategies in public policy interrelating the sectors of civil society through which the individual and the community can build social values, knowledge, skills, attitudes, and competency aimed at conservation of the environment, a healthy quality of life, and guarantees of sustainability. In this model, Cachoeirinha participates in the guidelines of the United Nations to meet UN Water's global campaign in the International Decade for Action 2005-2015: "Water for Life", with local public policies such as the consolidation of the Municipal Plan for Basic Sanitation, the renewal of the water resources management contract with Companhia Riograndense de Saneamento- CORSAN to broaden the entire sewage network system in about 73% coverage (currently exceeds 176 km of collection network) and make drinking water universally accessible, the execution of projects to expand the Sewage Treatment Station - ETE Free-Way, the completion of the stormwater drainage system: Conduto Forçado; partnerships with the Local and State Public Ministry in order to regulate the connections to the entire sewage network that currently exceed 54% - the highest rate in the metropolitan region of Porto Alegre, the supply of drinking water with 97% coverage, the activities regulated in the Environmental Licensing governing the uses of water in the city, the promotion of public hearings, and social-environmental campaigns and educational programs in continuing actions to change habits and attitudes that may increase the commitment of all parties to sustainable local environmental management.

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Geochemical – sedimentological characterization of the urban igarapés of Santarém/PA, Brazilian Amazon

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The *igarapés* are typical amazon creeks of the so-called *várzeas* and *terra firme* areas of Brazilian Amazon, characterized by acidic and high-oxygenated waters. The *São Brás*, *Irurá* and Urumari igarapés constitute the superficial water drainage network of the Santarem metropolitan area, the largest municipality of the lower amazon region of the state of Pará (Junk 1983, Sioli 1985, Mendonça *et al*. 2005). These creeks are widely used for domestic water supply and recreation by the local population, even so, little research has been done about the geochemistry of these aquatic ecosystems (IBGE 2010). In order to contribute to the lack of knowledge, water and bottom sediment samples of the three main urban igarapés have been collected at the end of the dry season (December 2015) and at the end of the rainy season (July 2016) to identify their geochemical characteristics. So, pH and Temperature (Hanna HI991003) have been measured in situ and in UFOPA laboratories analyzed the EC (YSI EcoSenseEC300A), turbidity (DM-TU), color (Hanna HI96727), DTS (Hanna HI9889) and DO (titrimetry), and grain size analysis of the sediments. The results show that the pH values range from 4.65 to 6.79 (mean of 5.66±0.76), the temperature varies between 23°C and 31°C (mean of 25.4±2,05°C), DO ranges from 4.43 to 10.5mg/l (mean of 7.1±1.16mg/l), EC varies from 8.6 to 55.9µS/cm (mean of 24.8±17µS/cm), DTS are between 4,43 and 35,9mg/L (mean of 15.2±9.8mg/L) and the turbidity 0.7 a 36.5NTU (mean of 10.3±10.7NTU). The sediments consist of sand (68 to 96%), silt (3 a 23%) and clay (1 a 9%) and quartz, kaolinite and anatase. Therefore, the *igarapés* are generally geochemically characterized by the acidic clear coreless odorless waters with typical DO, EC and DTS values for natural waters according to 357/2005 CONAMA (Brasil 2005), with fine quartz sands. The waters of the studied igarapés are mainly in agreement with CONAMA's guidance 237/2005 for human use (Class 2a), however they require treatment to guarantee their potability (BRASIL, 2004). In some parts of the igarapés, contaminant inputs such as household detergents, pottery material and turbid runoff waters were observed. However, these inputs are punctual and do not seem to affect water quality from a geochemical point of view at the selected sampling points. It is also important to note that this is a preliminary study of geochemical characterization of the main igarapés of the Santarém metropolitan area and that no bacteriological or tensoactive analyzes were performed.

Variation in water quality at Arroio Grande stream: comparison between sampling upstream and downstream the city in summer

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The National Sanitation Foundation (NSF) developed a commonly used water quality index (WQI) in 1970. The NSF WQI was developed to provide a standardized method for comparing the water quality of various bodies of water. CETESB (Environmental Company of the State of São Paulo) has been using WQI since 1975 and today is the main water quality index used in Brazil (ANA, 2012). An assessment of the sewage system situation of Arroio Grande conducted by Schumann et al (2016) reveals that the city does not present any type of treatment of the collected sewage, representing a high-risk contamination source. The samples were collected from Arroio Grande stream, in the city of Arroio Grande at coordinates 32°14'22.3"S and 53°05'23.4"W upstream and 32°15'19.9 "S and 53°04'52 "W downstream the city, in order to verify the difference in water quality index in these two sites. The aim of this work was to verify the influence of diffuse sewage release on the water quality in main water body: Arroio Grande stream. Samples were collected in 2014 and thirteen parameters were analysed as described in APHA (2005) through Standard Methods for the Examination of Water and Wastewater. WQI results showed that in December, the site upstream the city presented a good water quality (WQI=86.84) and the site downstream presented a medium water quality (WQI= 53.78). In January, the site upstream also presented a good water quality (WQI= 85. 22) and the site downstream presented a medium water quality (WQI= 66.75). It was concluded that in both months of the summer, the site downstream the city (possibly affected by sewage disposal of all residences) presented a reduction in water quality, proving the influence of the city in the stream water quality.

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Critical review of sewage system in Arroio do Padre/RS

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Basic sanitation services can be described as the set of activities that includes the collection of solid waste, urban drainage, water supply and sanitary sewage. The correct disposal of sewage is essential for human health and life quality (TELLES, 2014). The city of Arroio do Padre is located in the southeast of Rio Grande do Sul state (Brazil) and has an area of 134.317 km² and estimated population of 2.895 citizens in the year of 2016 (IBGE; 2010). For this work, it was performed a data collection in 2015 based in the information given by Brazilian Institute of Geography and Statistics (IBGE) in the 2010 census, besides field trips. From this information, a descriptive mapping of the potential of the sewage network of the city was carried out. Arroio do Padre has about 530 residences with no sewage collection or sewage treatment, leaving the population with the use of septic tanks, sinks, and in some places occur open-air dumping. 17.11% of all the residences have no bathrooms or these are incomplete, of which only 4.48% has a toilet. The city does not have a public concession to provide sanitary services, and is itself responsible for services of removal and treatment of domestic sewage. However, there is no legal determination to create the responsibility for the sanitary sewage system in the area. Among the 130 residences in the urban area and surroundings analyzed in the 2010 census, 33.85% use the septic tank system, 65.38% residences use rudimental tanks and 0.76% of residences have no bathroom. The data showed that the city has no sewage collection network and although there are efforts in solving specific problems, Arroio do Padre needs strategies for the definitive solution for problem because the lack of basic sanitation services or the inefficiency in these services contributes to problems in population health (FERREIRA et al. 2016).

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Estimation of a Trophic State Index for Uruguay River in Jaguarão/RS

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Water is one of the most important element in earth and it is essential for maintenance of life. Anthropogenic activities around water bodies can cause water contamination, so the Trophic State Index (TSI) is a useful method for water pollution determination and control. Carlson (1977) proposed to quantify the TSI value into for classes (oligotrophic, mesotrophic, eutrophic, and hypereutrophic), and Esteves (1998) proposed two more classes (ultraoligotrophic and supereutrophic). The aim of this study was to determine TSI classes for Uruguay River in the city of Jaguarão, RS, Brazil, during 2014.Two monitoring points were distributed with criteria of high and low anthropogenic influence and were sampled according to the procedures described in APHA (2005), and analyzed at the Laboratory of *Agência da Lagoa Mirim.* Thirty-two samples were collected and phosphorus parameter analyzed.The results showed that the sampling point farthest from the urban center presented classes of TSI in the supereutrophic levels, and the sampling point near in the city has TSI classified as hypereutrophic. The TSI results showed the high risk of eutrophication in the Uruguay River, describing it as a lotic environment in eutrophic condition. This condition may create serious problem to the water body and local people.

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Session 04. Sustainability in Exploration, Mining, and Renewable Energy

Conveners:
Prof. Dr. Ulrich A. Glasmacher, Institute of Earth Sciences, Heidelberg Center for the Environment, Heidelberg University
Prof. Dr. João Marcelo Ketzer, Instituto do Petróleo e dos Recursos Naturais (PUCRS)

Energy and Minerals are resources supplied by the natural environment and are used intensively by the human society. The need for elements and metals and the shortness of some of important elements (e.g. Rare Earth Elements) shed a light of the sustainable development of natural mineral resources. In addition, all societies provide financial support for research in the field of sustainable generation and use of energy. This research is driven by the future shortness in Oil deposits; the CO2 generation by using conventional energy sources, and the rising awareness in the human societies that radioactive decay takes a very long time to produce safe nuclear waste. The talks should describe these resources, their use in human societies and provide information on the sustainable use in the future. If possible all talks should include a short historical overview.

Keynote Lecture:
Prof. Dr. Ana Olívia Baruf Franco Magalhães, Instituto de Ciência e Tecnologia (Unifal-MG)

Oral presentations

Session 4

Sustainability in Exploration, Mining, and renewable Energy, important for and dependent on Human societies? Perspective from Planet Earth.

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The term “sustainability” is used in the sense of the early definition (March 20, 1987) by the Brundtland Commission of the United Nations: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. In general, sustainability is seen in the interaction of Environment, Social Actions, and Economics. Environment (Earth resources and processes) is connected with human societies (Social and Economic) by the terms “bearable” and “viable”. These terms describe a possible way in which human societies can sustainably develop by living within the system Earth and using the resources of planet Earth. The focus of the presentation is to understand the Earth resources and processes, the cultural identities, and the unique conditions in Economy, Law, Politics, and Social actions between Europe and Latin America. Therefore, the presentation will focus on the cultural identities, the Earth resources and processes (Minerals, Energy), and present the sustainable development in human society (Economics, Law, Politics, Social actions). Exploration, Mining, and renewable Energy are examples for fields of complex interactions between human society and natural resources. In addition, all themes related to Earth resources and processes would be discussed in the view of conflicting priorities of human needs.

Mineral ores in Brazil with a focus on the resources for green energy

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It is globally accepted that Brazil is one of the top players in mining industry. The country has a huge area with great potential for rare earth elements (REE) minerals, highly used to build up equipments in order to obtain the “green energy”. However, Brazil has high fertility but low maturity, considering the very low levels of investments in this mineral exploration topic. This could bring significant potential for new discoveries and developments on the metallurgy. The current study will present the state-of-art for REE mines, deposits and occurrences with a focus on providing an overview of the mineral exploration and adding value to the Brazilian mining sector.

Recycling of residual material from metallurgical processes towards a circular economy

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In the search of a more adequate production, which reduces environmental burdens and promotes a more sustainable use of raw materials, the current technological developments are focusing on energy productivity and resource efficiency. In this context, metals play a pivotal role due to their theoretical unlimited recyclability. Recycling is more difficult today than in the past, partly because the dissipation of valuable alloying elements in more highly alloyed structural materials already represents a loss of value in terms of raw materials. At the same time, complex reactions in production and manufacturing processes, and also during recycling, cause metal losses in the form of e.g. mill scale (oxidised surfaces during heating prior to hot rolling or during annealing), slag, filter dust and overspray from spray coating processes. The world is undergoing global structural change; taking into account the heavily populated BRICS countries and other newly industrialising countries, over 50 % of the global population contributes to the demand for raw materials. Brazil is one of the resource richest countries, which currently exports a large share of its raw materials, but in some sectors (aircraft construction, automobile manufacture, renewable energy, iron ore industry, steel industry, and others) already has modern, innovative and high-performing industries that are international leaders. Future developments will lead to the growth of innovative industries, which in turn will lead to a broadening of Brazil's economic base in addition to its raw material production. Consequently, recycling techniques and processes with which metals from past production residues and from waste materials in present production can be returned to the reusable material cycle are becoming increasingly important. With these techniques, the need of mineral extraction will decrease and major energy savings in metals recycle processes will be achieved, with related CO2 emission abatements.

Characterization of self-reducing Electric Arc Furnace Dust and petroleum coke mixtures aiming their use in steel mill

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The Electric Arc Furnace Dust (EAFD) is a solid waste originated from electric steelmaking furnaces. Currently, according to some authors, it is estimated the generation of 15 to 25 kg of dust per ton of steel produced. The formation of the dust is related to the following steps of the process: furnace charge, metals volatilization, iron volatilization under the arc, solid particle drag and, mainly by the collapse of CO bubbles formed by metallic bath decarburation. The dust has metals that are harmful to the environment. Otherwise, it is mostly composed of elements iron, zinc and oxygen. Due to increasing costs for disposal and because it is considered a hazardous waste, industry is looking at the possibility of returning the dust to the steelmaking process. One of the alternatives is by reintroducing the waste in electric melt shop using self-reducing agglomerates as part of the furnace burden. In this study, self-reducing mixtures are prepared with EAFD and petroleum coke (PET), presenting chemical and physical characterizations. An evaluation about the behavior of the mixtures is carried out in thermobalance, regarding the possibility of use in measuring accurate PET content in self-reducing pellets. As results it could be stated that the elements of economical interest, Zn and Fe, represent, respectively, 34.23 and 22.80%, in weight. These elements are present in chemical species frankilinite, zincite and magnetite and the reducible oxygen was estimated as 19.70%. Also, it was concluded the optimal content of petroleum coke in the mixtures varies from 10 to 15%, in weight. Therefore, the utilization potential of the thermogravimetric technique in the industrial field for adjustment of carbon content in batches of self-reducing pellets is satisfactory.

The goal of the ISO 50001 certifying system: cost reduction vs. environmental protection

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The global energy dependence is increasing which leads to the need to explore natural resources to maintain the functioning of society. Nonetheless, natural resources, if not renewables, are exhaustibles and they can be extinguished in the near future. To avoid this unfortune trend, better standards for energy efficiency in its generation and consuming is a great step to reach the promotion of the environmental protection. This research, through deductive method, pretends to verify whether the International Organization for Standardization - ISO 50001 - related to energy management systems could contribute for reducing energy consumption more efficiently and promote environmental protection, since the reduction of greenhouse gases (GGH) emissions is disposed as a goal in the standard's scope. Therefore, the legal nature of the norm is analyzed, considering the independent and private nature of the ISO. Energy management systems are provided through a Plan-Do-Check-Act procedure, establishing a baseline, action plan and monitoring to reach the targets. A great distinction is made between management standardization rules, as ISO 50001, and performance standardization rules. The first one is more flexible and can reach a wider range of organizations than the latter, which is more binding, restrictive, and maybe more effective. Finally, the conclusion is the ISO 50001 energy management system has the scope to reduce energy costs but, as an indirect effect, it can be considered as a mean to promote environmental protection.

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Development of a technology roadmap for biogas production from straw

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Technology Roadmap is a strategic tool that outlines the steps that an organization should follow to achieve the results and states objectives. It describes clearly links between tasks and priorities for action in the short, medium and long term and presents an effective script that connects technology, products and market at high levels of abstraction. As a result, the technological state of the company can be maintained and improved [1]. The straw is an agroindustry residue that lack proper destination and is usually disposed on the ground, contributing to the air pollution [2]. One of the most appropriated treatments for organic residues is the anaerobic digestion, which produces organic fertilizer and biogas, a gas mainly composed of methane. The process to obtain biogas is being promoted as an energy source of low carbon, potentially capable of reducing the dependence on fossil fuels, since the gas can be upgraded and be inserted in the gas grid, converted into thermal and electrical energy and biofuel for transportation [3]. This research aims at the development of a technology roadmap related to the biogas production from lignocellulosic waste. The methodology included the research in specialized media publications, scientific articles and applied for and granted patents. These technical documents were submitted to a detailed analysis of various criteria such as year of publication, country origin, type of author, focus of the study and the development of taxonomies related to the analyzed content [1]. This analysis was organized in the technological map, at different time periods, according to the selected taxonomies. The findings suggest that the majority of players were Chinese ones. Also, multinational players specialized in unrelated areas and not known for biogas production, like Novozymes, Shell and Texaco, have appeared in more than one period, whose documents had distinct approaches, elucidating possible long term strategies. The conclusion was that pretreatment is a crucial driver for process viability and that there was an increased investment in R&D carried out by China in this technology in comparison to the rest of the world, although hardly any patents were applied in foreign countries. The technology roadmap presents an important strategic planning tool for decision-making of the different players in the industry.
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Gold mining - output is not equal profit!

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Mining activities in the Amazon Rain Forest date back to the early 20th century comprising exploration projects for metallic, non-metallic and energetic recourses, when international and national mining companies began to prospect, explore and exploit. Mining of gold began in the Amazon Region as early as the 16th century in more easily accessible locations close to the coasts and major rivers. Mining around the world goes back to the Stone Age. Mining, as well as any other productive activity, causes expenses and profits. It is a widespread prejudice that, in mining, especially gold mining, the actual production is often equated with profit. However, the fact that considerable costs and expenditures are incurred is frequently not taken into account or even forgotten - or has anyone ever wondered if the money you pay at the cash desk when shopping at the supermarket is a hundred percent of the cashier's income? This study is intended to show all spending incurring with the extraction of one kilogram of gold over a certain period of time. The results are then converted directly proportional in percentages from exactly this one kilogram of gold. Above all, the different conditions for gold mining are taken into account, both from a regional and a technical point of view. Survey of primary data is carried out in industrial gold mining and small scale artisanal gold mining activities in the “Tapajós Mineral Province”, located in Western Pará, Brazil, which serves also as contribution to the project "NaGold" at the Institute for Industrial Ecology at the University of Applied Sciences Pforzheim. For further investigation, a distinction is made here between energy and non-energy costs, taking into account all incurring expenses such as fuel, machines, equipment, maintenance, environmental protection, mercury, cyanide, transport, taxes, licensing, royalties, survey, prospection, salaries, food, housing, among others.

Renewable energies: utopia or reality?

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The current concern for the environment has won impetus in an era which technology, while being largely responsible for the increase in energy demand, was able, on the other hand, to disseminate widely the fineness of natural resources to society. This analysis has resulted in a global alert. Since then, the concept of sustainable development has gradually increasing seriousness. The appearance of new studies and ideas occur daily as a consequence of a more apprehensive society on this theme, which mainly comprises the next generation's future. Nowadays, sustainability means providing needs not only of the present but also of the future, engaging essential values for the acting of the Institutions in the development of the society. Therefore, the lecture "Renewable Energies: Utopia or Reality?" discusses the use of fossil fuels and their brief finitude, the world panorama of renewable energy use, the obstacles and possibilities of Brazil in this market. Thereby, the presentation will mainly cover photovoltaic and wind generation technologies, whereas the country enjoys a wide unexploited availability of these resources in its territory (according to ABSOLAR, 440,5 GW of total capacity for wind power and 28,683 GW for solar). The study seeks to corroborate with the concept of environmental strategy that, according to Claver et al. (2007) conceptualize as being the result of the combination of environmental management and the development of a new strategy. Environmental management is the part of the management system that includes the organizational structure, responsibilities, practices, products, processes and significant resources found and maintained in the specific environmental behavior that can reduce the environmental impact caused by the operations of any company in the natural environment. In addition, it aims to disseminate knowledge in renewable energies by proposing a reflection on the issues addressed.

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Brazilian distributed energy policy and its contributions for UN's Sustainable Development Goals (SDGs)

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The close connection between sustainable development and renewable energies' fostering has been acknowledged by UN's Sustainable Development Goals (SDGs) through Goal 7, which is to "ensure access to affordable, reliable, sustainable and modern energy for all". As a developing country, Brazil faces the challenge of developing efficient regulations to achieve such goal. Brazilian electricity matrix is regarded as one of the cleanest worldwide, relying almost 82% on renewable sources. Solar energy, though, represents much less than 1% of this share that is mainly featured by hydroelectricity, which represents 83% of it. Although renewable, there are some setbacks in relying so heavily on such source of energy, once, besides controversies over its structuring (such as social and environmental impacts), it creates a major dependence that can affect a country's energy security in case of droughts. In this context, the Resolution 482 released in 2012, that establishes the general conditions of distributed energy, has been promoting the investment in renewable energies and the maintaining and diversification of Brazilian electricity matrix. Fundamentally, this resolution allows Brazilian people and private and public companies to generate their own energy up to 5 MW per unit while still connected to Brazilian power network. Since its release, it has been driving the market of renewables: until June 2017, the installed capacity of renewables linked to distributed energy was around 133 MW. From 2015 to 2016, the distributed energy installed capacity grew 400%, indicating that the community is gradually engaging to the idea and that a smarter, more distributed and less reliant grid is not only possible, but also under way. In this sense, allowing the generation to be decentralized has been of crucial importance for Brazil to meet with the sustainable development agenda, once the policy ensures universal access to affordable, reliable and modern energy services (target 7.1 of SDG 7) and substantially increases the share of renewable energy in the global energy mix (target 7.2 of SDG 7). Due to the complexity of the problem in question, achieving the Sustainable Development Agenda on its entirety, by 2030, will certainly require multiple efforts by governments, with integrated policies strategically oriented towards sustainability and resource efficiency. With regard to the fostering of renewable energies, it can be said that the resolution in question - is spite of its complementary role - represents an important step in the transformation of Brazil's electricity matrix, contributing to a more diversified and sustainable model of development.

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Poster presentations

Session 4

SEAGAS: fluid venting from gas hydrate systems on the Brazilian and Mediterranean ocean margins

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SEAGAS is a 3-year initiative to study processes in the deep sea, involving research groups in Brazil and Europe, including in Germany. The project is being coordinated by PUCRS in collaboration with Géoazur in Nice, France. The hosts have complementary strengths in marine geoscience as applied to submarine gas hydrates, consistent with the project's research, training and strategic objectives. SEAGAS involves research into gas hydrates, ice-like compounds of water and natural gas (mainly methane) that form at high pressures and low temperatures and so are stable in areas of permafrost and in deep-sea sediments. The oceans cover 71% of the Earth, and submarine gas hydrates form what is estimated to be the world's largest reserve of greenhouse gases. The stability of this 'frozen' methane reservoir is sensitive to temporal changes in sea-level and water temperature, but also to the poorly understood dynamics of chimney-like structures observed to vent gas to the oceans. SEAGAS aims to improve our understanding of fluid venting from gas hydrate systems, by comparing occurrences within the deep-sea fans of the world's two largest rivers, the Amazon and the Nile. Numerical modeling of gas hydrate stability in the two areas is being used to guide interrogations of marine datasets held by the hosts, in order to generate hypotheses for the acquisition of new data during a joint oceanographic campaign to take place during the project.The overall training objective of SEAGAS is to diversity the competencies of the researcher and project participants. The outgoing host contains a group dedicated to consolidating Brazilian expertise in gas hydrate studies, with strengths in marine geochemical methods and concepts. The French return host has traditional strengths in marine geology and geophysics and a growing interest in gas hydrates. The SEAGAS project is designed to bring all participants together in joint activities, including data acquistion and analyses, to address shared research interests. The strategic aim is to consolidate an emerging collaboration between the outgoing and return hosts, and to stimulate the development of future projects involving Brazilian and European scientists in mutually beneficial research activities. The Marie Skłodowska-Curie Actions offer opportunities for post-doctoral research mobility from Brazil to Europe, or from Europe to Brazil. The application deadline for Individual Fellowships is each year in September.

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A comparative analysis of the auto-suppliers' and the mini and microgeneration's legal regimes in german and brazilian energy law

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This paper aims to analyze the main differences between two legal regimes related to distributed generation based on renewable energy. Through deductive method, it presents the German and the Brazilian legislations in two separated topics, setting comparisons between them. In the first topic, it is presented the German legal regime, which, have been promoting and supporting renewable energies by means of the feed-in tariffs system. In order to implement the *Energiewende*, the Renewable Energy Act (EEG) established the legal regime through which consumers can generate their own electricity (*Eigenversorgung*) and get paid when the electricity is injected into the utility network (*Grünstromprivileg*)[1]. Since the EEG-2014 those prosumers[2] are no longer exempted from the obligation to pay the EEG-surcharge necessary to finance the *Energiewende*. This new approach raised political debates and legal questions, especially related to prosumers' vested rights to a certain legal regime. Rules to accommodate those old prosumers are also in the new version of the Act (EEG-2107)[3]. Besides that, the German specialized literature and the courts have already dealt with matters related to the concept of auto-supply and the concept of a PV-module, raising discussions as to what is distributed generation. By analyzing and evaluating the mature German legal system to promote auto-supply this paper offers relevant insights as to the developments that the renewable energy transition can undergo. In the second topic, the Brazilian electricity agency's Normative Resolution n. 482/2012[4] established consumers are allowed to generate their own (renewable) electricity, but on a net-metering system. An evaluation of the Brazilian legal regime poses some questions[5], mainly due the impossibility to freely trade electricity. Some doubts arise when the legal text is scrutinized. By offering an analysis of the detailed German legislation and comparing it to the established Brazilian legislation, we expect to offer the academia and the decision-making institutions some thoughtful insights as to how the mini and microgeneration of electricity from renewable sources can flourish and be promoted in a legally safe environment. Concluding remarks are drawn at the end of the paper.

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Physicochemical and microbiological analysis of soils on columns for simulation of CO2 leakage monitoring

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The aim of the project is the physicochemical and microbiological characterization of the soil, used in microcosms for biomonitoring CO2 leakage. The soil was collected at the campus of PUCRS in Viamão. The physicochemical analyzes are: pH, oxidation potential, conductivity, ash content, moisture content and organic matter. Microbiological analyzes are the most probable count of colony forming units and Ribosomal Intergenic Spacer Analysis (RISA). For the RISA execution, the soil's total DNA was extracted through the PowerSoil® DNA Isolation Kit (MOBIO Laboratories). These analyzes may indicate changes in soil behavior in the presence or contact with CO2 and, as such, be part of the Measurement, Monitoring and Verification (MMV) techniques of CO2 leakage in their storage wells. To simulate soil behavior, CO2 was injected into microcosms, which are PVC columns, filled with unsaturated soil and soil saturated with water. The analyzes were performed in three stages: previous to the injection of CO2, at the end of the injection and after the injection of CO2 (called the incubation period). In order to compare with the results in the microcosms, the same analyzes are also being performed for samples of points where CO2 injections were made directly in the soil. The physicochemical and microbiological analyzes are still being performed, but it is expected to obtain an optimized microbiological control model for ex situ CO2 leakage that contributes significantly to associated researches with MMV techniques, validating bio monitoring as a leakage control technique of CO2 in storage regions.

Biomass atlas of Rio Grande do Sul: an incentive to the biogas production as a source of renewable energy

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The increase in energy demands, coupled with the interest in reducing the dependence on fossil fuels and the need to reduce environmental problems, due to CO2 emissions from conventional energy sources, have been directing efforts to develop studies on sources of renewable energy. Biogas is a by-product of the process of conversion of organic matter into energy, called anaerobic digestion. The harnessing of the biogas energy potential, obtained from residual biomass, requires knowledge about the origin, supply and composition of biomasses to allow estimates of how much this energy source can contribute to the energy matrix. This study, consolidated through the Biomass Atlas of Rio Grande do Sul (Konrad et al., 2016), sought to compile information on the supply and potential of biogas generation of biomass residues available in the State of Rio Grande do Sul, in the south Brazil. The biomasses were quantified based on five generating sources: livestock (animal waste); agribusiness (sludge's and organic waste from slaughterhouses and dairy products); wine sector (sludge's and organic waste from wineries - seasonal); landfills and effluent treatment stations. The methods used for data acquisition and elaboration of the estimates were bibliographic research with consultation in reliable databases and field research with on-site visits for application of a specific questionnaire. The results were framed by region of the State, being presented estimates of biomass generation, biogas generation and biomethane generation for each Regional Development Council. This study converges with Public Policies to incentive the decentralized production of energy and allows to infer that the geographic distribution of biomasses in the State of Rio Grande do Sul is heterogeneous, resulting from the productive and economic characteristics of each region. According to the total estimated biomass of the State (85.7 million tons.year^{-1}), an estimated biogas generation potential of 9 million m³.day^{-1} was estimated. The biomass access is a determining factor for a recovery situation through its conversion into energy. In this sense, a significant part of potential existent in the State is suppressed due to logistical issues, reducing by more than 50% the volumes of biogas possible generated. The mapping allows the identification of scenarios that can direct investments in the biogas area.

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The study and implementation of a low-cost biodigester in a small rural property in Araranguá, SC

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One of the major issues associated with dairy cattle is the high production of manure. The correct disposal of these animals excrement is a challenge that encompasses technical, health and economic aspects. The installation of a low-cost anaerobic digester fed with cattle manure can contribute to addressing these challenges, by reducing negative social and environmental impacts of dairy farm activities. The purpose of this project is implementing a low-cost biodigester as well as to assess the behavior of anaerobic digestion and biogas production. The biogas will be used for water heating. The hot water is used to wash milking machines by small rural families in Araranguá, South of Santa Catarina State. These families use liquefied petroleum gas (LGP) for heating what increases their costs of production. This project will be a pilot experiment for starting the Brazilian regional group of the German organization "Technology Without Borders" (Technik ohne Grenzen)[1]. The Brazilian Group is starting its activities within the framework of the Energy Engineering program in the Federal University of Santa Catarina. Technology Without Borders supports engineering students in implementing low-cost technologies in developing countries. TWB places great importance on offering students the opportunity to make a difference through the application of technical and engineering skills to a variety of challenges in different locations and cultures. In Araranguá the low cost biodigester project is divided into two stages. Firstly, a literature review referring to themes like biomass, cow manure, biodigestion, biodigesters, and biogas was carried out. Secondly, it is planned the construction, installation, operation and monitoring of a biodigester in a dairy small farm. The project stages are carried out in partnership with Epagri – Santa Catarina State Agricultural Research and Rural Extension Agency. Among the results it is expected that the project will promote: 1) the use of low-cost energy production technologies in Araranguá region, 2) further cooperative projects with Epagri, 3) the partnership between the Federal University of Santa Catarina and Technology Without Borders Germany.

[1]Technology without Borders – solutions applied together. Access 17.05.2017 https://www.teog.ngo/?lang=en

Public policies and energy storage in Brazil

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Electricity in Brazil comes traditionally from hydro resources, thus, a renewable energy. This model has always made the country a pioneer in the use of clean energies. Nevertheless, hydropower can also have environmental and social impacts which include, for example, the flooding of large areas to formation of hydroelectric plants reservoirs and the forced dislocation of people of their homes. The E.P.E. (Brazilian Energy Research Company) responsible for planning the energy issue in the country has been attentive to the inclusion of other clean sources in the Brazilian matrix. Then, during the last ten years a favorable use of the wind and more recently the sun has given room to the eolic and photovoltaic energies. The intermittency of these sources and the difficulty of building new hydraulic plants with storage, indicates the need for alternatives to supply during periods when the demand for energy requires more than their producing capacity. This concern becomes even more evident in regions where energy production is based on intermittent sources. The cost of transmitting this energy to potential consumer areas may turn new projects unavailable. Therefore, the energy storage is a theme which should be addressed by the public policies. Commonly, during this period of intermittency, fossil fuel energies are used to supply additional demand. Policy of displacement of electricity consumption at peak time has resulted in distributed use of power generation with diesel fuel. However, the energy from fossil sources are not environmentally friendly. Moreover they are against the global trend which points out to the development of low carbon alternatives. Inside this scenario, this work aims at identifying the policies oriented to the issue of energy storage in Brazil. In other words, how this issue has been planned by the public actors who are responsible for the energy management. The study is divided into three parts. First, it is going to be explained the Brazilian power sector and its particularities. The second part will describe the storage technologies. Finally, the third part presents the energy storage policies in Brazil and some international experiences. The research has been carried out through literature and documentary review. Data has been collected from academic works, reports and official documents published by the agencies responsible for e energy planning and regulation. Among the expected results, this research aims at finding out how the storage issue has been considered by the Brazilian policy makers considering economic, social and environmental aspects. It also going to be discussed if and how the Brazilian international experiences can be useful in the national context.

Wind energy in the coastal zone of Brazil

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INTRODUCTION. The present research describes the Brazilian wind sector, based on a search protocol with the help of governmental tools. Through it was possible to locate, identify and list the wind farms installed in the cities presents in the Coastal Zone of Brazil. In addition, it was estimated the area occupied by wind projects and the number of wind turbines installed. At the end, the importance of the Coastal Zone in the production of national wind energy was discussed. METHODOLOGY. A search protocol was created based on three tools provided by the Brazilian government: Generation Information Bank - BIG / ANEEL; Geographic Information System of Wind Power Plants - SIGEL-EOL / SGC / ANEEL; Coastal Management System - SIGERCO - MMA. Coastal wind farms were located, listed and identified, as well as the number of wind turbines and the estimated occupied areas. Due to the number of wind farms in operation, the data were grouped by region. RESULTS.The distribution of Brazilian wind farms reflects the exploitation of the sites with the best wind power resources of the country, that are located on the coast (AMARANTE, et al., 2001). There are currently 414 wind farms in operation, with more than 60% of the projects installed in the states of Ceará, Rio Grande do Sul and Rio Grande do Norte (ANEEL, 2016). In its coastal cities, 172 wind farms are installed with corresponds to 41.5% of the projects. This represents about 4.1 GW or 40.6% of the country's total installed capacity. The Brazilian coastal have a total of 2.201 installed wind turbines, mainly on the states of Ceará (706), Rio Grande do Sul (649) and Rio Grande do Norte (634). In addition, the coastal farms occupy an estimated area of approximately 331,527,143 m², of which 94% of this occupation is concentrated in the states cited before with areas of 78,176,677 m², 117,437,143 m² and 118,389,035 m² respectively. CONCLUSION.Coastal wind farms account for 40.6% of installed wind capacity in Brazil. The concern about the expansion of wind farms on the Brazilian coast is related to the environmental impacts, especially in the phase of implementation, considering that all the Brazilian coastal zone is a permanent preservation area. The Coastal Zone promotes goods and services to humanity and environmental damage, added to the scientific uncertainty of Environmental Studies can lead to failure under the aspect of the sustainability of wind energy. The next step of this research is the study of the wind farm implementation instruments in Brazil.

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Synthesis and characterization of pyroaurite-type material at room temperature employing bauxite residues from Amazon Region

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The purpose of this study was to investigate the synthesis of pyroaurite-type material at room temperature, employing bauxite residues as starting material. It was characterized by X-ray diffractometry, Infrared spectroscopy and thermal analysis. Based to the results, a pyroaurite-type phase could be identified with 7.7 Å interlayer distance, rhombohedral (R3-m) unit cell with a = 3.10 Å, c = 23.28 Å and V = 193.84 Å^3, and average crystallite size obtained from FWHM approximately of 26,35 nm (Scherrer Equation). FTIR spectrum of the product presented bands around 615, 735, 874, 1365, 1456, 1678 and 3361 cm^{-1} and could be assigned to the layered framework structure. The TG-DTA curves showed five thermal events at 51, 225, 340, 390 and 615 ºC. After heating 230 ºC for 1 h, the lamellar structure turned into amorphous phase.

Studies of brazilian environmental legislation at federal level related to the energy power industry

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Wind power is increasingly being used as an important alternative of renewable energy in Brazil. Nevertheless, although this is considered a renewable energy source, the production of electricity through wind power may cause some negative environmental impacts. The purpose of this paper is to conduct a literature review on the environmental impacts caused by wind energy farms. Furthermore, the paper aims at analyzing the environmental regulations efficiency at the federal level in order to prevent and to mitigate the impacts from this kind of economic activity. The literature review showed that the wind energy industry causes negatives impacts to air, soil, water, fauna, flora and to the health and well being of the human population. Based on literature it was possible to analyses the federal regulations. It was found out that there are few environmental protection laws oriented to wind power industry. It was also verified that these few existing laws do not cover all stages of the wind energy production process. Considering these results, it was concluded that despite of the wind power be a promising renewable energy, federal regulations are required to minimize its negative impacts. The identified gaps in the environmental legislation related to the wind power may compromise the environmental quality of wind farms. Thus, it is very important to solve deficiencies and weakness of the current legislation.

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Thermal stability of rubidium birnessite-type material synthesized from Mn residues from Amazon Region

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We report the synthesis of octahedral layered birnessite-type phase with Rb^+ as interlayer cation (Rb-OL-1) from manganese residues at mining site from Carajás Mineral Province (Pará State, northern Brazil). Firstly, the synthetic route employed dissolution of Mn residues followed by re-precipitation of the birnessite-type phase with Na^+ interlayer, which was ion exchanged with an aqueous solution of Rb^+ at room temperature while stirring overnight. The X-ray diffraction patterns clearly showed the conversion of Mn residues into manganese oxide octahedral layer with basal spacing around 7.22 Å and (C2/m) monoclinic structure. The unit cell parameters were calculated as: a = 3.566(8) Å, b = 3.522 (7) Å and c = 7.333 (1) Å, as well as average crystallite size (58 nm) by Scherrer Equation. FTIR spectra of the product revealed diagnostic bands around 833, 751, 614, 500 and 445 cm^{-1} and could be assigned to the layered framework structure. After a thermal treatment up 700ºC, the X-ray diffraction analysis showed the transformation to $RbMn_8O_{16}$ having (I4/m) tetragonal structure (a = 9.811 Å and c = 2.881 Å).

Building 30 classroom's lighting energy efficiency

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According to the World Economy Outlook (WEO)[1], in 2016 arround 1,2 billion people did not have access to electricity. In addition, the International Energy Agency (IEA)[2] estimates that up to 45% of energy consumption will grow by 2030. The PUCRS just in 2016 had consumed about 53 million kWh, according to ABESCO's[3] studies, shows more than 5 million kWh as potential for energy saving. Therefore, the University, which is concerned with providing the academic community an infrastructure that is as sustainable as possible, has instituted the Projeto de Uso Sustentável da Energia (USE). This, among several actions, performs analyzes to determine the best opportunities for energy efficiency, as in the lighting systems of the Institution. For this, the Laboratório de Eficiência Energética (LABEE) has developed a study to optimize the use of artificial light in the classrooms of Building 30 of PUCRS. The initiative was aimed at replacing ordinary luminaires with high-reflectance luminaires and T8 fluorescent lamps for T5 fluorescent technology. The methodology was composed of three stages: energy diagnosis of the current system, simulation of energy efficiency proposals and post-occupation evaluation. The first one focused on the survey of installed power, the measurement of the level of illumination and the structural characterization of the room. In the second, the technological prospection of efficient lighting systems, simulation in the DIAlux Software and the determination of the energy conservation potential along with a financial analysis were made. In the final part, was installed the new equipment, the verification of the level of illumination of the current technologies and the elaboration of energy indicators was done. The review survey showed that, before replacements, the set had an average illumination level of 258 lux and with an installed power of 962 W. After the replacement, the values went to 450 lux and 741 W, representing an installed power reduction of 43% and an increase in the average illumination level of 25%. In addition, the estimated reducing in electricity consumption was 57%. This research made possible to had a significantly improvement at the quality of classroom lighting while reduce electricity consumption. Furthermore, it provided to all the students a real example of the improvement of the visual quality, causing smaller impacts to the environment.

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Energy wasting and economic potential in a university

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The Brazilian Energy Conservation Services Company Association (ABESCO)[1] declared that in Brazil, during the last five years, over than 50 GWh of electric energy was consumed. The energy saving potential of the commercial sector could reach until 11%. In addition, conforming to the International Energy Agency (IEA)[2], a 45% energy consumption growth is expected by 2030. In 2016, the Pontifical Catholic University of Rio Grande do Sul (PUCRS), consumed around 4 million kWh, with a potential saving of 440 thousand kWh, conforming de IEA. The energy cost reduction is not only an investment in new technologies and equipment but also increasing the user's awareness according to good and wrong habits. In agreement with this idea, the University has implemented the USE project (Sustainable Use of Energy), which acts on three different fronts of action: Technical, Educational, and Communication. Technical projects consist of energetic diagnostics and optimization studies while educational and communication projects respectively sensitize people and develop campaigns to remind eco-friendly habits to adopt. On the PUCRS campus, for instance, due to the installation of four new double flow acclimatization systems, a 33% energy economy was realized by using a heat exchanger. Another project accomplished on the campus consisted in informing the PUCRS José Otão central library´s employees about good behaviors concerning the natural illumination usage inside the building. As a result, 1000 lamps were switched off, generating an annual economy over R$ 30 thousand. Meanwhile, the campaign 'Nem tão quente, nem tão frio' sensitized eight secretaries and one laboratory, involving 45 employees, about the appropriate use of air temperature ranges. The research for more sustainable solutions is a priority, since knowing that human activities affect deeply the future of our planet. When the consumer uses energy rationally, he is preserving the natural resources while at the same time avoiding degradation. The fight against waste does not mean giving up comfort. You can take advantage of all the benefits that energy offers in the right way, without wasting.

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Use of rice husk and derivatives as a biosorbent for the remediation of mine-impacted water (MIW)

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Mineral acid drainage (DAM) of coal is responsible for causing serious environmental impacts to water resources. Therefore, 70% of the rivers of the coal mining region in the State of Santa Catarina are impacted by DAM. This affects aquatic life and causes serious economic damage and socio-environmental problems. DAM is an effluent with high acidity and high concentrations of sulfate, metals and metalloids. Sorption is a set of processes that transfer an ion from an aqueous to a solid phase. The biosorption, sorption process that uses sorbent materials organisms or biomass is an interesting alternative to treat the AMD. The biosorbents are derived from plant biomass residues. In other words, they derived from an abundant, renewable and low cost material. In the Laboratory of Water Reuse (LARA), the Integrated Environmental Laboratory (LIMA) and the Laboratory of Effluents and Toxicology (LABEFLUTOX) of the Federal University of Santa Catarina (UFSC) have been developing joint research projects to find out new techniques for the management of this serious environmental problem. The efforts of the UFSC in the search for methods that comprise the remediation of environmental liabilities caused by DAM are reflected in the study by Núñez-Gómez et al. (2017). This report reports the potential of the use of shrimp processing residues for the remediation of waters impacted by DAM. The present study aims at evaluating the efficiency of removal of Fe, Al and Mn ions present in waters contaminated by DAM, from three biosorbents: (i) in natura rice husk (CA); (Ii) rice husk ash (CCA) obtained by pyrolytic treatment in rice processing industries; (Iii) activated charcoal from the rice husk (CAC), synthesized by means of chemical activation processes. So far, the biosorbents have been prepared and the best treatment conditions are being studied by kinetic, isothermal and adsorption columns. Among the results it is expected that this provide an efficient and economically viable process of transforming water polluted by DAM into waters suitable for non-potable reuse. Thus, it is expected the valorization of a low-cost and abundant agricultural waste generated in the Southern region of the State of Santa Catarina.

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Ambient air characterization of underground coal mines in the southern Santa Catarina coal field and estimation of the emission of greenhouse gases

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A characterization of the air in underground coal mines is important because it allows the issues focused on safety at work and the environment. The present study aims to determine the concentrations of methane (CH_4) and carbon dioxide (CO_2) along the ventilation system of three underground coal mines (Minas A, B and C), located in the southern Santa Catarina Coal Field, in the South of Brazil and also estimate the emission of these greenhouse gases (GHG) to the environment. CH_4 is an asphyxiate and flammable gas that may increase the risk of explosion. CO_2, is a gas as an opponent and development, as well as CH4, be monitored. For the sampling and subsequent characterization of the gases, chromatographic methods were tested and collectors were validated.For the GHG estimates, different methodologies were evaluated, and each method (1, 2 and 3) presented different calculation conditions with different factors. In method 1, the methodology applied was Tier 1, developed by the IPCC, which takes into account the production of each mine; In method 2, the methodology was Tier 3, also developed by the IPCC considering a generic CH_4 concentration factor (500 ppm); In method 3, the methodology used was developed by studies developed in India, where gas concentrations and flows in the mines are taken into account.This last methodology allowed, through the research conditions carried out in this work, to make pioneer estimates of CO_2 emission from the ventilation system. The two chromatographic methods studied allow the analysis of the gases, each with its restrictions. The highest concentrations of CH_4 (1.8%) are found in areas with strong emanation of this gas at Mine A, below the explosive limit (5%). On the other hand, the exposure limits established by the Brazilian standard NR15 (3,900 ppm) and the North American standard MSHA (5,000 ppm) for CO_2 were exceeded (6,086 ppm) in the emanation areas, indicating the need to increase the level of ventilation In these places. In the mine with the highest emissions (mine A) estimates ranged from 163 t CH_4 / year (Method 3) to 3,984 t CH_4 / year (Method 1). The application of the alternative methodology (Method 3) allowed the pioneer estimation of direct CO_2 emissions, indicating contributions of 27 to 77% for total GHG emissions by the mines studied. It should be noted that the results obtained in this study are an attempt to improve these estimates. However, to improve the accuracy of inventories, more sampling should be done covering all mines in operation in the country.

Pilot scale green zeolite synthesis using wastes

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Society has always used the natural resources of the planet and generated pollution with little or no concern. This model generated impressive surpluses of economic wealth but brought with it major social and environmental problems, including waste [1]. According to data from the International Energy Agency (IEA) in 2014, 66.7% of the world's electricity production came from fossil fuel combustion, especially coal. The ashes produced by the burning of the coal are one of most abundant solid waste that are underutilized, being disposed in landfill with risks of contamination of the environment. However, coal ashes are important sources of Si and Al, and can be used as an alternative raw material in several processes such as zeolite production. Zeolites are non-toxic hydrated crystalline aluminosilicate minerals used worldwide and known for their remarkable thermal and chemical stability, versatility, low cost and high porosity. This work aims the optimization of an integrated synthesis of zeolites in pilot scale using fly ashes, from a coal power plant located in Southern Brazil, and the efficiency of the process, effluent generation and the quality of the zeolites produced were assessed. The process is divided into two steps, initially the silicon and aluminum extraction from ashes with alkaline solution followed by the hydrothermal treatment of the resulting aluminosilicate gel for the synthesis of the zeolite of interest. Both steps were previously optimized in bench scale (0.1 L PTFE reactor and conditions were employed in pilot scale. For the extraction, soft conditions (95ºC, 2 h) in an adapted low cost reactor (stainless steel PTFE coated vessel with 40 L, 4 kg solid load) were used. In the second step the extract were mixed with a solution of a commercial grade sodium aluminate (90-95ºC, 4 h), to correct Si/Al ratio in function of the type of zeolite to be synthesized. The concentrations of Si an Al on the extract were monitored immediately prior to its use in the synthesis step and to evaluate its stability (6-month storage period). A high purity zeolite 4 A was obtained (1.4 kg) with a high yield (99% Al conversion). A second zeolitic product (5.5 kg), contains a mixture of zeolites 4 A and X, were also obtained using residual fly ash from extraction step. The yield and quality of products obtained in pilot scale are similar to bench scale, suggesting that the process is feasible to be applied on a larger scale. The processes used to achieve so-called green zeolite synthesis proved simple and convenient, provided high yields and efficiency, as well as low effluents generated that could be reuse in the process.

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Public policies to promote the production of biogas from dairy farms in Santa Catarina: a study in São Miguel do Oeste

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The fast growth of farming production in Brazil has caused the intensification of environmental problems. Farming sector has grown expressively in the West region of Santa Catarina. Nevertheless, as production grows, there is also an increase in the amount of waste. This study focus on *Sao Miguel do Oeste*, a city located in this region and that has the fifth biggest dairy production in Brazil Bovine waste causes soil, air, and fountainhead contamination when it is carelessly,disposed, resulting in health hazard both to human and animal life. At the same time, it is noticed that the process of dairy production in the region makes use of electricity as power source for equipment like milking machine or water heating, which is used in sanitary processes and biological control. In addition, the most part of the dairy producers in the region work in a cooperative way with local companies and must store milk in coolers until it is collected. Bovine waste presents high heat value, which is an essential characteristic to produce bioenergy that can be used for heating or electricity production. Thus, the use of waste for energy purposes can reduce the cost of production, as well as avoid environmental problems. Nevertheless, bioenergy is not used in this region. The importance of public policies has been observed in regions or countries where the use of biogas is encouraged. In this context, this study aims at analyzing the Brazilian national and state public policies to encourage the use of biogas obtained from the milk farming waste in Santa Catarina state, specifically in of *Sao Miguel do Oeste* area. Furthermore, this study aims at establishing an alignment between both national and State policies by describing their strengths and weaknesses. This is a descriptive study with a qualitative approach, which was carried out based on literature and documentary review. Based on this review a questionnaire was elaborated. Interviews were carried out with a sample actors identified during the research. It is expected that the results of this research can contribute for the systematization of information referring to the use of biogas, as well as to the implementation of Brazilian federal and state public policies which can give support to the development of the biogas in rural area.

Synthesis of 13X molecular sieve employing Kaolin residues from Amazon Region

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The aim of this research was to develop a simple process to synthesis 13X zeolite molecular sieve employing Kaolin residues from Amazon Region, which actually has no commercial importance. A route synthetic was achieved by alkali fusion and low hydrothermal treatment in the starting material and it was not required heat procedure to metakaolinization technique. Materials characterization was performed using X-ray diffraction, infrared spectroscopy and thermogravimetry. According the X-ray diffraction measurement, a crystalline 13X zeolite phase was synthesized with Fd-3m cubic system and cell unit parameters *a* = 25,074 Å and V = 15.701 $Å^3$, average crystallite size around 40 nm (Scherrer equation) and lattice strain (4 ε) of 0.0178. The FTIR spectra displayed major bands at ~ 1660, 980, 670, 560 and 460 cm^{-1}, attributed to the zeolitic water, Si-O-H, Si-O-Si and TO_4 (T=Al or Si) vibration modes, respectively. The 13X zeolite was stable until 550 ºC.

Recycling of Spent Pot Lining – A Contribution to Resource Efficiency in Primary Aluminium Making

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Aluminium, with its current production of 57.5 million tons per year[1], is after steel the world's most sought after metal resource. Progressing industrialization in several global regions, the increasing importance of lightweight construction, and many other factors, will very likely result in a rising demand of this resource. Taken into account that the current resources are estimated to be between 55 to 75 billion tons[1], it can be expected, that aluminium will continue to be an important material for humanity well into the future. The state-of-the-art process for producing primary aluminium is the Hall-Héroult-Process. This process uses flat shaped oven cells and fused salt electrolysis to produce aluminium from its oxide. The electrodes used for this process are made mostly out of carbon materials like petroleum coke and graphite. The anodes are used up within weeks and continuously replaced, with their residues being generally recycled. A bit different is the situation for the cathode linings. Depending on process parameters and product specifications the cathode lining of the cells needs to be replaced every 5 to 7 years. Due to the process this so called Spent Pot Lining (SPL) is saturated with toxic chemicals from the production process, like sodium fluoride and cryolite, but also cyanides, nitrides, phosphides and carbides. Despite the high amount of precious resources contained in this SPL, the nature of its mixture refutes any direct and economically viable use. Currently, it is a hazardous waste that requires expensive treatment methods, as direct landfilling results in tremendous environmental risks. Within our german-brazillian project, which has been funded by the Federal Ministry of Education and Research (Germany), a new way of treating the material was developed. The continuous process includes steps for the chemical mobilization of the salts, the mechanical separation of the carbon fraction, an electrochemical step for separation of the fluoride salts including the regeneration of the chemical solution and dedicated ways to eliminate included pollutants. While being a multi-step process, it is fully capable of being integrated into existing residue processing facilities for drosses and salt slags resulting in a major improvement regarding its economic viability compared to other developments.

1: U.S. Geological Survey, Mineral Commodity Summaries, January 2017

REWITA – Recovery of high-tech resources from old mine deposits

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According to estimates, about 100 tons of indium, 180 tons of gallium and 1000 tons of cobalt are stored in the tailings of a former ore mine in Goslar, Germany. Also around one million tons of barite are contained in the sludge of the ponds. Within the project, which is funded by the German Federal Ministry of Education and Research (BMBF), the tailings are to be sampled, their contents examined and prepared for industrial recycling. The project closes the circle of the mining tradition of the Harz Mountains in Germany. The residues of the Rammelsberg ore mine, which was abandoned in 1988, have been fed for decades in the heaps and ponds, although they still contained metals and other valuable materials. Now, a group of researchers try to extract these metals, which were unattainable (and of lesser to no interest) thirty years ago. Also the partners from science and industry have an eye on the entire recycling process chain: from the granting of permits to the infrastructure of industrial exploitation and the renaturation of the ponds. This is done with the following steps: Firstly, the scientists determine the material stock and the mineralogy of the deposits by means of test drillings. Based on this, a model of the deposit is implemented. From the non-ferrous metal concentrates, the target metals are separated and concentrated in a second step. The Rammelsberg ore contained an average of 600 ppm of indium in the zinc blende. The recycling of the special metal concentrates should be carried out without the usual pyrometallurgical process stage. In the next step, the concentrates are transformed into marketable products – for this, innovative metallurgical processes are required. The holistic approach of the project also includes an exploitation concept, including process modeling and data management. Ecological, technical and economic aspects are combined, a reliable mining process is developed and tested and extensive environmental assessments are made. If the team of eight project partners from university and industry is successful, they are creating a model for similar deposits of mining residues. Deposits with similar high special metal content are for example Mount Isa and Broken Hill in Australia. Numerous tailings in Germany, for example in Meggen/Sauerland, are also capable of using this projects results and developed technologies.

Sustainable use of coal bottom ash in road paving

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The generation of energy in coal fired power plants in the State of Rio Grande do Sul, Brazil, produces bottom ash, a residue that returns to the coal producing company and accumulates in the environment. This material does not receive previous treatment and generates potential to impact the soil and the groundwater with the infiltration and percolation of the superficial water. The United States Environmental Protection Agency cites a number of advantages in using residues from coal combustion, including reducing greenhouse gas emissions and saving energy to extract and process other materials that can be substituted for the residues. The use of bottom ash as a base and sub-base of semi-rigid road pavement is common in several countries (Colonna et al., 2012), but in Brazil the residue is very little used for this purpose, although it has already been applied in an experimental paving in the State of Santa Catarina, in the 1980s (Silva et al., 1997). The present study deals with both the mechanical and environmental behavior of blends among bottom ash, fly ash and cement and the development of experiments with the purpose of identifying a suitable blend for its application as base and sub-base in the construction of road pavements, with compatible technical criteria with Brazilian standards. The results of the mechanical experiments indicated an ideal blend composed of 87% of bottom ash, 5% of fly ash and 8% of composite Portland cement with RCS7 of 2.29 MPa, suitable to form layers for base and sub-base of highways under construction, according to the Brazilian standard DNIT 143/2010-ES (DNIT, 2010) that establishes the resistance for soil-cement. The experiments indicated that the materials fly ash and composite Portland cement acted as chemical and granulometric stabilizers in the ideal blend, which was subjected to leaching and solubilization tests. The results indicated that the ideal blend presented a characteristic of non-hazardous and inert material, according to the Brazilian standard ABNT NBR 10004:2004 (ABNT, 2004), which gives it environmental feasibility to be applied to road pavements.

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CHITIN - a sustainable alternative for synthetic microbeads

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In December 2015, a law was passed in the United States prohibiting the manufacture of cosmetics and other products containing polymer microbeads from July 1, 2018 and commercialization as of July 2019. Other countries also legislated the banning of synthetic microspheres (4). The main products that include microspheres are facial scrubs, toothpastes, and bath gels (1,5). The use of these products releases polymeric, non-biodegradable materials that accumulate in marine environments. The tiny dimensions prevent their retention by the water filtration systems, their size is in a wide range of 4μm to 1.24 mm.Chitin may be an interesting alternative for use in exfoliators based on synthetic polymers. It is a product of marine origin, a natural, biodegradable, biocompatible and non-toxic biopolymer. The production of chitin is dependent on the use of exoskeletons of crustaceans. This biomaterial represents a residue of the fishing industry. After its degradation the residues do not lend themselves to any form of consumption and their disposal, often in collections of water, causes serious environmental damage. Their use minimizes the environmental impact caused by the accumulation in the places where they are generated and stocked. We present a process that recovers chitin from crustacean residues using solutions of sodium hydroxide and hydrochloric acid without the production of residues and without using heating sources, which reduces the probability of the polymer chain degradation. The method of obtaining chitin developed in the present work is environmentally friendly (2,3). In addition to sustainability there is a promising aspect in social terms because due to its simplicity this process can be developed in its early stages by the most vulnerable populations, who usually work with the processing of crustaceans. Thus, waste can generate employment and income through the production of a high added value material.

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Microbial communities from a solid-state anaerobic biodigester fed with cattle manure

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Anaerobic Digestion (AD) is a microbial process that converts the organic carbon from biopolymers and other degradable molecules into its most reduced (methane) and its most oxidized (carbon dioxide) forms. AD is also known as biogasification or biogas production and is applied to many purposes, such as urban and rural ecological sanitation, energy production and biofertilization. We sampled organic waste from a 10,000 L biodigester fed with cattle manure in a continuous input flow during 18 days. Using high throughput sequencing we performed a metabarcoding survey based on 16S rRNA gene fragments, and assessed the microbial communities from these waste samples. The survey enabled us to taxonomically classify the bacterial groups. Each AD stage presented a conspicuous microbial community. Bacterial and archaeal OTUs were distributed within 39 phyla, 93 classes, 159 orders, 259 families, and 387 genera. Among the phyla occurring in abundance higher than 1% in at least one sample, twelve were bacterial and two were detected as archaeal. Bacteroidetes was the most abundant phylum in samples (18.7% of the total sequences), followed by Firmicutes (12.4% of the total sequences). The archaeal phyla Crenarchaeota and Euryarchaeota represent an average of 1.3% and 2.2% of the total sequences in the samples, respectively. The rare microbiota (representative phyla with less than 1% of the total sequences) included 24 phyla. Unclassified sequences constituted the major group in all samples (an average of 23.7% of the total sequences). These results contribute to the characterization of the microbial diversity inside a regional biodigester, and help expanding our understanding about the environmental sustainability of biogas production and utilization in Brazil.

Spatial complementarity between thermal energy in the "meeting of waters" and water and wind resources in northeastern Brazil

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Energetic complementarity is a concept that can be used as an important tool for the management of renewable energy resources. The work of Beluco et al. (2008) was the first to conduct a more in-depth discussion of this concept, distinguishing complementarity in time and complementarity in space. Beluco et al. (2008) also proposed a method to evaluate the complementarity in time between two energy resources at the same point in space. Among other works, the paper by Eifler Neto et al. (2014) determined the complementarity in time between water and wind resources along northeastern Brazil. Eifler Neto et al. (2014) identified regions where there is greater complementarity between these renewable resources, and areas where there is less complementarity, with approximately 40% of the studied area with the highest complementarities in time. Recently, Risso and Beluco (2017) presented a method for evaluating spatial complementarity, expressing this complementarity by means of "complementary roses". This work intends to identify the spatial complementarity between hydro and wind resources in northeastern Brazil with the energetic potential at the junction of the Negro and Solimões rivers, known as the "meeting of waters", with the use of these "complementarity roses". This energetic potential in the "meeting of waters" was characterized by Beluco and Souza (2014) and represents a vast energetic resource (due mainly to the large flows presented by these rivers) present in a temperature difference that varies between 5ºC and 8ºC over a year. Beluco and Souza (2014) estimated of an average energetic potential of the order of 2GW, using about 20% of the Negro River. This work evaluates the spatial complementarity between these energy resources and presents some comments about their possible use for power generation.

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Use of liquids in air quality monitoring in the municipality of Caçapava do Sul

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Due to the degradation of air quality, it is necessary to monitor the environment of regions with intense anthropic action, generated among other reasons by the mineral exploration, vehicular traffic and CO2 emission to the atmospheric air, from the use of too much wood in Fireplaces and stoves in colder periods such as autumn and winter. In this way, causing the excess of particulate material in atmospheric air, with different concentrations and chemical compositions. There are ways to monitor air quality through living organisms named as bioindicators. Lichens are used as bioindicators because of their excessive sensitivity to the toxic components of air and their vast capacity to accumulate elements. The monitoring is given due to the intervention of the concentration of the elements absorbed by the lichens, in face of their physiological, morphological and genetic alterations. The reaction of the organism to external aggressions is evaluated by its modifications in the vital cycles. The methodology used in this study comprised three stages: i) Planning for the implantation of bioindicators; (ii) data collection and evaluation; iii) Processing and interpretation of the data collected, with the aid of the analytical method of X-ray fluorescence spectrometry. In this way it was possible to qualify and quantify the existing elements in these organisms due to bioaccumulation. After the analysis, the intense accumulation of Ca, Mg and Si was observed, in which the presence of these elements is strongly linked to the geological structures present in acidic granitic rocks (greater than 65% SiO2.) And lenses of dolomitic limestone. The beneficiation of the dolomite limestone carried out by the local miners contributes to the dispersion of Ca and Mg in the atmosphere, since it comprises between 30-35% CaO and 15-20% MgO elements that had the largest increases in concentrations. In this way, monitoring these enterprises is an important decision-making tool in terms of air quality and population health.

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Session 05. Global Climate Change

Conveners:
Prof. Márcio Martins Pimentel, Departamento de Geologia Geral e Aplicada, Instituto de Geociências (UnB)
Prof. Dr. Jörg Matschullat, Institut für Mineralogie, Technische Universität Bergakademie Freiberg

The green and blue planet Earth is a unique complex biological-geoprocess interaction and feedback regime in the solar system. Climate on planet Earth is one of the regulative in the Bio-Geo interaction. Since the formation of planet Earth climate has dominated the evolution of everything on the Earth surface and interacts with plate tectonic forces. Over the past 4.6 Bill year's climate has changed dramatically and generated all changes of living species and plants on planet Earth. Since about 3 Mill years human population is growing and later moved out of their original habitat. All of their evolution and behaviour was and still is connected with changes in climate. We as humans learned over hundred thousands of years to adapt to all climate environments on recent planet Earth but with the recent extreme fast climate change the change of the chemical composition of the atmosphere is combined. The extreme fast change of the chemical composition of the atmosphere and the climate will cause significant harm to live and the human species as we will not have time to adapt. Nevertheless, we as humans are toolmakers and as toolmakers we have the ability to change the climate in such a way that all live on planet Earth is in danger. As we are regional located species and only see the results of our actions in a very local manner, we need to meet and discuss the influences of human action on the global climate system. We also need to develop goals to slow down or better to stop the recent climate change. The session will be open to all kind of contributions related to climate change in the past and recent, to descriptions of tools for slowing down or stop the climate change, and also to new ideas in advertising those tools for humans, and societies.

Oral presentations

Session 5

Amazon basin under climate change already?

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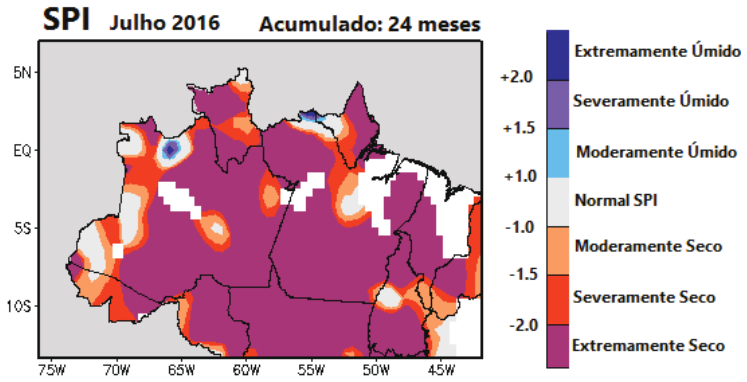
The Amazon basin is not homogenous – neither in respect to morphology and biome nor in climatology and meteorology. While large diurnal variances are known, seasonal differences (dry and wet seasons) are much less well known, partly due to a limited availability of high-quality data. That shortcoming is largely due to a limited number of stations inhibiting data homogenization. Following a short characterization of the dominant meteorological systems influencing northern Brazil (Malhi and Wright 2004) with emphasis on Amazonas state, we present strong evidence for climatic change in comparing the climate normal 1961–1990 with 1981–2010 and with the latest ENSO (El Niño Southern Oscillation) data in 2016 and 2017.The most prominent signal appears to relate to the emergence of serious drought phenomena, not only related to ENSO activities. Here, a combination of regional (deforestation) and global (circulation patterns and general warming tendency) seems to be responsible for change.



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Who has the knowledge about climate change?

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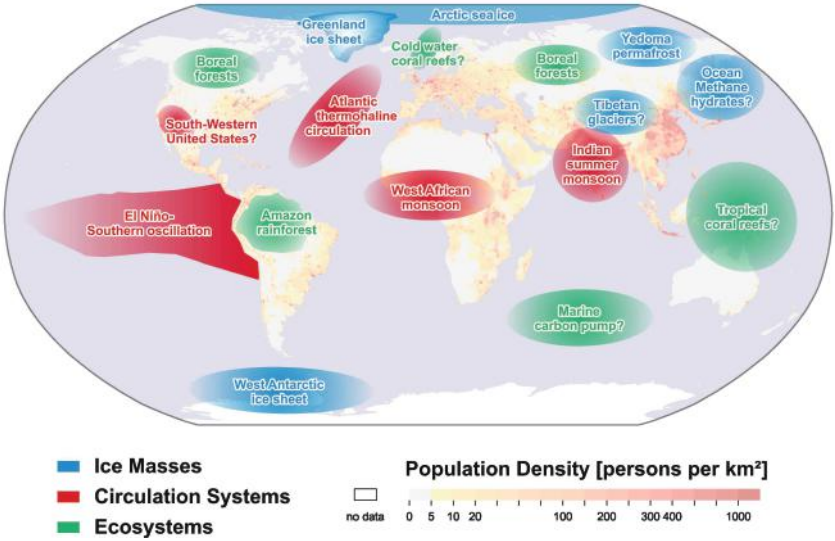
What do we know about climate change? What do we not know? Who can use that knowledge and how for climate policy? A bundle of crucial and important questions; yet are they that clearly defined? This talk critically discusses the issue of anthropogenic climate change in an unconventional way that has been inspired by Mike Hulme (2009).

Each question raised presents scientific understanding juxtaposed to human perception and misunderstandings. The underestimated role of extreme weather events serves as an example that illustrates the "wicked" challenge (Rayner and Malone 1998) anthropogenic climate change poses to human society.



Tipping elements in the Earth system (University of Colorado, Boulder, CO, USA)

The tipping element "Amazon rainforest" will be presented in another talk by the author and Dr[a]. Andrea Malheiros (INMET) in this session.

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A history of knowledge of the Amazonian dark earths

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The anthropogenic origin of the Amazonian dark earths has been a methodologically assured fact for 70 years. Especially during the last 30 years, *terras pretas* have been scientifically investigated with increasing intensity and in an ever-widening context. Today, the dominant concept, which guides current research, is the idea of binding atmospheric carbon with artificially produced dark earths. The large-scale production of *terra preta* is said to be an efficient instrument to combat global warming. This talk attempts a history of the knowledge on Amazonian dark earths (*terras pretas*) which not only focuses on scientific knowledge but also takes into account traditional indigenous knowledge. It is shown, that without indigenous knowledge, modern *terra preta* research would not exist. This has bearings for the ethical evaluation of applied modern *terra preta* research.

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Early movers on subnational adaptation: making sense of the partnership between Acre/Brazil and California/USA

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While national governments have generally been seen as the principal actors in climate change related decision making, the lack of positive results has triggered subnational innovation. Climate change is a 'wicked problem', therefore poses high requirements for governance. It is (yet) not agreed by diplomats, but it actually requires multi-level governance, a process that takes place across multiple geographic scale levels and actors. Our research hypothesis states that the way in which adaptation has been treated by actors on different levels is to a large extent dependent not on the availability of financial resources, a major argument at international negotiations, but mostly on different levels of good governance. Adaptation is a major political decision. The memorandum of understanding signed between Acre/Brazil and California/USA at 2010, constitutes an outstanding example of how paradiplomacy has become an important component of the state of the art of subnational adaption. Our argument states that this agreement steers from the high level of climate governance achieved at both states, mostly based on civic participation. In California, by the defeat of Proposition 23, supported by 62% of the voters. In Acre where civic engagement translated the vision developed by the 'People of the Forest' alliance into public policy. The development strategy supported by the people of Acre, one of the poorest states of Brazil, is innovative in the way it tackles climate change issues, and is recognized as such not only by the government of California, but also rewarded by the REDD+ Early Movers program, managed by the German KfW bank. Within the failure of national adaptation strategies, the findings from California and Acre, both learning regions, suggest that there is also not a 'silver bullet' intervention that promotes adaptation at subnational level, as the lack of results by the regulatory framework adopted by the – industrialized and wealthy - states of São Paulo and Rio de Janeiro demonstrates. Our findings support the proposition, that subnational government regulatory style can be seen, by large, as a function of its unique political heritage, since actors in different governance systems propose different course of action when faced with similar policy problems, as is the case for subnational adaptation.

Economic viability and dimensioning of photovoltaic panels to implementation in residencial buildings

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New sources of energy are being studied and developed worldwide. Solar energy is still the least explored source in Brazil, due to the high cost at the beginning of its application in the national scenario. However, in recent years, new means of production have been established by law, encouraging the use of solar energy through photovoltaic panels in homes and buildings. The Distributed Generation and Micro-generation of energy are the two parameters connected to the regulation that allows the user to have their energy production connected directly to the electric distribution network and to use it as a battery bank. This reduces the cost of the system and makes it attractive in the long run. This work analyzes the economic feasibility of applying a photovoltaic panel system in a vertical building located in the city of Joinville (Brazil), as well as conduct an assessment of cost and return on investment. With the demonstrations of climatic conditions of the area of interest, the solar irradiation as one of the factors of greater relevance to the system sizing, analyzing the losses occurred by the shading analysis, the system budget is consolidated at R$ 72.889,85, considering the current values of costs and installation. Finally, a time estimation of return of the investment is around five years. The accumulated value at the end of the useful life of the system is almost R$495 thousand.

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Ecological intensity of human well-being: is economic development reducing environmental impact in Brazil?

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The relationship between well-being and environmental impacts has been taking considerable space within the scope of the studies of Applied Social Sciences in recent years. According to Jorgenson and Dietz (2015), to raise human well-being from economic development depend on natural resources and ecosystem services, boosting the anthropogenic induction of environmental impacts. The refinement of this debate different metrics and approaches that aim at improving the debate about effects of anthropic actions on natural environments. In this context, emerges the interest to investigate how much pressure is deposited on environment to raise human well-being – the so called "ecological intensity of human well-being" (EIWB). EIWB is understood as the ratio between a non-monetary variable representative of human well-being and a measure of environmental stress. Intuitively, it is possible to read the EIWB as a mathematical expression stating how intense is the pressure on the environment per each unit of the human well-being measure. In order to push this debate a bit further, this research propose to investigate the effects of the economic development, represented by GDP per capita, on the ecological intensity of human well-being (EIWB) in the federative units of Brazil over time. It was chosen the emissions of CO_2 and CH_4 as the measure of environmental stress. As for the human well-being measure we selected two indicators: the proportion of people in monetary poverty and the life expectancy at birth. We covered the period ranging from 2002 and 2014. In order to verify the effects of economic development on the ecological intensity of human well-being over time, it was used the time-series cross-section Prais-Winsten regression model with panel-corrected standard errors (PCSE), as proposed by Jorgenson and Dietz (2015). The results indicated that economic development in Brazil was associated with a decline in environmental stress/impact per unit of well-being (for both measures). It means that the increase in GDP per capita resulted in less environmental impact for each unit of well-being generated. We explore some explanations for those results, as the legislation on deforestation, for instance.

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Environmental education and empowerment of children to mitigate the global climate change through community action with Plant for the Planet in Brazil: experiences in Irati, PR and Araranguá, SC

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Many governmental and private bodies approach the challenges of climate change globally. The civil society in form of social and political movements with grassroot organizations plays a critical role. They are a driving force in influencing future policy by public opinion. In 2013, the levels of the greenhouse gas carbon dioxide surpassed 400 parts per million in the earth's atmosphere, foreshadowing more long-term effects of climate change, affecting future generations[1]. Reforestation enables reduction of atmospheric carbon and providing fresh water and wood resources for future generations. In order to bring the global CO_2 concentration in the atmosphere back to stable conditions, the creation of the German initiative and later foundation Plant-for-the-Planet took place in 2007. Its goal is to plant 1000 billion trees worldwide until 2020. In 2013, the foundation was responsible for the United Nations Billion Tree Campaign and planted over 14.2 billion trees in over 70 countries[2]. Plant for the Planet works through collaborations together with international decision makers, political leaders and workshops in schools. These workshops have three goals: firstly, educating children about the current and future challenges of climate change, illustrating solutions and encouraging them to take action. Topics include extreme weather events, global migration and water resource shortages as well as the role of forests as carbon sinks. The children learn about these issues through presentations and group games. Secondly, children plant trees in their city and plan future tree planting. Lastly, they practice public speaking skills and how to organize children planting groups as well as how to set goals and identify possible supporters to achieve them. Cooperation with public, private and media representatives as donors and multipliers broaden the impact of these actions. In October 2016, two workshops or academies took place in schools in the rural city of Irati, Paraná. The cooperation between the German University of Applied Forestry Sciences in Rottenburg am Neckar (HFR) and the Department of Forestry of the Brazilian State University of the Central West (UNICENTRO) enabled these academies. In Irati, over 120 children were certified as climate ambassadors and planted over 150 trees. Inspired by the Irati experience, a Plant for the Planet project was initiated in the Federal University of Santa Catarina in 2017. Elementary school students, teachers and families were involved in the planting activities in Araranguá. Among the first results, it is possible to point out that those local schools and environmental organizations have great interest in participating and interacting with the universities. The actions and encouragement are very important to help children to understand their role as local and planetary citizens.

[1]Recent Monthly Average CO2 at Mauna Loa, Hawaii (10.05.2017). Access: 12.05.2017 https://www.esrl.noaa.gov/gmd/ccgg

[2]Tree counter. Access: 12.05.2017 https://www.plant-for-the-planet.org

Innovative techniques for gas bubble measurement from lakes: continuous record of bubble emissions from a subtropical reservoir using automated bubble traps

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Recent researches have pointed out lakes and reservoirs as potential sources of greenhouse gas (GHG) emissions to the atmosphere such as methane and carbon dioxide. The gases are transported to the atmosphere through three main paths: diffusion, ebullition and through rooted plants. Ebullition is frequently related to methane due to the low solubility of this gas in water. This pathway can represent up to 60% of the total methane emissions from water bodies on a global scale. The emissions within a reservoir have high temporal and spatial variability and as consequence, it is difficult to measure and to quantify the emissions. The objective of this presentation is to improve the temporal and spatial resolution of emissions data that are used to determine the net flux of GHG and to assess the impacts on climate. Two innovative methods for GHG emissions measurement were used in Passaúna freshwater reservoir. The methane probe TDLS – Franatech is made of titanium and has the capacity to measure dissolved methane in water in a range of 1 to 40 000 ppmv which a precision of ± 2 ppmv. The probe is kept suspended in the water column and it was attached to a multiparameter water quality meter (Horiba U-53) to measure the dissolved oxygen in the water. A CTD (Sontek CastAway) probe was used to obtain the water column temperature profile. In addition to conventional funnels, in which the volume of gas is captured is manually automated bubble traps (ABT) were deployed, recording the emitted gas volume continuously, and over large periods. Resulting methane profiles showed concentration gradients and suggested that methane flux occurs towards the reservoir center. The gas flux calculated from the conventional large diameter funnels was similar to the flux from the ABTs, that have the same diameter, validating the ABT's results. The results from the ABTs highlighted the large temporal variability of ebullition and suggest that short period measurements can lead to inaccurate mean ebullition estimation.

Climate change: geological and social properties

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The presentation “Climate change: Geological and social properties” will describe the terms climate and climate change. The aim of the presentation is to understand the geological, better called background, climate evolution during the last 700 Myr. Special focus will be provided how life on planet Earth has reacted to change of climate conditions. Moving towards younger time the presentation will cover the reaction of first humans to climate change at about 2.6 Myrs ago. In addition, the influence of climate change to rural societies will be described, discussed and compared to recent human societies on planet Earth. The presentation will discuss the anthropogenic climate change and follow the question why do humans have to reduce CO2 in the atmosphere. The final part of the presentation will cover the field of “What is a perfect climate for humans and what does individual humans accept as a perfect climate”. Furthermore, the consequences of human behavior will be described and a future view on planet Earth and human evolution will be provide in general.

In addition, the following questions are raised and answered:

- How do human react to climate change?
- What kind of climate humans want to have?
- Is there a special climate favored for human evolution?
- Who has the right to decide, which climate a living area of humans has over time?
- What does the term Geo-Engineering means?

Poster presentations

Session 5

Near-surface CO_2 monitoring in Brazilian field experiments

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Since the global economy's current depends on fossil fuels, Carbon Capture and Storage (CCS) is a feasible approach to combating rising CO_2 concentrations in the atmosphere. Although geologic storage sites are designed for zero leakage it is important to consider that exceptionally such undesirable events can occur. Therefore, one of the most critical challenges for CCS development is to ensure effective permanence of the CO_2 in the geological formation with the minimum leakage risks. For this reason, CO_2 monitoring is essential, providing effective information for the verification, accounting and risk assessment of potential carbon dioxide releases at the storage site (Moreira *et al*., 2014). Field-scale experiments have been designed worldwide to test the sensitivity of several existing monitoring techniques and methodologies as a mean of monitoring CO_2 leakage. Thereby in a joint R&D project sponsored by PETROBRAS, the first Brazilian CO_2 near-surface monitoring field lab was developed by Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Universidade Estadual Paulista (UNESP) and Universidade Federal de Santa Catarina (UFSC) from 2011 until 2015 at the Ressacada Farm (Santa Catarina State). The site offered an excellent opportunity to run controlled CO_2 release experiments in soil and shallow subsurface through a vertical injection well. In 2015 UNESP and PUCRS started the CO_2MOVE Project, a new experimental site inside PUCRS campus in Viamão (Rio Grande do Sul state). The project represents a deepening of monitoring studies in geologically more complex conditions and more challenging from a technological point of view. Time-lapse monitoring of the CO_2 migration in saturated and unsaturated subsurface are being done using geophysics, soil CO_2 flux measurements, tracers, subsurface gas analyses and other atmospheric methods.

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Food sovereignty, bioclimatic strategy and global equality

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The debate on the issue of food sovereignty is considered new, but quite articulate, involving local and national governments, NGOs and international organizations. Unlike the classical concept of sovereignty, fundamentally linked to territory and power dynamics, the concept of food sovereignty adds the idea of the role of people, not only in the food issue itself, but also in the development of individuals with quality of life and power decisions about their lives. The historical point for the analysis of food sovereignty is the context of globalization since the 70 Some of the topics of discussion on globalization and its impacts on agriculture include trade liberalization with changes in world trade standards agricultural products; the elimination of subsidies to small farmers in the South as measures resulting "austerity" the neoliberal model; the concentration of global companies in the agricultural industry; new organizational technologies deployed by these corporations with processing and manufacturing intended for retail distribution, and how these technologies, when combined with the corporate economic power, they end up forming and restrict practices and choices of farmers and the consumers. The creation of the concept of food sovereignty is attributed to the international movement of peasants, family farmers, fisher folks, rural, forest workers and indigenous groups: the Vía Campesina. More recently, global climate change has become one of the most important challenges for countries today and their social and environmental impacts contribute to violate the human right to adequate nutrition and healthy eating and increase and nutrition insecurity, especially between people in poverty situation. According to the Intergovernmental Panel on Climate Change (IPCC), the poor regions of Africa, Latin America and Asia are the most vulnerable to extreme events (such as floods, droughts, hurricanes, etc.) and less condition regions face the climate crisis. At international level, in the year of 2000 the member countries of the UN established the Millennium Development Goals and the first goal was exactly "Eradicate extreme poverty and hunger". According to the evaluation report of the Millennium Development Goals of the United Nations published in July 2014, the world has already reached certain goals such as reducing poverty, increasing access to sources of improved drinking water, improving the lives of slum dwellers and achieving gender parity in primary education, but inequality, social exclusion and protecting the environment still impedes progress and development of the most marginalized countries. Because of this growing need for greater environmental protection and the inclusion of objectives of economic development, it is discussing a new post-2015 agenda, called Sustainable Development Goals (ODS). Therefore, we analyze in this article the creation of public policies of food sovereignty as global equality strategy.

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Plant for the Planet: engaging future energy engineers and children in climate justice

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The main purpose of the Energy Engineering programme of the Federal University of Santa Catarina (UFSC) is to promote capacitation to graduate students able to create solutions to the challenges related to the production, storage, distribution and rational use of energy, as well as to the impacts associated to these processes. Moreover, the program aims at stimulating the future professionals to have critical thinking and optimistic attitudes, engaging to the idea of human development and environmental sustainability. Electricity generation and transmission are contributing to the most carbon emissions. Environmental and social projects are important ways to mitigate impacts of energy production and consumption. In this context, a group of undergraduate students of the Department of Energy and Sustainability has been implementing the communitarian project Plant for the Planet (PfP) in schools in Araranguá region, South of Santa Catarina. The PfP was initiated by a nine years old German student, FelizFlinkbeiner, in 2007. It was a child initiative to encourage new children to plant trees. The method consists of organizing academies or workshops for school children in order to inform them about the current climatic condition of the planet. They are encouraged to take climate justice in their own hands, therefore by start planting trees, as the logo of the organizations says: stop talking, start planting. The main proposal is to motivate children to take the frontline, so they can spread the word and take actions, creating clubs where themselves can arrange new movements[1]. In order to spread PfP initiative, the UFSC project will support volunteers and teachers interested in disseminating this method in schools. By searching for partnership with local schools, non-governmental and governmental agencies it is possible to create a network of interested people in protecting the natural resources and mitigating emissions. Among the main results, it is expect that the project can improve the interactions between university and society, encourage future energy engineers to get engaged in social and environmental sustainability actions and motivate children to understand their co-responsibility and rights related to the environmental protection.

¹ Plant for the Planet: About us, Acess. Access: 10.05.2017 https://www.plant-for-the-planet.org/

Synthesis and characterization of metal-organic framework NH2-MIL-53(Al) for CO2 capture

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Since the industrial era began, the emission of greenhouse gases has been verwhelming and uncontrolled by humanity. The massive emission of this group of gases, compounded mostly by carbon dioxide (CO_2), methane (CH_4), carbon monoxide (CO), nitrous oxide (N_2O), chlorofluorocarbons (CFCs) and water vapor, is a direct consequence of mankind's growing technology and mass production industries. With the concern about reducing emissions of greenhouse gases, the development of technological options to reduce the impacts of human activities, has been boosted. Some of these technologies are chemical adsorption on amines, separation by membranes, and adsorption in solids, based on the adhesion of molecules of gas over the surface of a solid. Various are the solids used on the last technic, among them are zeolites and metal-organic frameworks (MOFs). The Metal-Organic Frameworks are a class of porous materials of wide application in the industrial area, such as ion exchange, catalysis, sensors and gas storage. They consist on tridimensional nets formed by "knots" with a metallic base linked by bridges made of organic ligands. The structures are geometrically and crystallographically well defined, allowing the removal of host species included, resulting in their permanent porosity. The metal-organic structure can still be adjusted and projected based on the change of the organic ligand nature and/or altering the organic fraction connectivity. One of the alternatives for the capture of gaseous pollutants is the use of NH_2-MIL- 53(Al) as an adsorbent material. It is stable and its structure change with the insertion or removal of a host species and, with the functionalized group, have augmented CO2 adsorption capacity. The objective of this work is to evaluate the synthesis of NH_2-MIL-53(Al). Synthesis was adapted hydrothermal process in moderate conditions with subsequent washes and resuspensions. In this study was obtained 1.65 g of NH_2-MIL-53(Al) (yield 91%). Results obtained by SEM-FEG-EDS, show that MOF synthesized displays coherence with composition expected for the structure of MOF [1] (%/w) of 40.6 to C, 33.3 for O, 14.0 for Al, 9.8 for N and 2.3 for H. Through the FTIR spectrum, it is possible to observe two bands in 3498 and 3385 cm^{-1} due to the N-H stretch of NH_2 group of MOF and 3650 cm^{-1} the OH group. TGA analysis presented thermal event in 89° C for the water loss, a second loss in 213° C, that can be attributed to the release of the solvent and, finally, an event at higher temperature (549° C), related to the decomposition of the organic ligand structure of the MOF. The results indicate the possibility of obtaining the NH_2-MIL-53(Al), with high yield, in bench scale.

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CAPES, CNPq and SATC

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Supported IL/silica extracted from rice husk: synthesis, characterization and CO2 sorption capacity

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The concepts of greenhouse gas emissions and climate change are currently being debated by the scientific community. These phenomena are caused and aggravated by the increase of gas emissions in the atmosphere, especially carbon dioxide's (CO2). The development of a process to capture this gas, mitigate greenhouse gas emissions and their consequences is becoming increasingly necessary (IPCC, 2014; KIM and LEE, 2012). One of the strategies in the search of efficient processes for CO2 separation is to use supported ionic liquids (ILs) on solid material. This technique requires small amount of the liquid combined with the high surface area material, provided by a porous support, which increase the mass transfer of solute (gas) / solvent (ionic liquid) (SAFIAH, AZMI and NORMAWATI, 2014). The present study aims to evaluate the CO2 sorption capacity of supported ionic liquids with different IL concentrations. In this context, the porous support used was silica extracted from the rice husk by acid hydrolysis (BAKAR, YAHYA and GAN, 2016) and the ionic liquid [mbmim][Tf2N] in concentrations of 10%, 20% and 30% m/m, was incorporated into the support by wet impregnation (physical impregnation) (CHIARO *et al*., 2011). CO2 solubility for the three supports was evaluated based on Koros and Paul (1976) cell at 303.15 K. After evaluating the sorption, the supported ionic liquid that presented the highest CO2 sorption capacity was characterized by FTIR, TGA and DSC techniques. Results showed that the use of ionic liquid supports can provide a viable alternative for CO2 capture, because it combines the advantages of ionic liquids with the benefits of mass transfer of a porous support.

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Cellulosic based poly-ionic liquids as heterogeneous catalyst in cyclic carbonates synthesis from epoxide and CO2

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The intensification of environmental effect caused by the exacerbated release of greenhouse gases, especially carbon dioxide (CO2) is pointed out as the main cause of climate change. The effects are already affecting both human and natural ecosystems [1]. In this way, several research groups are motivated to develop new technologies that help to mitigate these effects in environment [1] [2]. Carbon capture and storage (CCS) technologies have been identified as an essential element to reduce the CO2concentration in atmosphere [2]. An interesting possibility for the use of CO2 after its capture is the synthesis of cyclic carbonates. These chemicals are obtained from a cycloaddition reaction of CO2 to epoxides. Cyclic carbonates are products with great applicability as solvents in the chemical industry and are used as raw material for a wide range of products [3]. However, the cycloaddition reaction using CO2 and an epoxide requires a large amount of energy, demanding the use a catalyst to optimize the reaction. In this context, the poly (ionic liquids) (PIL) has been presented as a promising alternative to be used as catalysts. PIL are selective, recyclable and present considerable conversion [2]. In this work, a cellulosic poly-ionic liquid (CPLI), extracted from the rice husk and motifed with the ionic liquid TBPB as described in literature [4], was tested at different temperatures, pressures and reaction times. The cycloaddition reactions were carried out with propylene oxide and CO2 in pressures from 20 to 40 bar, the temperature from 90 to 110°C and time from 3 to 6 hours of reaction. The obtained product was characterized by gas chromatograph (GC), Fourier Transform Infrared (FTIR) and Nuclear Magnetic Resonance (NMR). The selectivity, TON and TOF of the CPIL-TBP were also evaluated. Results showed that it is possible to point out the best conditions for the use of CPIL-TBP as a promising heterogeneous catalyst for cycloaddition reactions, combining low cost and abundant waste materials combined with small amounts of ionic liquids.

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Synthesis and characterization of new CO_2 sorbents obtained from ionic liquids/ MCM silica produced from rice husk

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The sustainable development is a challenge mainly due to the global population growth in last decades. Earth's temperature increasing is one of the environmental problems caused by CO_2 emissions resulting from industrial and human activities [1]. Use of green solvents, such as ionic liquids, for the designing of new materials to solve this problem by capturing the CO_2 appears as a good option[2]. Among the possible syntheses routes, the support of ILs by covalent bond on mesoporous materials can be highlighted as an interesting alternative for mitigating the global carbon emissions[3]. In this work, we carried out the evaluation of CO_2 capture capacity of 1,3-bis(3-trimethoxysilylpropyl)imidazolium chloride supported in a commercial silica MCM-41 and in MCMRH obtained from rice husk. The IL synthesis and immobilization was performed based in literature[4,5]. FTIR and NMR were used to characterize the IL. MCMRH was prepared in two steps, first the amorphous silica was extracted from rice husk by acid hydrolysis then the cetyltrimethylammonium bromide (CTAB) was used as template for MCMRH synthesis. TEM, DRX, TGA and FTIR were used to confirm the properties of MCMRH. The evaluation of CO_2 sorption capacity was performed using the pressure-decay technique at an equilibrium pressure between 0.1 and 2 MPa.

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Paleowildfires: usual events late Paleozoic of Gondwana

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Macro-charcoal is widely accepted as a direct evidence of the occurrence of paleowildfires and, in Upper Paleozoic sediments of Euramerica and Cathaysia, records of these remains are relatively common and more or less homogeneously distributed. On the other hand, only recently the records for the Gondwana increased. The studies demonstrated that, like Cathaysia, paleowildfires were also common in the Late Paleozoic of the continent. The most important Gondwanic records are related specially to coal bearing strata and are spread out in different sequences and stratigraphic intervals in the Permian. The records occur on Cool-Temperate areas [e.g. Paraná Basin (Sakmarian/Artinskian of Brazil), Karoo Basin (Guadalupian of South Africa), Damodar Valley Basin (Lopingian of India)]. The abundance of evidences for Permian macro-charcoal in Southern Permian areas, seems to prove that paleowildfires occurred at different spatial and temporal scales during the course of the Permian in Gondwana, during the transition from a cold to cool and warm climate interval. The estimated high atmospheric oxygen concentration which peaked during the Early Permian probably made vegetation highly flammable even under wet conditions. The macroscopic charcoal remains confirmed that paleowildfires occurred in high latitudes and promptly after the deglaciation. The scarcity of charcoal remains after the cessation of peat deposition in the warm topmost Permian, besides estimations of elevated O2 levels until at least the latest Permian could be attributed to climatic change that may bring about directional changes in the frequencies and magnitude of these fire events. Furthermore, the high incidence of charcoal indicates that the paleoenvironmental conditions in Western and Eastern Gondwana during the Late Paleozoic were adequate for fire occurrence.

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Climate change, analysis of heat islands in microscale

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We live in a time of speed, where everything changes. As well as temperature, which is one of the major themes of study of the 21st century through the climate change. And on this subject, we will discuss about the heat islands in a neighborhood of the city of Passo Fundo in Rio Grande do Sul, Brazil.The concept of heat islands is widely diffused and studied in large cities, based on the principles that base their effects, analysis of urbanized area, field area, open spaces and other factors, we elaborated the study in a neighborhood observing the use of the soil containing Green spaces such as a square, and furthermore the infrastructures composed of houses, a building and streets, busy or not.Thus, through the study of the neighborhood map, sampling points were established so that with a functional environment tester the temperatures were determined. Those data are inserted into the ArcGIS software and was applied the analysis tool by means of kriging. Obtaining as a partial result the temperature maps in these sampling zones. This allowed to analyze the data with the infrastructure of the site and understand the reasons for its results. It was verified that there are infrastructure factors that have a direct influence on temperature, such as a building with black facade and mirrored glass in the middle of houses and constructions of less than 10 meters, and indirect influence, such as high traffic streets. We conclude that the microscale analysis allows to verify the existence of heat islands and makes possible the determination of the factors that generate these temperature variations.

The importance of knowing the heat islands in face the global climate changes

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The 21st century is considered the age of the greatest global warming in history, where actions between governments and multinationals seek to mitigate these changes. However, their actions act on the macro scale, leaving gaps over means to study and remedy these effects at the microscale. What has been showing constant concern for the scientific community in search of indicators to know the influence of the heat island on the climate change. The objective was to analyze and compare how atmospheric conditions and human interference have altered the microclimate of a university campus. Sampling points were selected in order to allow the repetition of the studies to serve as a data base, demonstrating the need to focus also on the microscale, using the Campus I area of the University of Passo Fundo, Brazil. The studies were carried out in georeferenced zones to allow the analysis of the relation of soil use/ temperature and or humidity and thus to identify natural and artificial means that reduce the effects of the climatic changes. Through field analyzes at geographically determined points for temperature and relative humidity, with the geoprocessing of data, via kriging, it was possible to analyze the results of soil use and verify the truthfulness with the replica of the study. The results show that there is the presence of the heat island effect within its surroundings, and it is verified that there are areas with higher temperature incidence into locals with low green area index, repeating itself both in the morning and in the afternoon. The analysis of these indices allows the decision making regarding the planning in the physical expansion of the buildings. It was concluded that replication makes possible to study the comparisons and allows finding natural and artificial solutions that will reduce the effects of climate change, demonstrating the importance of the microscale study, showing that vegetation plays a fundamental role in mitigating temperature changes.

Session 06. Biodiversity, Ecology, and Forestry

Conveners:
Prof. Dr. Gerhard Ernst Overbeck, Faculdade de Biologia (UFRGS)
Dr. Marcus Giese, Management of Crop Water Stress in the Tropics and Subtropics, University Hohenheim

The change in biodiversity is an evolutionary process of life on planet Earth. Key examples from the past to the present will be shown. It is also expected that the causes for changes will be provided. Bridging examples from the field of forestry provide information on issues already established and studied by research projects of sustainable interaction between natural resources and processes and demands of human societies. The talks shall provide information on analytical tools that help to retrieve necessary information for decision makers that have to implant managing systems, define economic behaviours and formulate and change necessary judicial systems to initiate and provide the legal base for sustainable development.

Oral presentations

Session 6

Grassland restoration in Southern Brazil: Where are we, and where do we need to go?

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Ecological restoration is a key issue on the environmental agenda worldwide, including in Brazil, and an important component of sustainable development. In southern Brazil, species-rich natural grasslands that provide important ecosystem services are important target systems for ecological restoration. However, restoration in Brazil has much focused on forest in the past, and only recently initiatives on grassland restoration have been launched. Despite some advances, many challenges remain for grassland restoration, including in the identification of degradation processes, the establishment of restoration priorities and the development and application of restoration techniques e.g. by species introduction. Here, I will give an overview about current state of knowledge and state of the art in practice and science, based on current research that in part was achieved by German-Brazilian cooperation projects. In the first part of the presentation, I will report recent results from experiments aiming at re-introducing management and species in grasslands degraded by different processes, such as agricultural use, tree plantations, and exotic plant invasions, by re-introduction of mowing and or grazing and, in some experiments, hay transfer. The results from our studies clearly indicate that spontaneous recovery is no adequate strategy for restoration: active restoration is necessary. Our current data indicates that it is possible to restore grasslands, but that possibly it will be difficult to reach original species composition. More experiments and long term monitoring are necessary to consolidate the results and develop applicable techniques. Additionally, research into propagation and establishment of target species that then could be sown or planted individually is needed. The second part will focus on the institutional setting necessary for successful restoration, including on the question of seed production. Parts of the results presented here come from German-Brazilian cooperation projects, and we plan to continue research activities with German partners in the future.

Towards the sustainable use of grassland ecosystems – a cross continental analysis for integrated solutions

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Grasslands cover around 30% of the terrestrial land surface and are considered as key-ecosystems affected by climate change and land-use dynamics. The provision of important ecosystem services such as carbon sequestration and biodiversity conservation are attributed to various grassland types comprising ecosystems from temperate steppe climate to the tropical environments of different savannah grasslands. Livestock production, strategically using natural grasslands, is the main land use option contributing to food security, livelihoods, national economies and provision of ecosystem services and functions.Land use of grasslands is mainly depending on resource availability determined by rainfall amounts and distribution, temperature regimes and soil fertility. But also the socio-economic background of the particular region affects land use practices and consequentially important ecosystem processes [1]. Overgrazing is very often associated with unsustainable land use management leading to land degradation. But on the other hand also grassland underutilization could reduce productivity, forage quality and shift species composition towards unwanted invasive plants [2]. Although experts have tried to identify a superior grazing system e.g. the controversial debate about continuous vs. rotational grazing [3], we are still facing many unsolved questions. The current land-use discussion is drifting to a more integrated and responsive grazing management approach taking into account the complexity of different given grazing systems. Key to successful grazing management is mobility, flexibility and responsiveness [4]. Despite the fact that many researchers meanwhile agree to such integrated grazing management approaches, our knowledge on the underlying biophysical processes and options to manipulate and adjust these with intelligent management in order to attain sustainability goals is rather scarce [5]. The talk will show examples how integrated land use strategies could be adapted for grassland ecosystems aiming at sustainable intensification and maintaining ecosystem services.

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Loss of Atlantic Rain Forest's Protected Area Compromise Sustainable Development

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Understanding ecosystems' spatial distribution through time is key to sustainable development because they provide several benefits such as soil formation, water purification, carbon sequestration and climate regulation. These benefits are also known as ecosystem services. Biodiversity hotspots, such as the Atlantic rain forests, are even more important due to their relatively high species richness and its inherently resilience to climate changes. Here we addressed which are the impacts of climate change on the occurrence and distribution of Atlantic rain forest by modeling 50 diagnostic species through 11 different algorithms, four Representative Concentration Pathways (RCP 2.6, 4.5, 6.0 and 8.5) and 11 atmosphere-ocean coupled general circulation models, with assessments at present (2010), 2050 and 2070 climatic conditions using three strictly selected variables (mean temperature of the wettest quarter, annual precipitation, precipitation of the warmest quarter). Models showed that Serra do Mar will likely be climatically stable and, therefore, a potential refuge for Atlantic rain forest through future, especially because Serra do Mar is currently covered by several protected areas and comprises only a few areas that could be geomorphologically suitable to agriculture. However, in considering the whole extent of Atlantic rain forests, the total amount of suitable climates within protected area will potentially be dramatically reduced. Currently, 13.8% of Atlantic rain forests are found within protected areas, but even in the most optimistic scenario this percentage drops 40.9% in 2050 and 40.3% in 2070. In the most pessimistic scenario, protected areas drops 54.4% in 2050 and 63.6% in 2070. Most of the Brazilian population currently lives within the delimitation of Atlantic Forest Domain and, thus, it is imperative that we preserve and restore this formation in order to maintain ecosystem services, as they have a key role in sustainable development. Cities like São Paulo and Rio de Janeiro have the potential to worsen or improve climate change mitigation for their proximity to Serra do Mar. Government and academia must work together to provide efficient restoration plans for the Atlantic rain forests, ensuring connectivity through fragments, maintaining species diversity and,therefore, preserving ecosystem services not just within protected areas, but also outside its boundaries, since the current Brazilian reserves system was not plannedto bare climate changes impacts. (CAPES)

Seed dispersal in southern Brazilian forest-grassland mosaics: How far can the seeds achieve?

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The expansion of woody vegetation over natural grasslands is a worldwide phenomenon that has increased over the past 100–200 years (Archer *et al*., 2017), being seed dispersal a key process to understand it. Nevertheless, there are few studies on the relative importance of seed dispersal syndromes at forest-grassland mosaics of southern Brazil. Therefore, our questions were: (1) is there any dominant pattern of dispersal syndromes along the forest-grassland gradient? (2) how do attributes of the seeds respond to the gradient? (3) does the seed richness greater within the forest? (4) how far can forest seeds disperse? To answer these questions, soil litter was collected from thirteen 1,150 cm^2 plots located in two 120 m transects (60 m from edge towards the grassland and 60m towards the forest) at nine sites in southern Brazil. The soil litter sampling units were dried at 60°C until constant weight and were screened and analyzed with stereomicroscope. We counted for each plot the number of seed morphotypes (richness), proportion of anemochorous and zoochorous seeds (%), mean seed length and width (mm), and ratio of seed width by length. Analyzes were performed in software Systat v. 11. Plots at 10 to 60m of forest interior showed high contribution of zoochorous seeds ($F_{12,190}$ = 8.43; P < 0.001), being anemochorus seeds prevailing at 70-120m far from forest interior. Seed richness did not change significantly with distance from forest ($F_{12,190}$ = 1.25, P = 0.252). Nevertheless, seed attributes changed along the forest-grassland mosaic. Plots inside the forest had seeds as wide as long ($F_{12,190}$ = 4.07; P < 0.001), while plots in the grassland farther from the forest edge had seeds longer than large, probably, due to structures related to wind dispersal (e.g. papus of Asteraceae seeds).These preliminary results showed that seed richness is uniform along the gradient forest-grassland. Regarding dispersal syndromes, the pattern found corroborates previous hypotheses about the exchange of syndromes along these gradient (Müller *et al*., 2012). Furthermore, we were able to infer that faunal movements occur at least until 10 m from the forest border towards the grassland, showing that seed dispersal process is crucial to forest expansion over southern Brazilian Campos.

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Educational sustainability of 28 years of biological classes of Tübingen University in Brazil

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Tübingen University maintains partnerships with numerous Brazilian universities starting in 1983 with PUCRS, Porto Alegre, RS. Since 1989, 24 zoological field trips of one month each and since 2002, 15 geoecological practical classes of three week duration were organized and carried out up to 2017. From Tübingen University and other universities of the State of Baden-Württemberg almost 500 students participated in the field trips, around 225 the geoecology classes. Innumerable Brazilian students came along at least part of the time. Besides the studies during the field classes, a series of students came back to Brazil to participate in DAAD exchange programs, do practical work in NGOs or university projects or did their bachelor, masters or doctoral work in Brazil. A series of German former students finished their degrees in Tübingen or Brazil, some became professors in Brazil, their former guest country. As a counterpart Brazilian students did part of their university career in Tübingen and are now professors in Brazil. This is a nice example of sustainability in education and catalyzing careers in both directions.

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brasilienexkursion.wordpress.com

Economic opportunities, local people and extractive reserves in the Brazilian Amazon

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The growing human population and the increased demand for food and income present challenges to both protect biodiversity and sustain local people. These challenges are more evident in developing countries with a rich biodiversity, such as in Brazil and especially in the Amazon Basin, one of the last biodiversity refuges with vast pristine areas of tropical forests in the world. A promising approach to conciliate biodiversity conservation and maintenance of local people and their culture are the sustainable or extractive reserves. These conservation units have been implemented by the Brazilian government with the aim of protect endangered species and ecosystems while also promoting the sustainable use of natural resources. These conservation units include local people within their boundaries and these people are allowed to use natural resources, including agriculture, forest products (seeds, fruits), hunting and fishing, but need to follow management rules. These people usually assume the unintended role of 'forest guardians' and get their sustenance from the protected forests and ecosystems where they live. However, their role as forest guardians could be compromised if people inside extractive reserves are poor and have reduced economic opportunities. Lack of opportunities could lead to overharvest of natural resources within reserves or make people to leave reserves. The goal of this study is to compare the economic status of people in fishing communities inside and outside an extractive reserve (RESEX, in Portuguese) in the Tapajos River, Brazilian Amazon. We interviewed 160 fishers in four communities inside (n= 88 interviewees) and four outside (n = 72) the RESEX of Tapajos-Arapiuns, along the lower Tapajos River. We analyzed two economic indicators from answers of interviewees to the questionnaire: categories of income and number of assets that they have in their homes (television, refrigerator, bathrooms, among others). We compared the distribution of income categories between interviewees inside and outside the RESEX through a two-sample Kolmogorov test and the mean number of assets was compared through an analysis of variance (ANOVA). People in the communities inside the RESEX have lower income (more people in the lowest income category of less than R$ 500) and less mean assets (3.4 ± 1.2 assets) than people outside the RESEX (4.1 ± 1.6). These results indicate that people living in the studied RESEX may have reduced economic opportunities, may be due to the distance to markets and because they are less involved in touristic oriented activities. It would be desirable to increase the economic welfare of these people who live in the RESEX, through market oriented management programs of natural resources or by including these communities in sustainable tourism.

Terra firme: Soil respiration

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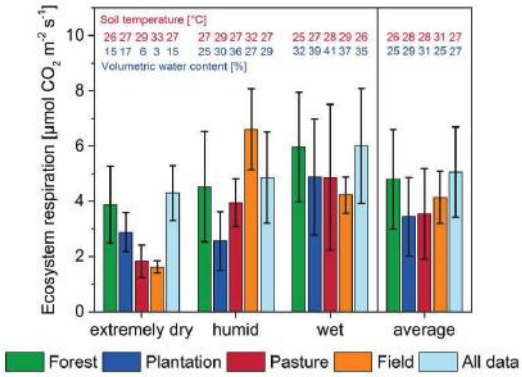
Given the relevance of the Amazon basin for global biogeochemistry, relatively little is known about representative soil respiration data. So far, respiration work in the basin was restricted to individual cluster studies. While these present fine data, it remained unclear to which extent the data were truly representative of the vast space of Amazônia real. Our project EcoRespira-Amazon studies soil and ecosystem respiration at 13 terra firme locations, each with at least two sites representing forest and post-forest land cover. Measurements and data acquisition include gases (CO_2, CH_4, N_2O) and soil chemistry (63 elements, including C, N, and S), taken three times under very dry, humid and wet meteorological conditions (http://blogs.hrz.tu-freiberg.de/ecorespira/). While general respiration fluxes of previous work and differences between dry and wet season could be confirmed, our high-resolution data allow for a more in-depth exploration of processes (e.g., Figure below).



Ecosystem and soil respiration (CO_2 fluxes) EcoRespira-Amazon in the sequence of very dry, humid to wet season conditions differentiated forest and post-forest land cover

Increasing respiration rates with soil humidity emerge (Figure above), albeit with interesting modifications. Agricultural land shows distinctively lower signals in comparison with forestland cover. Based on these data, it appears reasonable to upscale the soil respiration behavior not only for Terra firme conditions in the Amazon basin, but also for the future (2100 AD), when trends towards more extreme weather conditions and likely increasing drought risks in southern Amazonia will determine the challenge for agriculture and agroforestry (See contribution in session 02: “Amazon basin under climate change already?”).

Influence of bees on canola productivity and its relation to climate change

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The global decline of pollinators adversely affects agricultural crop pollination services. Bees are the main pollinators, which pollinate more than 90% of 107 global crops, such as canola. Studies indicate that the visit of insects promotes a productivity increase of the canola grains in 12 to 47%. This study aims to know the diversity of bees in the canola agroecosystem and to evaluate the influence of pollinators on crop productivity, as well as habitat suitability for pollinating species (*Tetragonisca fiebrigi* and *Scaptotrigona bipunctata*) in the face of climatic changes in future scenarios (2050). The insects were collected with the use of pan traps in eight canola fields (*Brassica napus* cultivars Hyola 420 and Hyola 61) in the municipalities of Esmeralda, Estrela and Guarani das Missões, RS, Brazil. For the development of maps of habitat suitability, records of occurrences of species were used in databases of scientific collections, and records of canola crops were obtained from growers. The productivity of canola was positively influenced by the diversity of bees, both social and solitary, and the distance of the forest remnant affected the composition of the bees guilds present inside the crop. It can be observed that the composition of bees found in the canola agroecosystem responds to the ecological and historical factors of each region and is directly related to the food resources and the quality of the adjacent habitat. A high number of areas suitable for canola with potential for future crop expansion from the perspective of climate change were also recorded. However, it is necessary to use new cultivars with greater tolerance to climatic variables, since they affect plant phenology. In addition, when mapping suitable areas for canola and stingless bee species, it is necessary to adopt conservation measures for natural/semi-natural habitats to provide food and nesting resources for the maintenance of pollinator populations.

Halinski, R. Polinizadores de canola: perspectivas para o manejo sustentável de insetos, produtividade de grãos e mudanças climáticas. Tese de Doutorado em Zoologia na PUCRS. 151p.

Poster presentations

Session 6

Landowner behavior in relation to the natural forests in Paraná

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The Project “Development of Sustainable Forestry in Small-Scale Farming-Areas of Paraná/Brazil” was founded in 2010. It is realized by the Midwestern State University of Paraná (UNICENTRO) in Irati/PR and the University of Applied Forest Sciences (HFR) in Rottenburg/BW and is supported by the research ministries of both countries. The native type of forest in southern Brazil is called Floresta Ombrófolia Mista (FOM). This type of forest is dominated by the species Araucaria angustifolia. Until the first half of the 19th century it covered an area of over 185.000 km². Today, only about 1,000 km² of natural Araucaria forests are left. The south of Brazil is heavily populated. In the past there was no sustainable forestry management. Competition between land uses such as agriculture or highly productive plantations and natural forest conservation is fierce. The Araucaria is recognized as an endangered species by both the International Union for Conservation of Nature (IUCN) as well as the Brazilian Environmental Institute IBAMA. Numerous other endangered species are associated with and depend on the Araucaria. As part of the Biome Mata Atlântica and as a heavily endangered ecosystem, forests of Araucaria are especially protected and the use of wood is prohibited by law[1]. Especially for small-scale farmers this means a conflict of interest because while natural forests offer hardly any earnings, they have to protect them. There is an existing discussion if the preservation is more constructive than sustainable forestry[2] and this project should help to clarify still existing research gaps. In this context the project tries to find answers to the questions: How does regulation influence landowners’ behavior in relation to the natural forests? What political measures can improve the protection of natural forests and the quality of life of small-scale farmers? Due to the complexity of the topic and missing hypotheses, a qualitative research approach was chosen. 56 semi-structured interviews were conducted and analyzed using qualitative content analysis according to Mayring[3]. Hypotheses were developed and validated in three steps. As a result there were defined different types of landowners which react different to the land-use regulations. Our research findings may help to develop and improve existing political strategies concerning natural forest conservation in Paraná.

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Community forest management in protected areas in the Amazon: an impact assessment at Verde para Sempre Extractive RESERVE and at Rio Negro Sustainable Development Reserve

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The community forest management (CFM) for timber extraction is considered an important instrument to increase income and forestry sustainability among traditional local users who live in protected areas in the Amazon region. However, there is little evidence that this tool has brought social benefits to their users. The present research aims at identifying the social and economic impact of the introduction of two CFM programs: *Projeto de Apoio ao Manejo Florestal Sustentável* (PROMANEJO) at Verde para Sempre Extractive RESERVE and *Programa Bolsa Florestal* (PBF) at Rio Negro Sustainable Development Reserve. An effectiveness evaluation has been performed, that uses observation at fieldwork and personal interviews with main managers and communities´ leadership. The evidence shows that both initiatives brought mainly positive effects, particularly through income increase and deforestation decrease. Regarding livelihood standards and the overall program performance, the study indicates better results at Rio Negro, due to PBF's participative approach and the continuity of program, which has no end date.

Avifauna in the different phases of a wind farm

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Based on the growing demand for renewable energy sources, wind energy has grown significantly in the world. The wind farms, admittedly, have low environmental impact, but impacts on the avifauna are much studied and discussed. Brazil has been encouraging the development of new energy projects that promote a lower environmental impact. Currently, the wind sector contributes with 7.2% of the Brazilian energy matrix and the southern region occupies the fourth place with a production of 1,720.9 MW of installed capacity. The Palmares Wind Farm, has been operating since the end of 2010, has 25 wind turbines and collaborates with 57.5 MW of installed capacity. The region of the wind farm implantation is mainly characterized by dry lands, humid lands and large extensions of rice plantation and *Pinus eliotii*. The objective of this work was to evaluate the bird community present in the area of the Palmares Wind Farm, located in Palmares do Sul county, RS, during all phases of the project. In this way, the avifauna data of the environmental monitoring - delivered to the state environmental agency, FEPAM - from the pre-deployment, deployment and operation phases was analyzed. In addition, the land use, before and after the implementation of the wind farm, was also analyzed. From the analysis of the reports it was possible to evaluate the community of birds present in the wind farm during the different phases of the project, comparing the species richness. The total number of birds registered in all phases of the wind farm was 167 species. In the pre-deployment, 156 bird species were registered, 115 species in the deployment and during the operation of the wind farm 118 species. 101 species of birds are common to all phases of the enterprise. 20 species were registered in at least two phases of the enterprise. However, some species are unique to some stage: 37 species were only registered in the pre-deployment, four in the deployment and five in the operation. The analysis of the land use allowed to observe that has had modifications of the surrounding areas, caused by the removal of forests and increase of rice planting, which explains why some species have been no longer observed, since they have their habitat areas as marshes, forest or edge of the forest. On the other hand, *Circus cinereus* was only registered on the operation of the wind farm and it is a vulnerable species on a national and regional level. The analysis of these secondary data allowed to evaluate which changes the implantation of an enterprise of this segment can bring to the regional avifauna, being also able to associate them to the changes on the original configurations, considering the use of the ground and the ecological succession of native vegetation at the wind farm area.

Income expectation with forest products in a settlement project in the lower Tapajós region, state of Pará, Brazil

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The aim of this study was to estimate the potential income generated by forest products with commercial demand in a rural community. We carried out this study at São Mateus community, in Moju I and II settlement projects, municipality of Placas, Brazilian Amazon. We performed a forest inventory, installing 11 sample units of 50 m x 200 m, measuring all trees with Diameter at Breast Height (diameter measured at 1.30 meters above ground) - DBH ≥ 10 cm. For the valuation of forest products, we conducted interviews with people from the studied community and at fairs to obtain information about the commercial use, productivity and market price of the species. We estimated 501.6 trees.ha^{-1} in the forest inventory, distributed in 48 families and 143 botanical species, with basal area of 28.77 m².ha^{-1}. By analyzing the phytosociological parameters of the harvesting stock (DBH ≥ 50 cm), we observed that only *Mezilaurus itauba* Taubert ex Mez. (itaúba), *Hymenaea parviflora* Huber. (jutaí mirim), *Nectandra* sp. (louro), *Manilkara huberi* (Ducke) Chevalier (maçaranduba), *Manilkara bidentata* (A.DC.) A. Chev. (maparajuba) and *Eperua schomburgkiana* Benth. (muirapiranga) presented indices that qualified them to compose the group of species for wood production. If we consider an area of 80 ha, which corresponds to the forest reserve of the lots and applying the Brazilian legislation for community forest management, it is possible to harvest 8 hectares per year, totaling 77.3 m³ of wood (9.663 m³ ha^{-1}), which generates a Net worth of US$ 3,209.58 (US$ 401.20 ha^{-1}) if the community sells the tree standing, what usually happens. Among non-timber forest products (NTFPs), the species that presented the highest monetary values were: *Dipteryx odorata* (Aublet) Willd. (cumarú), *Brosimum parinarioides* Ducke (amapá doce), *Carapa guianensis* Aubl. (andiroba), *Diplotropis purpurea* (Rich.) Amsh. (sucupira amarela) and *Caryocar villosum* (Aubl.) Pers. (piquiá). In the case of the non-destructive collection of NTFPs, Brazilian legislation allows annual harvesting in the entire forest management area, which totaled US$ 8,578.92 for an area of 80 ha, corresponding to a monthly income of US$ 714.91. The monetary value of forest products (timber and non-timber) was estimated at US$ 11,788.50, which corresponded to a monthly income of US$ 982.37. This income expectation is superior to that of agriculture and family livestock, which is a stimulus for the adoption of community forest management.

Characteristics of biological soil crusts in the southwest areas of Rio Grande do Sul, Brazil

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The present study proposes to investigate the components of biological soil crusts (BSC) in order to understand the behavior and inter-relations of BSC in Pampa's (*Areais*) biome in the southwestern of Rio Grande do Sul State (RS) Brazil. It can be understood as a BSC analysis from the sequence of succession and morphological classification. BSC are able to rapidly colonize areas that have suffered some kind of disturbance, generating support for higher vegetation strata. In this way, the selected areas suffer from the sand process, which is a procedure of reworking sandy deposits, which made vegetation difficult to fix due to the intense mobility of sediments for the action of water and wind. The samples were collected in May 2014 and 2015 in three sites, two per site, in the Alegrete and São Francisco de Assis. The site analyzed in Alegrete consists of an area covered by *Eucalyptus sp*. plantation, whereas the sites in São Francisco de Assis are characterized by sandy areas that undergo ravine processes, one without human interference and the other with artificially stabilized ravine. The results show that the sequence of succession showed from primary stages - with cyanobacteria stains - to more evolved taxa with thick mosses. Different morphologies were observed for BSC, following the soft, rough, pinacular and corrugated taxonomic patterns. In this way, the study includes an exploratory analysis of BSC through its geoecological behavior, in order to initiate studies on BSC in Rio Grande do Sul, Brazil.

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Influence of fragment isolation on mutualistic networks inserted in an urban matrix

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The mutualistic relationships between plants and animals play a key role in ecosystems as drivers of evolutionary and ecological processes. These relationships can be summarized as complex mutualistic networks of interacting organisms, which show recurrent structural patterns and provide valuable multi-taxonomic information that can be used as a tool to unravel ecological patterns and plan conservation efforts. Mutualistic networks, just like most other levels of biological organization, are severely threatened by human-driven phenomena. This work aims to evaluate the influence of habitat fragmentation caused by urban expansion on animal-plant mutualistic networks. We sampled floral visitors in 12 natural grassland fragments distributed in four hills inserted within an urban matrix in southern Brazil. Sampling was conducted in southern hemisphere spring and summer, in one circular 1-hectar plot per fragment. We sampled flower visitors with the focal method (10 minutes of observation per plant; total sampling time 207 hours). We only included potential pollinators in the sampling, which restricted visitors to four orders (Hymenoptera [except ants], Coleoptera, Diptera and Lepidoptera). Animal-plant pairs with only one observed interaction were removed from the dataset. We estimated the degree of isolation of each fragment in the urban matrix by calculating the mean distance between the center of the circular sampling plot and the closest physical barrier (urbanized area or large water body) in four directions (N, S, E and W). We constructed quantitative bipartite animal-plant interaction matrices for each fragment, and calculated the following network metrics for each matrix/fragment: nestedness and connectance (for the whole networks); generalization, extinction curves, diversity of partners and robustness (for each trophic level separately). We estimated correlation between isolation of fragments and each network metric with Pearson's correlation coefficient, assuming a probabilistic threshold of 90%. We sampled 1,240 plant individuals distributed in 213 species. Total abundance of floral visitors was 878 individuals (417 Hymenoptera, 358 Coleoptera, 98 Diptera and 5 Lepidoptera). Networks were dominated by highly asymmetrical interactions, with few species concentrating most of the observed interactions, as expected for mutualistic networks. Mean distance to the urban matrix was positively correlated with nestedness ($r = 0.629$, $p = 0.021$), as well as with generality ($r = 0.652$, $p = 0.015$), partner diversity ($r = 0.635$, $p = 0.019$) and robustness ($r = 0.525$, $p = 0.065$) of floral visitors. These findings suggest that fragments less isolated by the urban matrix present a more cohesive and structured core of interactions shaped by generalist species, to which specialists connect. Mean distance to the urban matrix was also correlated with connectance ($r = 0.484$, $p = 0.093$) and extinction slope for plants ($r = 0.634$, $p = 0.019$), suggesting that the fraction of realized interactions and the resistance of plant species to random extinction of animal partners increase towards less isolated fragments. Our findings bring evidence that habitat fragmentation by urban expansion affect not only plant and animal diversity per se as documented before, but also the structure of the mutualistic interaction networks they shape.

Application of biotecnology for the conservation of *Elaphoglossum macrophyllum*

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The Atlantic Forest Biome is one of the richest areas in biodiversity. However, it is being drastically reduced, forming unfavorable fragments for the development of many species. *Elaphoglossum macrophyllum* (Mett. ex Kuhn) Christ is a fern of terrestrial or epiphytic habit with distribution restricted to South America. In the Brazilian state of Rio Grande do Sul (RS) the species is included in the list of species threatened with extinction as endangered (Rio Grande do Sul, 2014). The aim of the study was to establish the *in vitro* culture and acclimatization conditions of *E. macrophyllum* individuals, with the purpose of their future reintroduction into the forest environment. Fertile leaves were collected in a forest fragment in Campo Bom, RS. After asepsis with sodium hypochlorite, spores were sowed in 30 mL of Meyer liquid medium (Meyer *et al.*, 1955) supplemented with nystatin (three flasks per treatment). Germination was assessed after 60 days of *in vitro* culture under different pH (4, 5, 6 and 7), temperature (10, 15, 20, 25 and 30 ºC) and photoperiod (0, 6, 12, 18 and 24 h light) conditions. After establishing the abiotic conditions, a new *in vitro* culture was performed to produce clusters of cordiform gametophytes. These were cultivated *ex vitro* in three substrates: vermiculite (basaltic mineral compound), organic soil/vermiculite (1:1 v/v) and Carolina® (composed of peat, vermiculite and rice hulls). For each substrate seven trays were prepared, each one containing five clusters. Spore germination was significantly higher at pHs 4 (94%) and 5 (88%), in relation to pHs 6 (52%) and 7 (26%). The highest germination percentage (76%) was obtained in cultures maintained at 25 °C, and no germination occurred in the cultures at 10 °C. This species is photoblastic positive, presenting higher germination at 6 (83%), 12 (86%) and 18 (75%) h light, differing significantly from 24 h light (49%). In the *ex vitro* acclimatization, the production of sporophytes was asynchronous, with the first record of leaves in the 16th week in sporophytes on the organic soil/vermiculite substrate. In the 30th week, number of leaves was counted. The clusters acclimatized on organic soil/vermiculite presented an average of 58 leaves, which was significantly different from vermiculite (20 leaves) and Carolina® (10 leaves). The development of individuals cultivated at pH 4.0, at 25 ºC, photoperiod 12 h light, and acclimatized on organic soil/vermiculite is being monitored for subsequent reintroduction and for the determination of a propagation and conservation model for this species.

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Impact of land use on the ichthyofauna, in the buffer zone of National Parks in Rio Grande do Sul, Brazil

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The National Parks (PARNAs) are federal conservation units (UCs) whose basic objective is the preservation of natural ecosystems of ecological relevance. The Aparados da Serra (PNAS) and Serra Geral (PNSG) national parks have considerable diversity of fauna and flora, mainly due to their geological characteristics. These units have buffer zones, regions around conservation areas that aim at both economic profitability and mitigation of impacts, assuming a sustainable management system. One tool that collaborates with the investigation and management of these activities is georeferencing, which consists of an analytical tool for collecting, storing, processing and analyzing georeferenced data. The main objective of this work is to highlight the importance of georeferencing as an analytical tool in order to know and quantify the anthropogenic activities that occur within the PNAS and PNSG buffer zones to analyze practices that may impact the local ichthyofauna. The software ArcGIS 10.1 was used for landscape data analysis. Satellite images were used to delimit the PARNAs areas, as well as the different types of land use in the buffer zones. The ichthyofauna was sampled between April / 2015 and August / 2016, covering the Mampituba, Araranguá and Taquari-Antas basins. There were 56 species distributed among 15 families and 6 orders. In the buffer zones of PNAS and PNSG they include activities such as cattle raising, forestry and agriculture. Riparian vegetation is also an important factor for the maintenance of water quality, filtering out substances from the surrounding area and providing organic material and substrate for the fauna present therein. Forestry, in particular *Eucalyptus* plantations, causes a great water impact, and can dry flooded areas like wetlands, directly impacting the fish fauna of the region. Although the georeferencing is a promising analytical tool to verify the impacts that the preservation areas suffer, contributing to the implementation of management systems aimed at sustainable development, information and databases are still very scarce.

Application of a microscopy software to measure morphological characters of parasitic helminths of fish from the Tramandaí River Basin, Southern Brazil

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In biology, morphometry incorporates analysis, quantitative description and the interpretation of the shape. The discovery of evolution and taxonomic history of the species is one of the biggest challenges of scientific research of living beings. This happens because the biodiversity of individuals is strongly associated with great morphological variability. In any systematic study, techniques of description, measurement, and comparison of structural shapes are essentials. Taxonomic studies of the parasitic fauna prove to be an indispensable requirement for the preparation of inventories. Through these inventories is possible to know the biodiversity and biogeography of these parasites. Today, methods which use traditional techniques based on visual inspection are obsolete. Owing to the technological advances, in the present times researchers have a wide range of tools for study species. The main goal of this work was to use a microscopy software to measure morphological characters of parasitic helminths of fish from the Tramandaí River Basin, Southern Brazil. In July 2016, at the Lagoa dos Quadros, sixty specimens of the fish *Geophagus brasiliensis* were purchased from local fishermen. Soon after, searching for parasites, the fish were necropsied according to the techniques of Amato & Amato (2010). The parasites found were fixed, stained, clarified and mounted on permanent blades with Canada Balsam for morphometric study. Using the measures found after, the taxonomic identification of the parasites was realized using a specific identification key for trematodes. To measure the morphometric characters of the parasites a microscope with attached camera, model Axiocam ERc5s by Zeiss was used. The software choosen was AxioVision 4.2 by Zeiss. Twenty-six of the seventy-three individuals of the digenean parasite *Lobatostoma jungwirth* were measured. The unit of measure used was micrometers and the results were represented by the mean followed by the standard deviation. Measures taken from *L. jungwirth*: body (BD): 2275 ± 944.70 long, 877 ± 292.14 wide; pharynx (PH): 183 ± 35.22 long, 172 ± 28.37 wide; ovary (OV): 189 ± 89.81 long, 145 ± 65.40 wide; testicle (TC): 402 ± 158,097 long, 278 ± 98.106 wide. Observing the results obtained we can conclude that the use of specific softwares in morphometry can be an allied tool of taxonomy in order to obtain measurements of structures that are too difficult to measure. In this way, the use of such tools can represent a great help to researchers in the description of biodiversity.

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Occurrences of the Ocotea Aubl. Genus, of the Lauraceae Family, in Atlantic Forest of Ceará State

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This paper presents a critical and informative bibliographical review of the Lauraceae Family, focusing on the Ocotea Aubl. Genus and occurrence of it species in Atlantic Forest of the state of Ceará, NE Brazil. The Lauraceae family encompasses 68 plant geni and 2,978 species (THE PLANT LIST, 2013). In Brazil, over 20 geni have been identifien. Ocotea is the largest genus in the family, contraining 428 species. Fourteen (14) species of Ocotea have been identifien in Ceará and two (2) in the sp. Category, of which two are endemic (VATTIMO-GIL, 1960/1961; SANTOS & ALVES, 2013). Ocotea baturitensis Vattimo-Gil and Ocotea maranguapensis Vattimo-Gil. The latter and Ocotea loefgrenii Vattimo-Gil, are on the list of rare plant species in Brazil (BAITELLO, 2009).

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Relevant aspects for the development of a conservation project: case study of the reintroduction of an epiphytic orchid species

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The reintroduction of micropropagated plants allow the re-establishment of *in situ* orchid populations which due to several anthropic impacts on their habitats, are threatened with extinction. However, a number of factors must be taken into account in order to achieve successful conservation projects [1]. In the present study, we are going to discuss relevant aspects for the success of a conservation project based on two initiatives of the epiphytic *Cattleya intermedia* reintroduction. The plants, obtained from *in vitro* sowing, were cultivated in laboratory and reintroduced in two distinct areas of the Atlantic Forest, located in the South of Brazil. Data from biotic and abiotic factors were collected periodically during the following years after the reintroduction of the plants, as well as qualitative observations about the establishment of *Cattleya intermedia in situ*, which allowed the aspects presented in this study to be determined. The two areas of reintroduction are within the phytoecological unit of the Seasonal Semideciduous Forest (Atlantic Forest) occurrence areas of *C. intermedia*, which can contribute for the reintroduced individuals to establish relations with essential organisms for the continuity of the populations over time, such as insect pollinators and mycorrhizal fungi. One of the selected areas was a private rural property and the other a municipal conservation unit, since the search for protected areas can grant greater security to the plants after reintroduction. The reintroduction on the trees near 7 m height guaranteed better development of the individuals, possibly due to greater sunlight availability of this stratum or because of the access to rainfall and nutrients coming from atmospheric deposition. In addition, this height hinders irregular collections, since some plants fixed at about 3.5 m height on the trunk of the trees were collected. The collections happened in the conservation unit, which, despite having a biodiversity protection function, is located in the urban matrix of the city and has free access of the public. The selected trees for fixation of the individuals belonged to species that did not present scaling of the trunk and originally carried epiphytes, indicating their quality as hosts. Plant attachment on the hosts was conducted with flexible plastified wire, which had the necessary durability for the plant roots to develop and attach on the trunk. Every three months, inspections aiming the maintenance of the wires were performed to ensure that the increase in trunk circumference did not hurt the stems and roots of the orchids. When taken into account, such characteristics of reintroduction projects may allow inferences about the ecophysiological needs of the species and may assist in the design of reintroduction projects of orchid species or even of other groups of epiphytes threatened with extinction.

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Biotechnology for plant conservation: *in situ* reintroduction of *Vriesea incurvata* propagated *in vitro*

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The Atlantic Forest is one of the world's priority areas for conservation and presents high endemism of Bromeliaceae. Due to anthropogenic pressure on the biome, conservation strategies of plants are necessary for the maintenance of biodiversity. Therefore, the present study aimed the monitoring of survival and development of micropropagated young plants of *Vriesea incurvata* reintroduced in the natural environmental. Seeds were collected from a natural population, germinated in culture medium, and the plantlets were grown *in vitro*. Subsequently, the individuals were acclimatized in substrates and cultivated *ex vitro*. The young plants were reintroduced in an Atlantic Forest area located in Maquiné River Basin (Rio Grande do Sul State, Brazil). Two transects of 100 m were delineated in the interior of the forest fragment: one parallel to the margin of a small water course (width: ±3 m; denominated "stream edge") and the second parallel and distant 100 m from the first transect (denominated "interior"). At each transect, 19 phorophytes were selected, which received four bromeliads each, fixed between 3.5 and 4.0 m in height, making a total of 152 individuals. Plants were monitored and at 180 days after reintroduction survival, length of the longest leaf (LLL), number of leaves (NL), and diameter of the rosette (DR) were measured. It was recorded a survival of 100% at the stream edge and 96% in the interior. The average growth of the LLL was 17.2% and 9.6% at the stream edge and in the interior, respectively. This growth resulted in averages significantly higher than the initial size (19.4±2.7; $p<0.001$ and 18.3±2.8; $p<0.001$, respectively). NL was significantly greater at 180 days after reintroduction at the stream edge (16.5±2.1), with an average increase of 8.1%. On the other hand, a decrease of 11.4% in the NL was observed in the individuals of *V. incurvata* reintroduced in the interior, resulting in a significantly lower average than the initial size (14.1±2.3; $p<0.001$). DR at 180 days after reintroduction was significantly higher at the stream edge (22.8±3.3; $p<0.001$) and in the interior (19.1±3.3; $p<0.001$) when compared to the initial size, resulting from the average growth of 36.6% and 12.6%, respectively. In general, for the evaluated parameters, the development of the plants fixed at the stream edge was significantly higher than for the plants fixed in the interior. The results of the present study are still initial and point to the establishment of *V. incurvata* reintroduced plants, although long-term monitoring is still necessary to evaluate their *in situ* development and to understand their interaction with the environment. (Acknowledgements: CAPES, FEEVALE and FEPAGRO/Litoral Norte).

Land conver changes between 2002 and 2009 in Rio Grande do Sul state

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Land cover maps are used worldwide for monitoring land change. Environmental NGO's as well as food security studies have large interest in identify potential areas of interest for conservation or for agricultural development, respectively. This kind of map can be of mutual interest for both groups. On the other hand, land cover maps are available either at general scale of detail at global or regional basis or for small areas at the level of a municipality of a local watershed. We wanted to produce a land cover map which has an intermediate scale and that could be usefull for monitoring both agricultural and natural areas. Main objective of this work is to produce a land cover map of Rio Grande do Sul, Brazil, the southernmost state of Brazil. It covers an area of 281,738 km² (3.3 % of Brazilian's surface). Before the European colonization, the state was covered by grasslands (71.1 %) and forests (28.9 %). The methodology was based on visual interpretation on a mosaic out of 22 Landsat 5TM images for the year 2009, the same as used to produce a land cover map of the year 2002. Main reason is that it allows an easy evaluation of land change along the time. Results show that the state has 49.6 % of its surface covered by man-made human land cover, 31.9 % corresponds to original land cover and 18.5 % are grasslands and forests with some degree of human use. When confronted to the 2002 land cover map, it can be observed that in seven years there was a change of 6,0 % (16,900 km²). Most of that change represents a conversion of natural land cover in cultivated areas. More than know quantitative values of land cover, maps offer the possibility to know where different covers happen and, consequently, where land change is taking place.

Session 07. Bioeconomy

Conveners:
Prof. Dr. José Vitor Bomtempo Martins, Escola de Química (UFRJ)
Dr. Dominik Patzelt, BIOPRO Baden-Württemberg GmbH

The following description of Bioeconomy is provided by the European Commission in the field of Research and Innovation at Horizon 2020 (http://ec.europa.eu/research/bioeconomy/): "Bioeconomy encompasses the sustainable production of renewable resources from land, fisheries and aquaculture environments and their conversion into food, feed, fibre, bio-based products and bio-energy as well as the related public goods. The Bioeconomy includes primary production, such as agriculture, forestry, fisheries and aquaculture, and industries using/processing biological resources, such as the food and pulp and paper industries and parts of the chemical, biotechnological and energy industries." The session seeks for presentations that combine sustainable production of renewable resources and their industrial using/processing.

Oral presentations

Session 7

Challenges and opportunities in bioeconomy: an innovation dynamics approach

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Bioeconomy is seen as having many innovation opportunities in very diversified markets such as bioenergy, biofuels, biomaterials and bioplastics, biochemicals, food and feed. Nevertheless, it seems to be challenging for policy makers, business managers and researchers to design policies and strategies targeting these opportunities. I propose to present an analytical frame based on the innovation dynamics which aims at identifying the key dimensions in the bioeconomy development. The framework is illustrated exploring the Brazilian position in the bioeconomy.

Bioeconomy in Germany

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Nowadays fossil resources are key components in the everyday life of almost every human being. Coal and oil that are used since 250 years had their legitimization in the past as enabler for a modern and industrialized society, but many countries and their general public have developed a deep-rooted understanding, that building a culture on fossil resources will not be sustainable in the future. The global awareness for climate change, destruction of ecosystems and the finite nature of fossil resources need to trigger a new revolution. To achieve the transition from fossil to renewable sources, a “raw material shift” in all aspects of life needs to be done. The Bioeconomy has the potential to facilitate this transition. At this point in history, Bioeconomy is not capable of replacing all fossil resources, but tremendous amounts of good ideas, entrepreneurship and hands on mentality already pave the way for a promising future development. The bases for a Bioeconomy are renewable raw materials for food, feed, energy and industrial products. Along the Bioeconomy, Circular Economy, and cascading the use of raw material are important elements to make use of carbon sources as long as possible before composting or usage as energy source. Germany entitled itself to Bioeconomy with a Research and a Policy Strategy. With help of these strategies, several challenges need to be mastered along the way, that are supply of food for a growing world population, supply of sustainable raw material for all industrial applications, development of new technologies and protection of biodiversity. From the German point of view, aspects of conversion as well as usage of biogenic residues are most promising, because Germany is a center for technology on the one hand and has limited availability of cultivation areas on the other hand. Bioeconomy will supply “Drop-in” solutions for already existing technologies but also generate new materials with new and potentially better material properties. The success of Bioeconomy will strongly depend on the profitability of those products and participation of the public. To achieve both, new value chains and networks need to be developed and promoted on a quadruple helix structure, that is involvement of policy, academia, business and the public.

Recovery of organic waste as a component of bioeconomy

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The increasing world population and economic growth (especially in rapidly developing countries) in combination with decreasing resources and climate change require renewable resources for material and energetic use. Waste biomass is mostly an untapped source for providing materials for energy generation and recycling. A major advantage is that waste biomass, accounting between 40 and 70 % in municipal waste, is not competing with other sources compared to renewable resources from agriculture. The presentation shows the potentials and use of organic waste in Germany as a part of bioeconomy as well as its significance in the international context. Organic waste potentials of households based on current research activities and the high-quality recovery of organic waste in Germany are described. One essential element is also the bioenergy production through biogas, the optimization of biogas plants and the recovery of high-quality composts and digestates. The results shall be put into context of Europe and emerging and developing countries. The basis is formed by two research projects carried out under the research program bioeconomy Baden-Wuerttemberg and other research projects on organic waste recovery within the national and international framework. The results show organic waste potentials from households between 80 to over 160 kg/E·a. These potentials can be deployed for material and energetic use. The measurable quantity in Germany alone amounts to up to 16 millions Mg/a. Special attention should be paid to the optimization of energetic recovery, for example through flexible biogas generation and the reduction of extraneous matters. One Mg of biowaste can substitute between 35 up to 200 kg fossile CO_2 equivalents through composting and anaerobic digestion [1], [2]. In addition, methane emissions from landfills account up to 18 % of the anthropogenic methane emissions worldwide [3]. The avoidance of these specific emissions in combination with the simultaneous generation of bioenergy and compost can make a relevant contribution for climate and resource protection in emerging and developing countries.

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A study of German Municipalities' innovation policy criteria for renewable energy systems

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This paper presents a preliminary study based on a survey conducted with 727 middle and large German municipalities which aim was to undestand the main innovation policy criteria used for the development of Renewable Energy Systems (RES) as a part of the regional innovation system. Three main criteria were studied: municipal localtional factors, cooperation activities and existing local knowledge on this issue. We analyzed how these criteria impact the performance of RES in these municipalities by using econometrics analysis based on two-steps regression methods. We show that two of these factors have a positive effect on RES while one of them was not significant (locational factors). These results help for policy makers to understand what contribute for the RES performance in Germany and how this can be applied in other countries such as Brazil.

Acrocomia as accelerator for integrated agricultural production systems for family-based peasant farms in Paraguay

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Agriculture constitutes a fundamental pillar of Paraguay's economy. The largest share of farms are peasant family farms. They mainly produce crops and raise livestock for their own consumption, but also grow cash crops (such as sesame, watermelon and soybean) as an alternative income source.[1] Against this background, farmers face several obstacles, such as the increase of variable climatic conditions, soil compaction, and degradation resulting in lower crop yields. Additionally, weak access to markets and low integration into the agro-industry sector prevent farmers from marketing their production at better prices. A promising alternative to overcome those challenges is *Acrocomia totai*, also known as macaúba, a native palm of the neotropics. Acrocomia is a multipurpose palm-tree, offering a multitude of useful products, such as edible fruits for human consumption (flour and nuts), animal feed (crashed fruits or press cake), and industrial oils (biofuel and cosmetics). The benefits of Acrocomia are particularly attractive if cultivated in an integrated agricultural production system (IAPS), an agricultural system with multiple components (i.e. crops, livestock, and trees) that interacts in space and/or time resulting in a synergistic resource transfer among system's components.[2] Integrating Acrocomia in an IAPS can increase the agricultural system's resilience (against variable climatic conditions) and responsiveness to commercial markets. It may also increase financial returns per hectare, reduce risk and overcome environmental burdens. The main objective of this research is to identify economically viable and locally adaptable, Acrocomia based IAPS. A field survey was conducted in San Pedro del Paraná (province of Itapúa), a representative district for family-based peasant agriculture and naturally growing Acrocomia. Farm-level data on labor, production costs as well as revenues were collected with farmers and local experts. A farm-based mathematical programming micro-simulation model was built with the software package MPMAS[3]. Our simulations showed that Acrocomia cultivation leads to higher productivity of labor and land. Additionally, a sensitivity analysis demonstrated that Acrocomia is more stable and resilient in comparison to conventional production systems. Due to its multitude of useful products and potential synergistic effects, Acrocomia points out to be a potential accelerator for sustainable production systems, such as IAPS. Our results also showed that further incentives on technical assistance and marketing channels, such as cooperatives, are necessary to increase the adoption rates of Acrocomia.

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Hi-tech farm project – an innovative, sustainable and profitable approach to beefproduction

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The Hi-Tech Farm is a large-scale rural facility designed to produce organic cattle meat in an innovative, sustainable and highly profitable closed cycle approach, associating also the urban solid waste processing without environmental impact. Historically, the *Campanha* region, in southernmiddleof *Rio Grande do Sul* state, is dedicated to the production of grain monoculture and extensive beef cattle. Our fields and foods are one of the most contaminated in the world by the pesticides andchemical fertilizers. As our region has almost no industrialization, the profits of the agriculture business don't stay here; they flow abroad to the big industries. We took this challenge to develop a new way of producing high quality food in a natural, organic, sustainable biodynamic cycle. However, this project needed to be operationally and financially robust. Several technologies were investigated and validated. Next, we performed economic analyses of many different business scenarios. Then, we reach a very interesting configuration for the Hi-Tech Farm. This US$30 million project will return the investment in less than 4 years, producing 4,000 tons of organic beef per year, with a profit margin of 35%, employing about 110 workers. The closed cycle is formed by the organic plantation of grain and pasture, silos and silages, cattle feed plant, cattle confinement, slaughterhouse, anaerobic digester, solid waste sorting unit and plasma gasification reactor. This 20 hectares industrial complex located inside 1,500 hectares farm, will receive 350 calvesof European breedsper week that will be fed during 100 days with a high quality and well-balanced organic nutrition. The complex will receive the municipal waste from 100,000 habitants, mechanically sorting the organic stream to the digester and the rest to the plasma plant. The digester will be fed with the blend of cattle manure, slaughterhouse residuals and municipal organic waste. Both plasma and digester plants will generate about 2MW of renewable electrical energy to drive the all the needs of the industrial complex and the farm irrigation. As a result, the Hi-Tech Farm will be able to produce,at lower costs, a high quality organic beef, in a sustainable cycle, with lower greenhouse gases emissions, continuously enhancing the soil nutrition, producing their own electricityandmanaging urban waste in a much cleaner way than landfills.Ultimately, this project aims to start promoting a mindset change among the traditional farmers, demonstrating that,adding innovation and industrialization to the field, the organic and sustainable food production can be very lucrative.

Payment for environmental services and agroecology: perspectives from ecological economics and the rule of law for nature

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Modern agriculture has generated complex environmental damages. Sustainable food production models must be encouraged. Agroecology is presented as a more sustainable option, since it brings a holistic view of these complex and interdependent elements: food production, environmental protection, and protection of traditional knowledge. However, this model is not properly applied. This research aims to analyze how the economic instrument of Payment for Environmental Services (PES) can be enhanced in order to promote the reproduction of agroecology in Brazil. Thus, the main theme of this research is Payment for Environmental Services. The effectiveness of the protection of the environment is connected to the way Law interrelates with Economics. The legal compound built by Environmental Law and specifically PES has derived from the traditional economic paradigm, built on the pillars of Environmental Neoclassic Economics. There is a need to part from the this fragmented view and become an instrument for achieving Ecological Economics and to materialize the Rule of Law for Nature, as well as the promotion of agroecology. In this context, the research problem is: Can the economic instrument of the PES be improved so as to weaken the socio-environmental impacts that currently follows it and to guarantee the rights of farmers practicing agroecology? Thus, the general objective is to verify if it is possible to evolve PES to promote agroecology, overcoming the logic of Environmental Neoclassic Economics and becoming based on the Rule of Law for Nature, Ecological Economics and their principles, as a public, participant and non-monetary instrument, going beyond the commodification of nature and celebrating the socio-environmental rights of farmers. The specific objectives of this research are: to understand the agricultural systems of modern agriculture and agroecology with their effects on nature and people, as well as existing economic systems and their relations with the law; to analyze the PES instrument, based on its definitions and critiques; to investigate based on more sustainable parameters, the PES is capable of promoting agroecology and the rights of farmers by overcoming the market and centralizing bias, and consolidating the public and non-monetary aspects. The conclusion is that PES can be an appropriate instrument to promote agroecology, if it changes its theoretical and ideologic basis. The methodology follows the deductive method of approach. The procedure used was the monographic method, on Brazilian and foreign doctrines and scientific papers. The research technique used is the literature and the document research.

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Poster presentations

Session 7

Natural and Social capital interactions in the richest counties in the State of Sao Paulo, Brazil

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To explain differences in economic development, early studies considered natural capital (land) as the most important input. Technological evolution modified this view. For instance, Agricultural performance in *center-west* Brazil has presented better results than in western São Paulo State, although their soils are not more fertile than São Paulo's are. Other kinds of capital or interactions among them explain the reasons for lags in regional development. Besides income, several variables explain development. Maybe the most conclusive study about this question was Putnam's work — which rescues Coleman's definition on Social Capital. Putnam (1993) indicated that non-democratic government diminishes social capital. For decades that was the case of Brazil. According to the United Nations Economic Commission for Latin America — the major influence on Brazilian development questions those times — industrialization would be the best way to achieve economic development. Brazil chose this policy orientation. Although the country's GNP increased at high rates for years (1968-1973), unequal income distribution became a serious problem. At the end of last century, in the State of São Paulo, municipalities compounded two groups with significant differences in their incomes. Bernardes and Ambrósio (2015) had discussed the poorer municipalities. This present analysis is about the group that has presented higher income index (171 municipalities). By hypothesis, interactions between capital stocks explain the income. The specific goal was to analyze the interactions between social and natural capitals to explain income. A previous analysis has used Factor Analysis. Results displayed differences in the composition of the stocks of capital between income groups of municipalities. From resulted factors, obtained in such analysis — in which original variables represent capital stocks — interactions among factors were calculated. The variables more strongly correlated to each factor multiplies the factor score coefficient. The sum of each product is a new variable that multiplies each one of the new variables. Such interactions were explanatory variables of the income index in the multiple linear regression analysis. Results included interaction between capitals, so it corroborated the hypothesis. Interaction between social and natural capitals are in the solution and they are different from the results found for poorer municipalities.

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Macaw palm and its potential for sustainable oil production

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The neotropics are rich in biodiversity and provide a large resource for bioeconomy. Macaw palm (*Acrocomia* sp.), endemic to the Brazilian cerrados, is one of these species, having an excellent bio-economic potential (Hilger et al. 2015). Macaw palmhasmanifoldtraditionalusesforfoodspecialties,animalfeed,fiberormedicine.However,itsmainproducts,oilsfromfruitpulpandkernel,mayboostitsimportance. It is hereby aneconomicallyviable, sustainable and environmental friendly alternativeto the *Elaeisguineensis*.Macaw palm is found from Mexico down to Argentina, even on less fertile soils. In contrast to the African oil palm, the genus *Acrocomia* shows high plasticity with regard to environmental conditions. They occur in temperate, subtropical and tropical regions. Further they thrive under annual precipitation from <700-2500 mm and tolerate even freezing for a short period of time (Poetsch et al. 2012). Hence, macaw palmsdonotcompetewithrainforest areasorfertileland. We studied the growth performance and light interception of *A. totei* on three pioneer plantations in the Itapúa province of Paraguay. Aboveground biomass was 5.6, 12.3 and 19.1 Mg ha^{-1} in 29-, 69-, and 88-month-old crop stands, respectively. Leaf area index (LAI: 0.32, 1.09 and 1.49 for 29-, 69-, and 88-month-old crop stands) increased with age, whereas light transmission ratio (LTR: 78, 41 and 32% for 29-, 69-, and 88-month-old crop stands) decreased. Photosynthetic active radiation penetrating through sole-cropped macaw palm stands, spaced 5 m by 5 m and measured between 8.30 a.m. and 3.30 p.m., still reached up to 1000 µmol m^{-2} s^{-1} in the 88-month-old stand. This may allow establishing food crops below the canopy of macaw palms, an interesting option for peasant farms. Root observations also showed that the root distribution of macaw palms is favorable for intercropping macaw palm with other crops. Currently, macaw palms start flowering after 48 months and produce fruits up to 70 years and more. Fresh fruit yields are around 22 Mg ha^{-1}, providing 1 and 2 Mg ha^{-1} of kernel and pulp oil, respectively. Its composition of fatty acids is similar to that of *E.guineensis* with the advantage that it alterswith the ecological conditions under which it grows and is, hence, flexible in its applications.

Research on *genotype x environment* interactions is urgently required to identify the best accessions for each ecological condition under which it grows. Thus, specific varieties tailored for specific macaw palm applications in the bioeconomy sector could be developed.

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Comparative economic analysis of irrigated production of castor bean, seed and ornamental sunflower, and ornamental pineapple with different water sources

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The study aimed to evaluate the operational economic results of the production of oleifera and ornamental sunflower, castor and ornamental pineapple, irrigated with different types of water. The analysis of economic efficiency was carried out through a set of focused financial indicators in the operational results of irrigated production systems of castor plants (Ricinus communis L.) and sunflower (HelianthusannusL.) and ornamental species of pineapple (Ananas comosus var .erectifolius) and sunflower (Helianthussp.). The crops were irrigated with two types of produced water: one treated by simple filtration (APF) and other with a reverse osmosis (APO) and the control with underground water captured in the Açu aquifer (ACA), having three experiments of 20 x 20 m for each treatment. The plants performance were variable according the type of water. However, independent of the plant and water physical production, the higher negative economic operational result and inefficiency were with APO. Otherwise, the irrigated ornamentals species presented a positive economic operational results, with the best results achieved with the use of ACA and APF. These results allow us to infer that the irrigation with produced and underground water present to inefficient economic production of sunflower and castor; while the tested ornamental species present economic efficiency in the production. Hence, these species present attractiveness to production. However, this requires a minimal infrastructure in rural establishments and in logistics near the oilfield to stimulate the production of flower stalks sunflower and ornamental pineapple location.

Integrated processing of microalgae for recovery of sugars, pigments and a protein-rich residue

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Microalgae are fast growing photosynthetic organisms, being good sources of proteins, carbohydrates and lipids (Spolaore, 2006). Cultivation time and growth conditions affect decisively microalgae composition and can be tuned to enhance starch accumulation. The intracellular starch can be hydrolyzed by amylases to give a glucose syrup for use in several fermentation processes, yielding building blocks such as ethanol, 1,3-propanediol and succinic acid (Bozzel and Petersen, 2010). After starch hydrolysis, the remaining fraction is rich in proteins and nutraceutical lipids such as PUFAs, which can be used for human nutrition. Moreover, pigments can be extracted and used as antioxidants in the food and cosmetics industry with several health benefits, improving the revenue of a microalgae-based biorefinery. Major bottlenecks for microalgae processing are the cells harvesting and drying steps necessary to reduce the algae biomass water content, which are usually energy intensive (Vanthoor-Koopmans et al., 2013). According to the foregoing, the aim of this work was to study starch accumulation by the green microalga Chlorella sorokiniana and an integrated algae biomass processing. To develop a more economically attractive process, low cost green technologies were used to decrease the cost of the processing steps. C. sorokiniana was initially cultivated to achieve high intracellular starch accumulation, reaching 30 % (w/w) of the algae dry weight. This starch-rich biomass showed greater cell size than cells with low starch content and could be collected by sedimentation, which is a low-energy process. The freshly collected cells were submitted to a treatment with ethanol to extract pigments prior to the starch enzymatic hydrolysis step. The data for ethanol extraction were similar to that obtained for methanol extraction of dry ball milled cells. As such, it was possible to eliminate the milling step and to substitute the hazardous methanol by ethanol. After extraction, the ethanol impregnated cells were more easily dried than the humid unextracted cells, reducing the energy requirement of the drying step. Extracted dried cells were afterwards subjected to enzymatic hydrolysis using an enzyme pool rich in cellulases and amylases. These enzymes were not able to break the microalgal cell wall, making it necessary to disrupt this structure by milling. The intracellular starch was easily hydrolyzed in the disrupted material, with yields higher than 90 % after 4 hours of hydrolysis. The composition of the material resulting from the enzymatic hydrolysis showed 33 % of protein, 27 % lipid and 15 % carbohydrate and as such it would be suitable for application in the food and feed industries.

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Production of recombinant β-galactosidase in bioreactors by fed batch culture using DO-stat and Linear control

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The enzyme β-galactosidase (EC.3.2.1.23) hydrolyses lactose into its constituent monosaccharides, glucose and galactose. One of the major industrial application of this enzyme is the preparation of lactose-hydrolyzed milk and whey (Panesar et al., 2010). Lactose hydrolysis can be performed either by acid treatment at high temperature (150°C), or by enzymatic catalysis carried out with β-galactosidase. The enzymatic hydrolysis of lactose offers benefits mainly in health, food technology and environment (Grosová et al., 2008). In the cheese industry, lactose is a residue associated with the high biochemical and chemical oxygen demand, which can cause economic and environmental issues in wastewater treatment. The production 1 kg of cheese generates approximately 9 liters of whey, amounting to over 160 million tons of this lactose-rich residue produced worldwide each year (Guimarães et al., 2010). In this regard, β-galactosidases can be a sustainable alternative to the environmental problem of treating permeate whey eliminatedin dairy industries, by transforming it intoconsumable products (Haider and Husain, 2009). The industrial use of enzymes presents an additional process step, reflecting in the final product cost. A viable alternative, increasing the productivity and yield of the processes, would be the use of the recombinant enzyme and its production in large scale, through fed batch cultures. The objective of this work was to study the overexpression of recombinant β-galactosidase in bioreactors, by means of fed batch cultures with DO-stat and Linear control. Recombinant *Escherichia coli* strain BL21 (DE3) bearing the β-galactosidase gene of *Kluyveromyces* sp. were cultured in 2-liter bioreactors containingLB medium at 30°C. Three induction times for enzyme expression (12 h, 18 h, and 24 h) using 1mM isopropylthiogalactoside (IPTG) were studied. Fed batch cultivations induced after 12 h employing DO-stat strategy resulted in the highest specific enzymatic activity (approximately 40 $U/mg_{protein}$).Perspectives are the purification of the recombinant enzyme and its immobilization on a viable support for industrial processing.

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Organic fraction of urban solid waste in the State of Rio Grande do Sul/Brazil: a business opportunity

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The waste of food and the high amounts of waste generated from these losses are current issues of great concern and global mobilization. Data from the Food and Agriculture Organization of the United Nations(2) indicate that 1.3 billion tons of food are dumped each year in the world, that is, 1/3 of the food produced is wasted. The online platform of the Government of the State of Rio Grande do Sul(1), in Brazil, points out that 38 tons of organic waste per day are generated in the Central of Supply of Rio Grande do Sul (Ceasa-RS), which is equivalent to a daily production of a city of 50 thousand inhabitants. According to the State Solid Waste Plan of Rio Grande do Sul(3), in the year 2014 only 3 million tons of urban solid waste (USW) were generated in the state. Of these, 1,897,369 tons correspond to the organic fraction of municipal solid waste, or approximately 64% of the total amount. However, only 24% of the municipalities use composting as a treatment of the organic fraction of USW, and all other municipalities send their amounts for disposal in landfills. According to Schultz(4), anaerobic digestion is an important alternative to be considered for the treatment of the organic fraction, as it generates products with economic and energy value. The anaerobic biodegradation of organic matter generates gases (CH_4, CO_2) that can be collected and used in energy production. In addition, the process residue is a stable biocomposite, and can be used as fertilizer, since it has high values of nutrients such as nitrogen (N) and phosphorus (P).A study conducted in 2010 by the United Nations Development Program (UNDP et al., 2010) estimated the potential for energy production from municipal solid waste generated in 56 municipalities in the country and concluded that between the decade of 2010 by 2020, there would be the possibility of generating 311 MW of biogas, which could supply an estimated population of approximately 5.6 million inhabitants, which is practically the city of Rio de Janeiro/Brazil. So, there are many business opportunities to be studied and explored.

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The Lepidoptera *Methona themisto* as a source of microbial biocatalysts

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The larvae of the Lepidoptera *Methona themisto* consume leaves mostly from a single plant genus, *Brunfelsia* (Solanaceae), popularly called "manacá". Wood and leaf consuming insects have a microbiota specialized on the degradation of various plant polymers (Engel et al., 2013). It is of great industrial interest to have available bacteria and fungi species able to degrade such polymers. However, the capability of plant biomass degradation does not fulfill the industrial needs. For a microbe to be economically distinct, it must also be able to produce molecules valued on the market. The first challenge met when trying to isolate microorganisms from any environment is that most (>99%) are refractory to *in vitro* cultivation (Kaeberlein et al., 2002). In this context, this work aims to isolate microorganisms from *M. themisto* gut using culture media prepared with *Brunfelsia australis* leaves. This strategy provides a nutrient source that may bridge the growth factors gap missing in conventional rich media. Firstly, the Lepidoptera from which we extracted the gut to be used as inoculum source were all identified as *M. themisto* via Sanger sequencing a portion of the mitochondrial gene cytochrome oxidase I (COI). Employing the leaf medium formulation, we were able to isolate up to 15 different strains, along with 9 other isolates using rich media (LB and HBI). Isolates with conspicuous colony morphology were selected, resulting in 15 Gram-Positive and 9 Gram-Negative strains. They were all tested for production of acetoin, a highly valuable molecule (US$41.0/Kg) with various industrial applications (Xiao and Lu, 2014), which was detected and quantified through the biochemical test Voges-Proskauer. Out of these 24 isolates,12 were able to ferment glucose into acetoin. The most promising strain reached a titer of 6.1 mM after 120 minutes incubation at 28°C and 100 rpm agitation, in liquid LB medium with 1% glucose. We also tested the isolates for their capacity to degrade cellulose. Out of the same 24 isolates 10 were able to degrade cellulose. These isolates will be taxonomically characterized (16S sequencing). The results obtained so far give us a glance on the often neglected biotechnological potential of the Brazilian biodiversity.

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Biotechnology and primary growth in Brazil: economic aspects

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Preliminary data from the Food and Agriculture Organization of the United Nations (FAO) indicate that 82% of the soybeans, 68% of the cotton, 30% of the corn and 25% of the canola produced in the world already involve biotechnology in their production process. In Brazil, total soybean crop is responsible for more than 56% of the cultivated area (BRAZIL, 2016). The objective of this work was to reflect on the role of Brazil in relation to biotechnology, combining agriculture and research as a path of economic growth. With the support of research and development institutions, such as Embrapa and public universities, the country stands out as one of the main actors in conducting research on transgenic, especially soybean (CEBRAP, 2011). In 2009, Brazil became the second largest producer to use genetically modified plants, behind only the USA. Given this context, bioeconomy arises as a result of a revolution of innovations applied in the field of biological sciences. The Organization for Economic Cooperation and Development (OECD) estimates that, by 2030, the global contribution of biotechnology will be US $ 1 trillion / year, distributed among health sectors (US $ 260 billion / year), primary production $ 380 billion / year) and industrial ($ 420 billion / year). Brazil has been a pioneer in the research and use of genetically modified agricultural products, as well as in the development of state-of-the-art agricultural biotechnology. The Brazilian government, mainly through Embrapa, has been working for decades in the research, development and commercialization of this knowledge, and biotechnology has been considered a national strategic priority since 2003. This has become official through Decree no. 6041 (Sixteen forty-one), of 2007, which establishes a "Biotechnology Development Policy" (Dias e Carvalho, 2017). Agribusiness is expected to expand by 2% in 2017, according to estimates by the Confederation of Agriculture and Livestock of Brazil (CNA, 2017), which allows inferring that this sector can and should leverage on the Gross Domestic Product (GDP) of 2017, based on the GDP of agribusiness, which grew between 2.5% and 3% in 2016 (BRAZIL, 2017). In this way, it can be concluded that Brazil has the necessary tools to achieve economic development through the bioeconomy, transforming and strengthen essential segments such as agriculture, ratifying the vanguard of food production.

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Manacá leaves as a source of microorganisms with biotechnological application

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The continued increase of carbon dioxide atmospheric concentration due to anthropogenic emissions is predicted to lead to significant climate changes, which can cause several environmental problems (Solomon et al., 2009). The need to decrease carbon dioxide emissions and to find alternatives to fossil fuels leads to the exploration of sustainable energy sources. In this context, the use of microorganisms to convert renewable carbon sources (plant biomass) into biofuels is a strategy of great interest. One well established example in Brazil is the fermentation of sugarcane into ethanol by the yeast *Saccharomyces cerevisiae*. However, the inability of this species to ferment lignocellulose leads to a waste of 2/3 of the sugars present in the plant. Phyllosphere is the surface of aboveground portions of plants. As a result of the intimate plant-microbe interactions on the phyllosphere, we hypothesize that this environment may harbor microorganisms capable of efficiently metabolizing plant biomass into molecules with economical value. The leaf phyllosphere of Atlantic forest plants comprises an estimated diversity of 2 to 13 million bacterial species and most of them are still undescribed (Lambais et al., 2016). In order to isolate these microorganisms, leaves of the native species manacá (*Brunfelsia australis*) were homogenized, mixtured with 3% autoclaved agar, and poured into sterile petri dishes. By using homogenized leaves as the nutrient and inoculum source, we aim to provide essential growth factors otherwise difficult supply, and consequently increase the number of cultivated microbial species. So far, the use of this methodology provided 50 isolated strains containing different colony morphologies. Further characterization of each isolate such as Gram staining, and analyses of their capacity to ferment different plant sugars are under course. This project envisions not only to isolate new biocatalysts with industrial/biotechnological applications, but also to develop a new methodology for improved *in vitro* microbial culture and isolation. Brazilian biodiversity holds many untapped biotechnological solutions for world problems. The potentially new bacterial species here isolated from *B. australis* leaves may contribute to renewable energy generation processes, a sustainable alternative for fossil fuels.

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Microbial isolation of the genus Enhydrobacter from paper and cellulose industry waste samples

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Waste disposal is one of the major concerns from industries towards sustainability, involving economic, social and environmental aspects. Sludge from wastewater treatment units of pulp and paper industries is one of the most produced cellulosic solid wastes. They can vary significantly in terms of their composition, which depends on the production process [1]. Moreover, the microorganisms that occur in such sludge may be metabolically adapted to consume cellulosic biomass. In this context, we performed a 16S rRNA survey to identify the microorganisms present in recycled paper mill wastewater sludges. The results revealed that these samples were dominated by Enhydrobacter, a rare bacterial genus with a single species described, E. aerosaccus. Biotechnological potential of this genus was described by Premalatha et al. [2], which reported an optimization of cellulase production by Enhydrobacter sp. ACCA2. Besides, cellulase activity was observed in microbial isolates from recycled paper sludge [2] Microbial isolation is needed as a complementary approach to obtain pure cultures for biochemical and physiological experiments. This study aims to use conventional microbial isolation and plate-screening to obtain microorganisms from the waste samples able to produce cellulases. For isolation of cellulase producing bacteria, one gram of the wastewater sludge was suspended in 99 mL carboxymethyl cellulose broth medium and incubated at 28ºC for 24 h. A serial dilution pour plate technique was performed in carboxymethyl cellulose agar medium, followed by incubation at 28º C for 3 days [3]. Under aerobic conditions, colonies appeared; the cells were gram-positive, non-motile coccobacillus. Biochemical analyzes for cellulose degradation tests will be conducted, as well as analyzes for molecular identification of the colonies obtained. Since recycling paper sludge presents null or negative economic charge, and do not require a pretreatment, they represent an excellent alternative source of microorganisms from which microbial cellulolytic enzymes can be isolated for biotechnological application in industry. [

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Rice husk ash (RHA) as a precursor in production of chemically activated carbon

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Rice husk ash (RHA), a polluting agroindustrial residue, contains approximately 80-95% silica in the amorphous state (GHOSH; BHATTACHERJEE, 2013). The amorphous silica present in the RHA can enable its use for the production of activated carbon (PODE, 2016). The present work aim to evaluate the performance of activated carbon (AC) produced from RHA in the removal of the methylene blue dye (MB), using hydrochloric acid as the activating agent. The precursor used in the study comes from a rice industry in the city of Pelotas, RS. Five grams of rice husk ash (0.6 mm diameter) was used in the activation, adding 100 ml of hydrochloric acid solution (3 mol L^{-1}). The mixture remained in dynamic contact for 2 hours at a temperature of 100 °C. Subsequently it was filtered and the acid leached with distilled water, and then drying the AC for 24 hours at 110 °C. The adsorption kinetics study lasted 240 minutes. It was used a solution of Methylene Blue with an initial concentration of 20 mg L^{-1} and 0.5 g of AC. The residual concentration of MB in solution was determined by a UV-visible spectrophotometer (kazuaki) at a wavelength of 665 nm. The results showed adsorption capacity by dye with AC of 4 mg g^{-1} and 20% removal. According to Liu et al. (2012) the maximum adsorption capacity of MB for commercial coal, activated with H_2O at 850 °C is 28 mg g^{-1}. Thus, the results of this work were positive for the production of active carbon having hydrochloric acid as activating agent. The continuity of the study is essential for more accurate data and information regarding the process of activating this industrial waste and transforming an environmental problem into a product with high aggregate economic value such as activated carbon.

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Valorization of cheese whey by the production of bioactive peptides for the food industry

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Whey is a by-product, which became problematical to the environment with industrialization and expansion of dairy products manufacture in the 20th century. For the production of 1 kg cheese, around 9 kg of cheese whey are generated as an effluent. Bovine whey still contains 20% of the milk protein content, furthermore the whole milk lactose content (~5%), traces of fat (0.1%) and mineral salts (0.46-10%). About 99% of this organic matter is biodegradable, resulting in a high Biological Oxygen Demand (BOD > 30.000 mg O_2/L for sweet whey and 35.000 mg O_2/L for acid whey). Biological treatment of whey is difficult because of its high sodium contents, acidic pH (3.8-6.5), low alkalinity, free ammonia, potassium and volatile fatty acids (Prazeres et al., 2012, Smithers, 2015). Enzymatic hydrolyzed whey proteins possess (beside their high nutritional value) distinguished health benefits, e.g. antioxidant, antibacterial or immunomodulatory activities, which in turn makes whey a high-value raw material for the food industry, e.g. for the production of functional foods or for food biopreservation (Yadav et al., 2015). Natural digestion of whey proteins in the gastrointestinal tract by consumption of whey protein containing products is not sufficient to achieve a positive health effect, thus the effect-responsible bioactive peptides must be enriched by industrial manufacturing from hydrolyzed whey. An industrial scale-up of employed laboratory processes, such as chromatographic approaches, are high priced, difficult in their application or affect the peptides secondary structure, resulting in a possible change or elimination of its bioactive characteristics. The lack of economically profitable production processes decelerates the development of products with bioactive peptides (Agyei et al., 2016). One approach to solve that problem could be the modification of conventional laboratory development processes by inclusion of *in silico*- bioprospecting simulation models that can allow the determination of suitable purification techniques, when combined with mechanistic modelling and heuristics from the biopharmaceutical industry.

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Session 08. Global Geoparks

Conveners:
Prof. Dr. José Patricio Pereira Melo, Departamento de Direito (URCA)
Dr. Jutta Weber, Geosciences, Public Relations, International Cooperation, UNESCO Global Geopark Bergstrasse-Odenwald

During the last decade, the Global Geoparks Network, which consists currently of 127 territories in 34 countries worldwide, has developed a wide range of tools towards sustainable regional development, geo-education, regional and international networking, science transfer, and conservation strategies. Their holistic approach, which includes the connection of Earth history, nature, man and culture, enables innovative development of territories and supports their regional identity, including their past, present and future. In November 2015, UNESCO has honored this successful development and implemented the "International Geosciences and Geoparks" Programme (IGGP) as third pillar of UNESCO world class designations – besides the World Heritage Sites and Man and Biosphere Reserves. With respect to their holistic approach and community-based bottom up strategy, the UNESCO Global Geoparks can act as model regions following and communicating the Sustainable Development Goals 2030 as model regions. During a series of workshops and consultations, the main strengths and goals are currently identified and will now be developed further on by the worldwide 127 members of the IGGP as common task in the frame of the membership in the United Nations Education, Science and Culture Organization.

Keynote Lecture:
Me. Elizabeth Silva, Programa Internacional de Geociências e Geoparques (UNESCO)
Prof. Dr. Artur Sá, Geoparques, Desenvolvimento Regional Sustentado e Estilos de Vida Saudáveis (UNESCO)

Oral presentations

Session 8

UNESCO Global Geoparks as key territories for the implementation of the Sustainable Development Goals 2030: Case study from the UNESCO Global Geoparks in Germany

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For more than 10 years now and all over the world, UNESCO Global Geoparks have campaigned for a holistic understanding of our planet and its evolution. Their environmental education and awareness programmes place a special emphasis on conveying these natural interrelationships and the impact Man has on these. The Geoparks create their initiatives and projects together with the people of the region. Their international activities are an opportunity for exchanging ideas with partners around the world. Thus the UNESCO Global Geoparks provide an ideal platform for implementing and supporting the SDG 2030. Based on a workshop organised by the Federal Foreign Office and the German UNESCO-Commission, the German UNESCO Global Geoparks have investigated their potentials, which focus on the following goals: No. 4 (quality education), No.8 (sustainable tourism), No.12 (sustainable consumption and production), No.13 (climate action), No.15 (protection of terrestrial ecosystems and biodiversity) as well as No.16 and 17 (forming networks and partnerships, international cooperation). Also relevant are goals No. 6 (water protection) and No. 11 (heritage preservation, settlement development). During the presentation, best practise from all 6 Geoparks will be given. In accordance with their holistic philosophy, the UNESCO Global Geoparks have been actively pursuing the afore mentioned SDGs for a number of years and implementing their initiatives for the benefit of their regions, nature and the people. Developing Geopark projects and programs always takes into account relevant sustainability goals. Regional products, preservation of local traditions, old crafts or excursions into the landscape are all important facets that contribute towards creating a regional identity. This helps to discover the multifaceted diversity of our planet, the individual landscapes and their evolution and their significance for us humans, leading to a greater appreciation of our nature and environment and an awareness of the need for protection. The biggest strongpoint of the UNESCO Global Geoparks in this context, is their ability to transform the rather abstract international sustainability goals 2030 into hands-on activities and projects, which help raise the awareness of the local populace about these goals in a clear and understandable manner. Thus the Geoparks form the decisive interface between international declarations of intent and concrete on-the-spot implementation. Both the Federal Foreign Office and the German UNESCO-Commission see the UNESCO Global Geoparks in Germany as key regions for explaining and implementing the Sustainable Development Goals 2030.

The Agenda 2030 of the United Nations for Sustainable Development: UNESCO Global Geoparks key-actors in its implementation of the 17 SDG's in these territories

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In the final report of the United Nations Decade of Education for Sustainable Development (2005-2014) the launch of this Decade marked the beginning of ten years of an explicit global movement towards improving and reorienting education systems towards sustainable development (UNESCO, 2014). In this sense, it was recognized that two complementary approaches were needed to develop the objectives of this Decade: i) to support the education community in its role in the transition to sustainable development; ii) to support stakeholders working on sustainable development to incorporate education into their work. Therefore, UNESCO worked with the Member States to provide them with opportunities to incorporate Education for Sustainable Development (ESD) into education reform efforts in order to contribute simultaneously to Sustainable Development and educational quality and to realizing the Millennium Development Goals (MDGs) through ESD efforts. However, by the end of the Decade, in spite of a richer understanding of the process of ESD, it was concluded that still much more had to be done worldwide. In this context, in October 2015, the General Assembly of the United Nations adopted the Resolution A/RES/70/1 Transforming our world: the 2030 Agenda for Sustainable Development based in 17 Sustainable Development Goals (SDG's) and its 169 targets. Taking into account the new designation of UNESCO Global Geoparks (UGG) and its definition, a preliminary study is being conducted, trying to demonstrate how UGG can be considered key actors in the implementation of the SDG's in these territories. Therefore, some data will be presented based in the results of a questionnaire and in semi-structure interviews done to the managers of some European UGG, taking into account that they have to manage the territories based in a holistic concept of protection, education and sustainable development, aligned with a bottom-up approach, which means that necessarily they have to involve local communities and need to give them the opportunity to develop cohesive partnerships.

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The UNESCO Chair "Geoparks, Regional Sustainable Development and Healthy Lifestyles" and the 1st International Summer University as a tool of sharing knowledge and capacity building on these topics

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The UNESCO Chair "Geoparks, Regional Sustainable Development and Healthy Lifestyles" implemented on the University of Trás-os-Montes and Alto Douro (UTAD), Vila Real, Portugal, aims to create an innovative and integrated network of research, teaching, transfer of knowledge, joint research projects and communication for increasing society awareness on these topics. This UNESCO Chair is cooperating on this aims with other higher education institutions in Portuguese-speaking African countries and Ibero-American countries. This partnership includes for now, the universities of Agostinho Neto (Angola), Amazon Regional - IKIAM (Ecuador), Atacama (Chile), Complutense Madrid (Spain), Eduardo Mondelane (Mozambique), Federal Pernambuco (Brazil), Regional of Cariri (Brazil), San Luís Potosí (México) and Tucumán (Argentina). It also works in a very active partnership with the Portuguese National Commission for UNESCO and with the UNESCO Offices of Montevideo (Uruguay) and Nairobi (Kenya). This UNESCO Chair also provides a platform for all the partners involved in this project to improve a holistic and transformational education, integrating UNESCO priorities and critical issues (e.g., climate change, disaster risk reduction, Earth's natural resources) and motivating people to adopt sustainable and healthy lifestyles. Being the first UNESCO Chair on UNESCO Global Geoparks (UGG) and taking into account its main goals, it was developed by UTAD, during 3 rd – 14th of July 2017 the 1 st International Summer University based in a new and multidisciplinary approach towards capacity building. In this advanced training course participated a total of 42 trainees (27 Portuguese and 15 international trainees from Argentina, Brazil, Germany, Greece, Italy, Mexico, Rumania, Spain and United Kingdom) and 38 participants from 15 different nationalities (Antigua and Barbuda, Brazil, Cape Verde, Cameroon, Canada, Croatia, Germany, Ghana, Greece, Italy, Mexico, Mozambique, Portugal, Spain and United Kingdom). This broadspectrum educational initiative was complemented with a strong practice component through mid-course field trips to Arouca UGG, Terras de Cavaleiros UGG, Alto Douro Wine Region (World Heritage Site), Meseta Iberica Transboundary Biosphere Reserve, Natural Park of International Douro and Azibo reservoir protected landscape. This initiative provided a broadband training course for students, researchers, managers, staff members and civil servants, among others on Geoparks, Sustainable Regional Development and Healthy Lifestyles, creating simultaneously awareness about the Agenda 2030 for Sustainable Development and its 17 Sustainable Development Goals (SDG's).

On the proper of an innovative urban geoapark on the banks of the Poti River in Teresina, Piauí state

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The Fossil Forest of Teresina is a paleontological site located on the banks of the Poti River, at the point it crosses the urban area of this city, being the only of this kind in a Brazilian metropolis, still intact. Teresina is the capital of Piauí state, and is separated from Timon, in the neighbor state of Maranhão only by another river, the Parnaíba, forming a conurbation with ca. 1 million inhabitants. It is the largest capital in territorial extension and the sole that is not located on the shores of the Atlantic Ocean in the northeastern region of Brazil. This fossilized rocky outcrop belongs to the The Permian Pedra de Fogo Formation, exposed in the west borders of Parnaíba Basin, representing one of the most important terminal Paleozoic sedimentary record of the Western Gondwana. The main lithotypes of this unit are sandstones, shales, carbonate rocks, evaporites. The unit is famous for its large amounts of chert and presence of well-preserved Permian flora. This site was only reported in 1909 by the geologist Miguel Arrojado Lisboa, despite references of fossils from this region can be seen in the seminal book "Reise in Brasilien" published in Munich in between 1823-1831 by the naturalist travelers von Spix and von Martius, who spanned significant parts of Brazil from 1817 to 1820. It is characterized by the occurrence of several fossilized trunks, many of which stand in its pristine position of growing, mostly of the Genus Psaronius, also found in Germany and other regions, whose records date from the time of the supercontinent Pangea. The fossil wood *Psaronius brasiliensis*, collected by von Martius and described by Brongniart in 1827, was the first Brazilian fossil to be mentioned in the scientific literature. A probable Lower Middle Permian age (ca. 280-270 mya) can be assigned to the specimens from this important and rare fossiliferous site, by biostratigraphic correlation. Up to now at least one wood specimen, belonging to a new genus and a new species (*Teresinoxylon euzebi* oi Mussa), was described. The establishment of the Environmental Park of the Poti River Fossil Forest in 1993, by the Municipality of Teresina, and the inscription as a National Patrimony by the Institute of National Historical and Artistic Heritage, in the category of paleontological site in 2011, were important landmarks for the protection policies of this vulnerable site. Also, to reinforcing to the scientific research and education in geosciences, paleobiology and culture in Piauí state, to the consolidation of the Museum of Paleontology of Teresina, and for fostering the desirable sustainable tourist and educational visitation, alongside correlated small business. In a preliminary overlook and to the best of our understanding, the set of desirable measurements and activities for preserving and promoting this site match the criteria and guidelines of the UNESCO Global Geoparks Programme, merging the protection and furtherance of the national geoheritage with sustainable urban development. Moreover, it contributes for the strengthening of Geopark concept in Brazil.

Geoparks as ancillary instruments for the furtherance of regional development policies in the state of Ceará, Brazil: the cases of Sertão Central and Ibiapaba planning regions as possible innovative territories embracing Geoparks.

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Ceará is the eight most populated and the 17th largest state placed on the northeastern part of Brazil. It is also one of the main tourist destinations in Brazil. Its capital is the metropolis of Fortaleza, the country's fourth most populous city. The state is known for its extensive coastline, with ca. 600 kilometers of sand and the dominance of a vast semiarid steppe area in the hinterlands. Nevertheless, the state also displays almost all of the Brazilian phytogeography systems, which reflects its geological and climate diversity. The state is the sponsor, through it's State Regional University of Cariri, of the first Global Geopark in the entire Americas and South Hemisphere under the patronage of UNESCO, the Geopark Araripe. Ceará shares only ca. 2% of the Brazilian economy, and is marked by profound inequalities, such as the concentration of population and incomes in the capital. Nevertheless, the governmental public sector, especially in the last three decades, has spent efforts to better manage the state, fostering a culture of development plans, among others, which ensured economic growth higher than national media. Considering the division of state in regions and the existence of the development plans for them, we propose the valuable contribution that Geoparks can offer to enhance the sustainable development in these territories, by incorporating this concept in the official plans. Moreover, the unequivocal success experienced by the Geopark Araripe in more than ten years is a landmark of the value of this proposal. We will discuss in detail two potential priority cases: the case of Sertão Central and its monumental valley dominated by the Quixadá-Quixeramobim granitic complex, where occur the most significant set of inselbergs in Brazil, embracing an area of ca. 300 km^2, with other important features from different domains. Probably, there is no other place on Earth where these formations are as numerous and cohesive. The other case pertains the Ibiapaba sedimentary plateau, bordering the state of Piauí, with a length of 110 km and altitudes between 800 and 1.100 m. The plateau comprises the most important karstic relief of the state of Ceará, composed by nine limestone hills where 14 caves were found up to now, amongst other natural and cultural features. It lies on the eastern edge of the large sedimentary Parnaiba Basin, which is centered on a set of Cambrian-Ordovician grabens formed during the last stages of the Brasiliano orogeny. In both regions we have the presence of campuses from four state and federal universities, with their important stock of human resources, and yet different national protection statuses, as National Forest and National Landscape, for Ibiapaba and Quixadá, respectively. To sum up we understand that Geoparks must be considered in regional development plans of the state of Ceará, which has a potential to develop two more Geoparks, merging the protection and furtherance of the national geoheritage with regional sustainable development, contributing to the formation of a state network and to the strengthening of the Geoparks concept in Brazil.

Poster presentations

Session 8

Geoparks for meaningful learning in geosciences

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In a society marked by technological progress which depends of the science for its productive process constitution, it is essential to have the knowledge of questions which evolve dynamics and Earth's constitution. The teaching of Geoscience in basic education can contribute mainly to the formation of young people aware of their social and environmental responsibilities and professionals actions. In basic education context, specifically in the high school, the geography discipline plays a significant role for introduction and teaching of Geoscience themes. However, one of the difficulties for diffusion and attractiveness of these themes is the absence of reference areas, which could expose in a practical and meaningful way the contents that are discussed in the classroom. Thereby, how to find references, which are part of the context of the student location or region to enhance the interest to study Geosciences topics? These and other related questions indicate the need for areas that can work as excellent open laboratories with factual evidence of geology. In this respect, this research positions the Geoparks as areas of a huge potential for teaching and meaningful learning in Geosciences, through its geological environmental and social attributes, which can supply the growing demand for environments, which deliver teaching activities. For the work methodology, it uses a qualitative analysis, with a bibliographic and documentary review about the meaningful learning (AUSUBEL 1963; MOREIRA, 2011) and about the concept and characterization of Geoparks established by UNESCO (2016). These are considered as geographic unified areas, where international sites and geological importance landscapes are managed with a holistic concept of protection, education and sustainable development. Considering that education is a prerequisite for all UNESCO Global Geoparks, it can be confirmed, that their teaching activities are inseparable from their functions and attributes, such as geosites and physical structures. These combination allows the meaningful learning for Geoscience students of basic education who participate in activities offered regularly by the UNESCO Global Geoparks.

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The Guarani Aquifer System as a inductive factor for the creation of a unesco global geopark in the hydrographic basin of the Corumbatiai River - São Paulo - Brazil

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This work aims to evaluate the use potential of the a new instrument of environmental protection through the territorial certification of UNESCO Global Geoparks (2016). The evaluation includes the search for effectiveness in the environmental protection of groundwater, especially in the Guarani Aquifer System outcrop areas (SAG). As study area, the hydrograph basin of Corumbataí River has been used, a territorial area with clearly defined boundaries comprising 1,708 km2 distributed in eight municipalities. The area, includes a remarkable geological heritage (PERINOTTO, LINO, 2004), especially the SAG (OEA, 2009), considered as world Heritage Site, associated to the strategy of sustainable development. The certification of a territory for the protection of its natural resources through the creation of a Geopark occurs in an inverse way of the Conservation Unit institution (BRASIL, 2000), since it is not a park and there is no need to implement a law. The involvement of the local population is essential in the Geopark process, as it becomes its main protagonist, avoiding the condition of mere spectators or even victims of a new law. This is a bottom-up process, which counts on the participation and commitment of the local people. The instrument of territorial certification must be in strict accordance with the legal instruments already existing in the territory, which continue in full force and must be contemplated in the Management Plan of the Geopark. In this context, the implementation of a Geopark in the Corumbataí River Basin is proposed to provide greater protection to the superficial and subterranean natural resources and, at the same time, to provide the regional socioeconomic development with the effective participation of the population, arousing the "belonging feeling" and "territorial identity".

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Session 09. Development of Green Infrastructure in Urban Areas

Conveners:
Prof. Dr. Paulo Renato Mesquita Pellegrino, Faculdade de Arquitetura, Urbanismo e Design (USP)
Dr.-Ing. Bernd Eisenberg, Institute of Landscape Planning and Ecology, University of Stuttgart

Examples from the fields of Green Infrastructure in Urban Areas shall provide information on issues already established and studied by research projects of sustainable interaction between natural resources and processes and demands of human societies. In addition, we seek for presentations related to the sustainable future of Cities, Megacities, and Urban areas. The talks shall provide information on analytical tools that help to retrieve necessary information for decision makers that have to implant managing systems, define economic behaviours and formulate and change necessary judicial systems to initiate and provide the legal base for sustainable development.

Oral presentations

Session 9

Landscapes in transition: opportunities for Green Infrastructure.

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How can we explore more efficiently the social and ecosystem services that landscapes can provide to our cities and regions? Following the concept of landscape as the design dimension of the environment, this presentation will explore ways to bring these values to the surface, and how we can integrate them into the urban and architectural fabric of our everyday environments which, for a variety of reasons, constantly suffer intervention processes. Will be brought for analysis and discussion examples of the latest investigations in subjects related to stormwater management, reclaiming streams in cities and improving the urban landscape carried out at FAU USP's LABVERDE.

Strengthening climate change adaptation through Integrated strategies for blue-green infrastructure

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Climate change adaptation concepts for urban regions promote green – and blue – infrastructure as crucial for reducing temperatures in inner city areas (EEA 2016, Born 2016). Due to limited space over and underground and considering increasingly extreme weather conditions with more floods and droughts new types of green and blue infrastructure need to be developed, tested and if successful scaled up in order to fulfill the required ecosystem service. The paper gives insight into research at the ILPÖ, University of Stuttgart with one project focusing on vertical greening as a hybrid green infrastructure measure for climate change adaptation - the green living room Ludwigsburg, Germany. It was built on top of an underground car park within the EU-Project TURAS and serves as a meeting point with high amenity value throughout the whole year. The effect of the green living room in its immediate surrounding is comparable to the edge of a small park (Eisenberg 2017). The question how those new types of green infrastructure as well as the traditional parks can maintain and enhance their capacity to mitigate heat stress even during long droughts is guiding further research initiatives. Drinking water as an increasingly scarce resource cannot be used therefore alternative water resources need to be mobilized. Sustainable irrigation of urban green infrastructure with innovative water treating and storing solutions is inevitable in order to preserve existing green areas and develop new ones as well. Concepts of 'water sensitive urban design' (Coutts et al. 2016) as well as 'water accounting and auditing' (Bachelor et al. 2016) have to be adapted for green infrastructure demands leading to integrated Strategies for Blue-Green Infrastructure.

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Drones and cameras help monitoring urban trees

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Field work of LVG Heidelberg uses a drone that has a protected motor-unit to permit the movement inside the tree-crown (see Foto 1). In cooperation with swiss partners LVGs practical experiences are used for further development of the drone. The idea behind this project is to reduce staff cost, rise the frequency and quality of monitoring of urban trees in the order to prevent accidents and protect wildlife. Full-HD- and infrared-cameras help to produce films and pictures that permit the early detection of diseases or wildlife in branch and stem cavities. In many cases the diagnosis can be made in situ by qualified personal.Poles made of carbon staffed with 360 ° cameras or infrared cameras are a simple to use tool proving to be effective in detection of problems and deseases in the height up to 20 m. An alternative practical method is to lift up the camera with the help of a rope for example to diagnose rots or fungi like Fomes fomentarius. Using infrared cameras on sunny days proved to be difficult. Drones can also be used to support the calculation of tree care services by overflying rows of trees and measuring the diametres of tree crowns. LVGs practical experiences indicate that the use of the drone in populated urban areas can only be advised to be carried out by qualified personal. In windy locations the light drones easily can be deviated and the quality of the pictures can be negatively affected.

A specially designed drone being able to enter the tree crown even in the stadium of foliage

Fotos: LVG Heidelberg

A pole staffed with a 360 ° camera lifted up into the height of 20 m detecting and documentating a desease in Populus nigra

Literature: Hoffstedde, B.; Frei, T.; Jillich, S.: Drohnen spüren Schadsymptome an Bäumen auf, ProBaum, 4, 2016, S.22
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Mapping of the hemeroby of the northern part of the watershed of the River Belem, Curitiba – PR – Brazil

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Since its origins, human societies modify the landscape, adapting them to their needs and desires. Many times, these changes lead to the formation of landscapes which are too dependent on technological tools and energy sources which lead to environmental degradation in their generation and use. The notion of dependence of energy and the technology for the operation of landscape is contained in the term hemeroby, a concept that has been being applied in Brazil, mainly in urban landscapes in detail scale. Thus, the landscapes which are more dependent on energy sources that cause damage to the environment or to the health of humans and that are also dependent on technologies that cause environmental pollution, would be classified as of high degree of hemeroby. The landscapes with low energy and technological dependence to its maintenance, high ability to self-regulation, permeable surfaces, high quality of the soil and the air, greater presence of unique flora and fauna and a minor presence of alien species, would present the minimum degree of hemeroby (NUCCI, et al., 2016). The element of the landscape that contributes the most to the reduction of the hemeroby is the vegetation and, therefore, in urbanized landscapes, the green areas would also play the role of softening hemeroby. The work presents the mapping and the evaluation, based on the concept of hemeroby, of landscapes found in the northern part of the watershed, the region of the headwaters of the river Belem (Curitiba-PR). A grid mesh (WALS and STEIN, 2014), of 0.5 cm edge was placed on satellite images provided by Google Earth, in scale 1:8,500 and from the year 2017. The dominant landscape found in each grid cell was classified according to three orders of hemeroby: low (predominance of arboreal vegetation), average (herbaceous vegetation/shrub, exposed soil and/or evidence of buildings) and high (buildings). The 1,964 squares evaluated in the grid indicated that the study area presents 755,012 m² (0.76 km² or 21.4%) of its surface with low hemeroby, 523,812 m² (0.52 or 14.6%) in average hemeroby order and 2,268,650 m² (2.27 km ² or 64%) in the high hemeroby order. Mainly, because it relates to the area of sources of rivers, controlling measures of the occupation are recommended, favouring the conservation of the remaining vegetation and increase of the green between and in the buildings, in order to reduce, or at least maintain the current state of hemeroby in the area.

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Sustainable energy efficient hotspot

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This work addresses the creation of an innovative environment at Federal University of Rio Grande do Sul, Porto Alegre, RS. The project is based on the integration of the economic, environmental and social pillars to create a pleasant place of coexistence and student awareness, proposing the harmonious and sustainable integration of the environment and technology. It intends to install a green curtain, making the environment inviting, easing the heat. The most promising spot was the cafeteria of the Faculty of Economics, where there was an unused space on the roof that would serve as space for students to create and develop new projects and ideas. It provides the opportunity for a green roof that will reduce the incident heat, while also reducing air conditioning expenses. In the same space, there are stationary bicycles that would be coupled to a circuit of lamps that lights up as the person pedals. And, last but not least, install photovoltaic modules, generating energy and demonstrating generation values in real time. This will show the potential microgeneration can have and contribute to the awareness of renewable energy. The power generated from the boards would supply batteries were coupled to charging stations, to recharge electronic devices.It is worth noting that the main objective of the project is to educate the public that it is possible to live in a sustainable way, because it will be through harmonious coexistence with nature that the fully efficient energy will be achieved, ensuring a better future for all. The project fits into the term Energy Harvesting, which according to (David, 2014) "The term EH, is also known as energy scavenging or power harvesting; is the process of capturing small quantities of energy from any number of naturally-occurring energy sources, which would otherwise be dissipated or lost (e.g. as sound, light, heat, movement or vibration); collecting them and storing them for later use".

Greening the city & connecting communities. Curitiba's participation in the 2017 Ecocity World Summit

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Ecocity Curitiba was a 5-day festival that happened in July 2017 in Curitiba city, a parallel event to the World Ecocity Summit in Melbourne, Australia. It was an experimental, positive provocation as to how Global Forums can become multinodal with greatly increased levels of participation, leading to greater and quicker urban transformation with the construction of an expanded global Ecocity network. The main objective in Curitiba was to Fix The City; to identify solutions to today's urban problems and construct pathways for necessary change in the city, through bottom-up, community led solutions. By identifying and connecting local initiatives, a diverse network built and shared visions of what sustainable futures might look like. Fittingly, a major urban agriculture victory happened during the week. Every world city should be able to participate in the 2019 World Ecocity Summit that will happen in Vancouver, Canada, the Curitiba group are developing open source tools to facilitate this. Curitiba is not an Ecocity today, but it is opening pathways to be so, soon.

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Methodology for an electric taxi powertrain design: a case study in ciudad Juarez

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It is estimated that the transport sector is responsible for 23% of the world's CO_2 emissions during 2012, while in Brazil this sector it is the biggest emission source with 45% of the country's emissions (INSTITUTO DE ENERGIA E MEIO AMBIENTE, 2015). The idea to use an electric vehicle as a taxi is a promising approach to reduce emissions in big cities because electric vehicles do not produce emissions during their operation. Additionally, taxis run small distances with frequent stops and long waiting times, which gives the opportunity for recharging batteries (WESTBROOK, 2001). This work aims to present a simple methodology to design a powertrain for an electric vehicle designed to operate as taxi in Ciudad Juarez, Mexico. The methodology consisted in four main steps: (i) definition of the main specifications of the vehicle, including the powertrain architecture; (ii) calculation of the vehicle's power and autonomy needed to fulfill the specifications defined in the first step; (iii) research for the specifications of different motors and batteries available on the market; (iv) employment of the Analytic Hierarchy Process to evaluate the optimal motor and battery from the ones found in the third step. The Analytic Hierarchy Process is a technic employed in complex decision-making of multiple criteria (SAATY; VARGAS, 2012). To test the methodology, 44 taxi passengers and 21 taxi drivers residing in Ciudad Juarez replied to a survey. The results of the survey helped to define the main specifications. The collected data allowed the design of the powertrain for an electric vehicle with an autonomy of 180 km and maximum speed of 80 km/h, defined with the survey. It has also a maximum torque of 235 Nm and maximum power of 55 kW. A simulation in Matlab showed that a vehicle with this powertrain design would be able to climb a slope of 20% with maximum weight and a slope 8% at the speed of 80 km/h, both cases consider the vehicle going against a 30 km/h wind (PEÑA; NÁJERA; CORRAL, 2015).

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Biophilic cities and the Passo Fundo/RS case

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The planet continues with a growing urbanization trend, which has modified many spaces, influencing in life quality and the relationship between the people and nature. Therefore it is inevitable to turn the attention to conscious planning of the urban centers. One of the current solutions to the problems of big cities is taking advantage of creative planning for the implantation of biophilic projects in the urban context. The Biophilic City concept comes from the need of integrating the nature to urban planning, recreating the connection of the cities with the flora and fauna, allowing the habitants to develop activities and a life style related to learning with the environment and engaging with its care. The benefits of the contact with nature are much more profound and have a big potential. In this context, the objective of this work is to analyze the current situation of the Passo Fundo city, in the state of Rio Grande do Sul, relating it with the principles of biophilic cities. Thus, the insertion of nature in the city should not be a late idea to solve the heat islands, pollution, humidity and noise problems, but an idea to be put into practice in the planning of urban centers, approaching nature to the daily life and people's habits, going back and adapting green spaces to the modern human needs.

Urban green infrastructure and the Banhado da Vergueiro Park case, in Passo Fundo/RS

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Green urban areas are part of recreation areas, tourist and leisure attractions, and guarantee the environmental preservation in cities, where many modifications of the natural space occur. The study intends to analyse the implantation of the Banhado da Vergueiro Environmental Park, in the city of Passo Fundo/RS, as well as the characteristics of the area before and after the implantation. The park was strategically implanted in an area where there is a typical ecosystem of the pampa biome: the wetland. The area had been suffering a series of demands from the population, because its maintenance and preservation were poorly kept. The environmental park is structurally different from conventional parks, because more than being a guarantee of a green are for the population, the park aims to adequate itself to environmental, preservation and education issues, aspects that make the park so important in the city. Therefore, the study will be organized by the definition of environmental parks, the importance of green areas in urban spaces and the review of the Banhado da Vergueiro Environmental Park.

Green infrastructure for smart cities in Amazon Matogressense

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The Brazilian cities has historically built by gray infrastructures that are monofunctional, inducing disordered chains of degradation in the environment and consequent lower quality of life. “Smart City”, is a technological and efficient strategy to solve the pertinent problems in the urban space. Ruiz and Tigre (2015), show that Smart City is a complex concept without a single definition, whose main objective is to use the new technologies for improve and manage the basic functions of the city, to ensure the quality of life to the population, as well as to establish economic, social and cultural profits, contributing to the reduction of climate change. In this context, we can mention the green infrastructures as a tool for development of the cities, that begin to be implanted in contrast to the gray infrastructure. The concept of green infrastructure includes urban forests, the use of permeable building materials and other solutions about common problems such as floods and heat islands. The forest, in addition to providing a milder temperature for the urban population, has become multifunctional, providing opportunities for leisure services, sports, historic-cultural places, flood relief, and shelter for urban biodiversity (FRISCHENBRUDER and PELLEGRINO, 2006). In the Amazon context, these opportunities become needful for urban develop ways with a vision for the citizen's well-being and opportunities to conserve biodiversity associated with economic development. The current work aims to contribute to the systematization of green infrastructure proposals implemented, elaborated or in progress by urban development agents, mainly professionals in architecture, engineering and natural sciences, as well as representatives of local government. The main proposal is the implantation of an urban green corridor that interconnects the main parks of Alta Floresta city, Mato Grosso - Brasil , helping the mobility, improving urban forest, connectivity and maximization of Amazonian biodiversity, especially birds sought by birdwathing (consolidated tourism in the region). This contribution will serve as a tool for future actions for the strategic development of smart cities with a focus on green infrastructures that provide the citizen's well-being, as well as the consequent growth of a new businesses, for example tourism. FRISCHENBRUDER, Marisa T. M.; PELLEGRINO, Paulo. “Using greenways to reclaim nature in Brazilian cities.” Landscape and Urban Planning Nos. 1-4, 2006. pág. 67-78. RUIZ, Isadora; TIGRE, Anja. Por dentro de Operações da Prefeitura do Rio de Janeiro. Cidades Inteligentes e mobilidade urbana. Rio de Janeiro, v.24º, p.140-123, 2015. Disponível em: www.fgv.br/fgvprojetos. Acesso em: 10 de jul. 2017.

Poster presentations

Session 9

Socio-environmental perception of the Farroupilha Park (Porto Alegre - RS)

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In modern cities the parks are urban spaces of great value to the population, since they are areas that generate environmental amenities, leisure spaces and social integration (Gomes e Soares, 2003). Thus, they are areas that constitute the city and, therefore, are important spaces for sustainable development due to its characteristics, within the dimensions understood as relevant. In the city of Porto Alegre, the Farroupilha Park stands out, in part because of its wide nature, historic relevance and leisure and recreation options (Prefeitura de Porto Alegre, 2016). This study seeks to determine the social and environmental perception that the Farroupilha park has for its users through estimating the Disposition to Pay (DTP), simulating a month contribution. Other perceptions, especially environmental ones, were also evaluated through interviews in the park, directly with the users, and through social networks. The face-to-face data were collected on four different days, in two weekends of September 2016, and also for one month in an online survey by Google Forms. The questions were directed with the purpose of evaluating the users profile and its environmental perception. What regards to the profile from the 301 interviewees, for both surveys, the majority are up to 33 years old, are either studying or working, earn up to four minimum salaries, use the park mainly for leisure activities and attend it 1 or 2 times per week, and also more than 50% have at least a college degree. A special conclusion is that about 67% of the park users are available for Disposition to Pay in order to maintain park structure, a relevant result considering the actual higher level of taxes, suggesting which direct resources are preferable in social preferences. The average Disposition to Pay was R$ 9,66 in the face-to-face survey and R$ 5,23 in the online survey, with an average of R$ 7,74 for both.

Phytoremediation: an urban landscape strategy for sustainable and healthy cities

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Phytoremediation is a natural technique which explores the interactions between bacteria located in rhizosphere and diverse types of contaminants (organic and inorganic), in other words, it is the use of living plants to remove, reduce or immobilize contaminants in water, soil and sludges. Natural processes act in water and soil depuration spontaneously through the molecules' chemicals transformations, resulting in a nontoxic substance. Cities worldwide are faced with the challenge of contaminated water, soil and air, exposing urban dwellers to several types of pollution destructive to the humans and to the city's health. In several cities, industrial and domestic effluents are dumped into rivers, lakes and streams without any caution, in other words, no treated sewage reaches clean water every day. This is the main form of surface water contamination. However, degradation of water resources also occurs indirectly by waste, soil, and air pollution; rainy events act like a wide basin surface washout, in this way runoff carries a vast pollutant amount. Facing this issue, new practices are emerging to improve pluvial and fluvial integrated water handling as part of urban environmental management, linking natural resources regeneration to architecture landscape and green infrastructure. Green areas are important to improve water surface quality, vegetation has the capacity to retain pollutants, collaborating to both sedimentation and infiltration phenomenon and promotes depurative biological process. New typologies of green infrastructure are adopted as an alternative to urban drainage, mimetizing the soil natural capacity of absorption and infiltration, collaborating to hydraulic stability. Natural systems design combined with landscape projects represents a holistic view, capable of preventing, treating, and to storage the contaminated runoff, expanding the performance beyond water quality, but also, a resilience mechanism between human and nature. By integrating phytoremediation and urban landscape it is possible to develop a multifunctional green infrastructure network, capable of mitigating problems related to water management and urban pollution. Root zone treatments are already recognized and understood by engineering, but phytoremediation mechanism is viewed isolated from urban landscape design. This paper provides a literature review that aims to recognize phytoremediation’s technical collaboration to a water sensitive urban design into sustainable cities, and join these important concepts to urban landscape practices.

Production of substrates and organic fertilizers from tree pruning and their use in the production of food and vegetables

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Knowledge of the N, P and K values present in organic wastes forms the basis of fertilization of each crop to achieve the desired productivity. Composting, among recycling technologies, is basically a way of stabilizing a waste. The composting of locally available organic waste and by-products is an alternative to meet growing demand for organic fertilizers and substrates. Tree pruning and vegetable waste from canteen and students' canteens are abundant supply materials at the Pelotas_IFSul-rio-grandense campus and at several other schools in Brazil. This study aims to develop, apply and evaluate technologies of composting processes of the pruning mixture of trees and vegetable residues of the school kitchen with sawdust and verify the performance of the compound obtained in the production of vegetables grown in organic system. The second stage will evaluate the performance of the substrates used in the production of arugula, lettuce, maize, mini pumpkin and Physalis peruviana L, compared to a commercial substrate. The performance of the compounds as fertilizer for lettuce and mini pumpkin production will also be evaluated, using an absolute control and bovine manure as reference. The analytical results of the compound will be obtained with parameters of humidity, density, pH, N, C, Ca, Mg, P, K, B, Fe, C / N ratio (US EPA, 1976; APHA, 1992), Zn and Copper, as well as a detailed bibliographic review on composting. Report of Soil Analysis will be carried out through methods of analysis used by Embrapa Agrobiology, Department of Soils of the Institute of Agronomy of UFRRJ and Laboratory of Soil Fertility of the Institute of Agronomy of UFPel. Interpretation and conclusions will be made through Statistical Software InfoStat (Ver. 2010) -R2.11.0 and MindManager X5 Pro.

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“Urban Forest”: university extension project to improve urban areas

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This work aims to raise awareness about the strict use and protection of urban sidewalk beds for planting trees. The focus is to develop a technology to identify, report and manage the occurrence of empty tree beds through the active involvement of people. Using a free mobile application, users will be able to georeference, notify and report on the state of these sites. This data will be collected by a team of undergraduate students of Forest Engineering at the Federal University of Santa Maria (UFSM) that will carry out detailed analysis of tree species, soil type and management techniques. Finally, the tree seedlings will be transported to their destination on a small utility vehicle according to a schedule and an action plan. Further aspects can be considered on a permanent basis concerning this application, for example, soil correction, systematic monitoring of the tree’s growth, pests and disease control and exploitation of biomass generated through regular pruning in accordance with modern techniques. The central idea is that this becomes a University Extension Project between the UFSM and the municipality of Santa Maria-RS in order to provide support and incentives for this cooperation.

Session 10. Social and Environmental Responsibility

Conveners:
Prof. Dr. Jose Rubens Morato Leite, Faculdade de Direito (UFSC)
Prof. Dr. Matthias Schmidt, Beuth Hochschule für Technik Berlin

The negative consequences of non-sustainable development around the world become more and more clear: Climate change, pollution, loss of biodiversity, poverty, economic disparities are only a few examples of future challenges. On this background, best-practice examples should be presented and discussed in this session. Stakeholders from government ministries and agencies, NGOs, universities and the academic and non-formal education should be invited to submit proposals for presentations and posters.

Oral presentations

Session 10

Payment for environmental services in the context of the National Waste Policy: the case of Florianopolis experience

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The current global scenario regarding the sustainability of a healthy and balanced environment is worrying for the present and future generations. Unfortunately, in Brazil, the conjecture of dealing with a constitutional right is not different. Guaranteed by the article 225 of the 1988 Constitution, the right to an ecologically balanced environment, which is public property and essential to a healthy quality of life, is currently being target of degradations. These degradations make the order made by the Federal Constitution to the government and the society regarding obligation of defending and preserving it for the current and next generations even more indispensable. Therefore, the ways to make its preservation safer and more efficient ought to be revised. In view of this, the use of taxes to control the taxpayers' behavior appears as a solution to the Public Power, applying rules that act as guides to beneficial acts to the preservation of the environment.. Through the granting of incentives, the taxpayers start adopting strategies defined in ecological projects, generating, as direct consequences, the beneficial effects to the environment. The presentation aims to address the tax reassignment proposed by some authors analyzing the problem of externalities in the ambit of Environmental Economics and its applications in the legislation on solid waste as a model. Thus, efficient and capable methods are pursued, through the application of the extra fiscal function of taxation, to materialize the duty constitutionally imposed to the Public Power in the environment defense, by the realization of ecological projects that have the desired effects and guarantee greater efficiency of wanted results. The objective of this essay is to provide a theoretical, reflexive and proactive approach to the proposal that aims at the introduction of standards, establishing an instrument outside the traditional system of administrative supervision of command and control, establishing an economic instrument for payment for environmental services aimed at vulnerable people Society, as the focus of the waste policy at the local level in the case of Florianópolis, Capital the State of Santa Catarina.

Core organizational responsibilities in the context of societal challenges

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Organizations are interwoven into complex regional and global societal contexts - and bear responsibility for both their design and development. In each phase, organizations are confronted with a range of demands from a variety of stakeholders that they have to engage with. Simultaneously, however, they, too, are in a position to direct demands and questions toward other actors that require a response. This places them in a very intricate, interdependent web of responsibilities, within which they pursue their purposes. I regard responsibility here as a dialogical principle. The demands deposited on organizations' doorsteps, for which they have to come up with reactions, derive from and are debated in public discourse. In this weave of reciprocal demands, responsibilities tend to extend infinitely, but this renders them nebulous and unwieldy. For instance, to transform cross-organizational objectives, such as the sustainable development goals, into an actionable concept, companies require a robust frame of reference on which to base and defend the focus of their individual responsibility - as well as its limits. The core-responsibility model provides an organization with a reference framework that allows it to define its specific responsibility. By examining its Core Business, Core Impact, and Core Values, an organization can use the model to formulate a responsible balance between its own activities and the challenges for which the public discourse deems it accountable. This makes it possible for the organization to concretize and operationalize overarching ambitions like the sustainable development goals, and thus participate meaningfully in a responsible contribution to social and ecological development.

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How to improve environmental and social responsibility: listening to those affected

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The worst environmental disaster in Brazilian history occurred in November 2015 near Mariana, Minas Gerais, , when a dam burst released millions of tons of toxic mud along 500 kms of the Rio Doce riverbed until the Atlantic Ocean. As a result, 19 people died, a whole town, Bento Rodrigues, disappeared, water supplies for 36 towns were polluted and the fishermen's livelihoods were severely threatened. Experts calculate that it will be necessary at least 5 to 10 years in order to recover the river. Samarco, the company which runs the mining, is a joint venture between two large multinational corporations, the Brazilian Vale do Rio Doce and the Anglo-Australian Billigton BHP, companies with large experience in these activities. Samarco had all the required licenses to operate provided by the Federal Mining Department and Minas Gerais State Environmental Agency. Ironically, the disaster occurred just as the Parliament was about to approve a bill which would make mining licenses less restrictive and that would take away from the indigenous people their right to object mining in their lands. Samarco's disaster is therefore an excellent case to discuss Social and Environmental Responsibility either by Public Institutions or by Private Corporations. Indeed, Environmental Justice movements and scholars have been accusing Latin American Governments of favoring mining and other extractive activities, such as oil exploration, that bring serious threats to traditional communities and indigenous people. Environmental Justice movements, therefore, propose a set of principles that should guide policies and legislation for mining. This presentation intends to discuss whether such principles might contribute to improve Environmental and Social Responsibility of companies and public bodies.

Enviromental impacts caused by the replacement of breastmilk with synthetic formula: an analysis from the perspective of advertising in a society of consumption

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The post-modern capitalist society[1] is based on consumption[2] in a way that all citizens, starting from a very young age and throughout their entire life are consumers. To maintain this consumption, suppliers need to develop techniques that maintain a constant flow in the cycle of consumption. Aimed of accomplishing this, it has become essential in a liquid and constantly changed society[3], the improvement in advertising methods, as well as the expansion of the consumer niche, in order to create more and more necessities. In this sense, a particular consumer segment stands out as a fertile ground for advertising: they are the "new-born" mothers. It is not uncommon for "new" mums, to be in a situation where they are inexperienced and vulnerable[4], and therefore, especially susceptible to external influence. Due to their fragilities, these consumers become targets of specific advertising, creating, often superfluous, needs. Within these practices, those which contradict nature and biology itself stand out and suggest (and convince)[5] that women are incapable and incompetent in the act of feeding their children, creating a market that sells substitutions for breastmilk, such as artificial milk. However, such substitutes, as well as having impacts in terms of public health for both mother and baby, also bring serious environmental impacts. We can start such analysis in terms of the necessity to produce cow milk in order to make it possible to manufacture baby formula[6]. The environmental cost of this production is high, such as creating forms of agricultural monoculture to feed the animals that produce the milk. As well as this, in the production of such food, fertilizers and pesticides are used, which are ingested by the animals and automatically passed on in the milk. Cattle are notoriously large emitters of gas, in particular, methane, a known contributor to climate change. Also, the fact that for its production, it is necessary to be packaged in specific packaging for infant formula, such as paper and metal, which in turn will be discarded[7]. Breastfeeding, on the contrary, leaves no ecological footprint. It is "transported" directly and safely in the mother's breast to the young, and most vulnerable of all consumers. No other animal, equipment, worker, industry or transporter is involved, minimising the use of the planet's natural resources, therefore, is one of the most sustainable forms of nutrition.

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Social and environmental responsability in superior education institutions: a case study of Programa Campus+Verde

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With the growing concern established with the shortage of the natural resources, people and organizations look for alternatives to minimize the impacts produced by the reckless progress of the civilization. Considering this context, in 1987, the Brutland Report (World Commission on Environment Development)[1] defined the concept of sustainable development as: "Whoever that meets the needs of the present without compromising the ability of future generations to meet their own needs". In this form, the Superior Education Institutions try to commit themselves to implement policies of social responsibility that, in accordance with Perseguini (2015)[2], represent the set of practices that make part of an enterprise and aim to generate benefits for all involved. In this ambit (scope), the superior educations institutions have an important role in the dissemination of sustainable ideas. Ribeiro (2013)[3] define that: "The role of the university is to develop proactive human minds for the practice of citizenship, through actions able to build societies socially responsible and economically sustainable". Therefore, it is considered that the academy needs to incorporate the knowledge that is guided by research and the development of the sustainability in the community. The Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), worried about the increase of the quality of life of the population, established the Program Campus + Verde (C+V).This one integrates all the initiatives, proposals and practices of the University about sustainability. Acting like part of its structure of management, assuming commitments and establishing marks for the actions that intent to the advancement able to provide the human necessities. The program was consolidated in six vectors: Energy, Mobility, Materials, Water, Biodiversity, Use of Soil and Effluent, Emissions and Residues. The present study aims to approach a perspective of the social and environmental responsibility applied in PUCRS through the analysis of the Program C+V. Observing the fact that in the University are formed, from the technical and scientific aspect, individuals made a commitment to the changes that the community will claim to reach. Will be evaluated the environmental and social impact and the actions implemented with the intention of restoring the welfare of the environment and the academic community.

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Re-ciclo: organic waste composting as a solution for urban solid waste management

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Brazil generates yearly 79.9 million tons of urban solid waste (ABRELPE, 2015), of which, in average, 51.4% of urban waste is organic waste (OW), composed by scraps and pruning residue (MMA, 2011). The waste management in Brazil is one of the biggest expenditures of municipalities, and generates many negatives social, economic and environmental impacts. In Porto Alegre, Brazilian city focused on this case study, 1500 tons of waste are generated every day by the citizens, of which 57% corresponds to OW (REIS, 2005), and the most are disposed in a landfill, involving costs around R$60 millions per year. Instead of being disposed in a landfill, OW could have its nutrients recycled by a composting process, defined as a controlled process of aerobic decomposition of organic material (Massukado, 2008) resulting in an organic material product with high fertilizing potential for agriculture. In order to avoid landfill disposal to OW and reduce the negative impacts caused by the urban solid waste management system applied nowadays in Brazil, Re-ciclo was founded in 2016, with the main goal to collect OW from houses and small companies, considering that the small generator has no efficient solution offered by the local government. Re-ciclo offers a collect system signature, in which once per week the citizen has the waste collected and forwarded to composting. Furthermore, bicycles are used as mean of locomotion in the collect process. Every month, the compost produced returns to the customer contributing to incentive urban agriculture. One year after the launch, the company already counts with 190 signatures and over 36 tons of OW collected, in 3 cities (Porto Alegre, Tramandaí and Imbé) and the service cost R$45 per month to sign in. Furthermore, to accomplish the mission to avoid landfill, Re-ciclo conducts courses for adults and environmental education in schools, sells composting equipment for houses, and leads speeches to improve the population knowledge about this thematic. The steps forward are being conducted to include big generators, as restaurants, in the collection system. Instead of returning the generated compost to these clients in the end of the month, the company aims to return organic food produced with the compost that has been produced with their OW itself, closing the cycle and achieving a circular economy.

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Method for assessing the risk of soil contamination in urban areas

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One of the 17 goals announced in UN´s 2030 Agenda for Sustainable Development is to “make cities and human settlements inclusive, safe, resilient and sustainable”. Turning this goal into reality involves a commitment from public administrations to make sure that all human settlements are located in appropriate places from an environmental and human health perspective. Since human health is directly impacted by the environmental condition of humans’ habitat location, assessing the risk of soil contamination in urban areas becomes crucial to evaluate the adequacy of human settlements’ current or proposed sites. This assessment, as well as a characterization of potential risks to the environment and human health, are notwithstanding difficult to investigate in urban areas. This difficulty emerges not only from the variation in the morphological characteristics of the soil, but also from the dynamics of human activities taking place in a specific territory over time. In Porto Alegre, Brazil, surveys of contaminated areas are only undertaken by public administrations for urban development projects that fit certain characteristics regarding their size and activity. As a result, there are cases in which more than one project is proposed for lots located in the same block, where only one of them is investigated because it fits the pre-determined criteria. In this scenario, some lots may not be investigated for not falling within the legal requirements set forth by the City Master Plan. The objective of this work is to establish a methodology for assessing the risk of soil contamination in urban areas using historical records of activities formally established across the city over time. The application of the proposed methodology, using geoprocessing tools to map these records in a certain area in Porto Alegre, allowed for the construction of a model capable of assisting the analysis of possible soil contamination, providing an initial evaluation of the existing situation. This initial evaluation, which must be confirmed in loco, allows for a citywide assessment more comprehensive than the one provided by commonly used single lot analysis, thereby saving both time and resources for the entrepreneur and the public administration alike. The results of this analysis may guide, in the case of positive confirmation, the implementation of mitigating and compensatory measures for the appropriate implementation of urban development projects for any activity and size.

EcoRespira-Amazon, contribution to sustainability?

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Following years of decreasing deforestation rates in the Amazon basin, the past few years have seen an increase of biome degradation, not only in the southern reaches of the basin. To which extent can bi-national research projects (with limited time frames) contribute to sustainable development? While the project EcoRespira-Amazon (http://blogs.hrz.tu-freiberg.de/ecorespira/) mostly studies soil and ecosystem respiration of terra firme soil under forest and post-forest land cover (see talk “Terra firme: Soil respiration” in session 10), it clearly commits to sustainable development in the region. But how so?

Illegal wood transport along the BR-230 (Transamazônica between Humaitá and Apuí)

Our scientific results serve as solid base to derive concrete suggestions for solutions that assist the interest of people living in the basin; of (economic) development and of preservation and protection of the unique biome. It is this biome that forms the base of long-term survival of humans in a rather challenging humid tropical environment. We suggest an approach that rethinks current ways of life, considering the development over the past decades (mostly as of 1960’s). Seven pathways are being elucidated with no specific preference, since there is NO SINGLE ONE solution available, given the complexity of the system and its people.

Poster presentations

Session 10

The energy-poverty nexus in rural areas of the Brazilian state of Ceará

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Access to modern and affordable energy services in form of electricity and clean means of cooking is expected to be a vector for poverty reduction in rural areas (Karekezi et al., 2012). This expectation primarily relies on the assumption that once poor people have access to these services, they can take advantage of energy to move out of poverty. However, such an expectation may not always prove to be true. Here, we aim to present results of a doctoral research, which analysed possible framework conditions necessary in long-term planning so that decentralized energy systems and clean means of cooking can contribute to improve living standards and reduce poverty in rural areas of the Brazilian state of Ceará. In 2015, the State has achieved universal electricity access mainly by grid extension. Nonetheless, Ceará is still one of the poorest Brazilian states with high levels of social inequalities (de Assis and Linhares, 2015). In general, poor families have electricity to attend basic needs and lack clean cooking facilities. A participatory approach involving communities' representatives and stakeholders from social, energy and rural development areas was carried out to problematize and systematize the energy-poverty nexus in rural areas of Ceará. The analysis of the nexus was done using Cross-Impact Balance Analysis (Weimer-Jehle, 2006), which enabled the construction of context energy scenarios aiming to provide orientation for long-term planning. The outcomes of this research pointed out to the necessity of two main preconditions to promote modern energy services as a vector for poverty reduction in rural areas of Ceará, namely contextualized education and good governance. Contextualized education instigates people to critical thinking in a determined context. Thus, it can increase awareness of the energy-poverty nexus among communities' members and planners, relating energy and poverty so as to use the first to reduce the later. Good governance is essential to provide adequate mechanisms to reduce inequalities and to ensure that poor people can profit from decentralized energy systems and clean means of cooking to move out of poverty. According to our results, without these two preconditions, poverty is expected to remain a concern in rural areas of Ceará, with poor people having electricity to attend basic needs and lacking adequate means of cooking. In addition, without adequate policies, it is expected that decentralized energy systems will benefit groups that are already in a better social and economic position than poor people, or are politically well represented. Finally, if one wants to promote energy as a vector for poverty reduction, more attention should be given to consider the dynamics of rural areas in relation to energy and poverty, since only the provision of modern energy services does not mean that poor people will be able to take advantage from energy to move out of poverty.

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Corporate social responsibility as an institute for maximizing human rights

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The paper is based on a critical analysis of the global parameters to the Corporate Social Responsibility (CSR) in human rights, in the context of Brazilian peripheral capitalism, with a theoretical and normative international framework on CSR to transnational corporations. Faced with the new patterns of globalized capitalism, it is necessary to discuss the function of responsibility of transnational corporations for the implementation and emancipation of human rights, due to economic and political strengthening growth of global companies as new social actors. Socially responsible is the company that fulfills its social function, with social justice in the field of exclusions, aiming at sustainable development in a full and spontaneous way, without legal imposition (HUSNI, 2007, 63), in order to improve the quality of life healthy (WANDERERLEY et al., 2000). However, in complete disregard to the social function, transnational corporations achieve exorbitant profits at the expense of suppression of human rights, through complementary organizational elements spread throughout the planet, which is articulate and collaborate with each other due to the globalization (RAMONET, 2007, p. 95-96). In this background, it is necessary to adapt the civilizational paradigm in order to grant a greater efficiency, because if we "reinvent no more benevolent relationships and greater collaboration between peoples, we will hardly retain the necessary sustainability to carry out the human project, open for the future" (BOFF, 2009, p.17). Faced with the dubious establishment of international relations based on global governance, as well as a legislative implementation aimed at standardizing conduct that protects these rights, CSR presents itself as a useful institute for the solidification of protective relations in human rights and environmental issues. In order to do so, it is pertinent to analyze the assignment of legal personality for transnational companies to be considered as subjects of international law, subdued to soft law systems. The notion that the benefit of entrepreneurial capital should be at the service of the whole community must be implemented in order to promote the raising of the civilizational standard and the pursuit for equitable environmental and social solutions. Under this logic of investment in human rights, there is a possible maximization of communitarian values, including those related to the circulation of capital, thus increasing the prospect of corporate earnings.

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Industry 4.0 definition and impacts on the environment - a qualitative approach

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Information has always existed, but its full access has always been a restriction for organizations. Knowing how to separate the useful from the useless information is a difficulty for many companies. Based on this, the Fourth Industrial Revolution or Industry 4.0 emerged through Internet of Things, cyber-physical systems and connectivity concepts to integrate factory elements and solve this problem. But what is Industry 4.0? What are its technologies? How would Industry 4.0 impact the environment? Seeking to answer these questions, this paper carried out a qualitative approach based on semi-structured interviews with people of considered technological expertise. For that, a questionnaire was developed that sought to understand the theme “Industry 4.0”. Through the interviews transcripts a cognitive map was elaborated. The cognitive map was divided into 5 clusters to answer each of the questions in the script. From the clusters it was possible to understand: (i) the main concepts of Industry 4.0; (ii) the implementation stages for companies; (iii) the main enabling technologies; (iv) the concept of M2M (machine-to-machine); and (v) the impacts generated in the environment through the benefits and barriers found in Industry 4.0 in the brazilian scenario. As main results in the clusters were identified: in cluster (i) the term “Industry 4.0” refers to the machines integration to work in a same language; in cluster (ii) were characterized three initial stages of implementation in Industry 4.0, as: (a) classic automation, (b) integration and (c) data analysis; in cluster (iii) RFID, servers, sensors and robots were pointed out as the main enabling technologies of Industry 4.0; in cluster (iv) it was emphasized the standardization of the industrial protocols enabling the machines to work in an integrated way (M2M); and in cluster (v) the reduction of waste was identified as a benefit directly impacting the increase of productivity and product quality. One of the stated premises of Industry 4.0 was the sustainable development, which the industries must work in an integrated way in the value chain (horizontal integration) worrying about social and environmental causes. As main barriers, the lack of actives and technical knowledge were identified. These could lead to large losses in the environment and big social concerns. Finally, the clusters made possible a discussion about the topics bringing what is in the literature about the theme.

Tecno-economic evaluation of food waste disposers on a compact wastewater treatment system

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Additional food waste in wastewater treatment system can bring a mass balance, increasing the performance of the treatment system (Koch, et al., 2015). The main objective of the research was carring out a tecno-economic analysis of the potential of co-digestion of food waste in a Compact Sewage Treatment System (CSTS). The system consists of anaerobic and aerobic stage and receives a sanitary sewage contribution from 600 employees of a company in the metallurgical company. The system is able to receive a BOD concentration in the range of 360 mg/L, with an inlet temperature of 22 º C and a Hydraulic Retention Time of 8 hours. To evaluate the potential of food waste treatment combined with sanitary sewage, the characterization of the raw effluent and this one mixed with the food waste was analyzed. The concentration ratio (food waste/sewage) used for the mixture was 1.7 g/L, which represents the amount of food waste daily generated in the company restaurant (45 kg) and volume sewage (42m³) that is daily treated in the CSTS. The analyzes showed an increase of 68% of COD and 121% of BOD after the addition of food waste to the raw sewage. On the analyzes of solids, the Total Solids presented a 44% increase in the concentration and the Total Fixed Solids maintained the same concentration of the raw sewage, which can be interpreted the additional organic matter is susceptible of degradation in the system. Based on the results, structure system and adjustments in the operation, it is possible to get the combined treatment of sanitary sewage with the food waste in CSTS. It costs a food crusher at the restaurant, due to adapt it to send food waste to the system, through a sewage pipe available. In addition it has a low cost of water consumption (6 liters per minute) and energy (3,75 kwh/month) from the crusher operation, which is insignificant in waste co-digestion projects. The results obtained in this study allowed an advance in the operational knowledge of alternative disposers of food waste, to reduce the impact caused by the destination of organic solid waste to landfills, according to specific Brazilian legislation.

KOCH, K. et al. Co-digestion of food waste in a municipal wastewater treatment plant: Camparison of batch testes and full-scale experiences. Waste Management (2015), http://dx.doi.org/10.1016/j.wasman.2015.04.022

Sustainability and higher education in the Amazon: dialogue in construction

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The society concern about the environmental questions intensified even more from the Second World War with the advances of science and technology areas (REIGOTA, 2007). In this scenario, the university considering its historical mission in the production and socialization of knowledge is directly involved. This research, in progress, is linked to the PhD in Environmental Sciences of the Society, in Nature and Development Program from the Federal University of Pará West, Research Line "Management and Innovation of Knowledge for Sustainable Development". In order to understand how the relationship between sustainability (GADOTTI, 2004) and higher education (MORIN, 2004a; 2004b) in Amazonia (ARAGÓN, 2001) it is intended to analyze the conception of curriculum and its interface with the environment and higher education In the Amazon, with the interest focus in sustainability. Specifically, the objective of this study was to identify the conception of curriculum greening and its main contributions to the environmental theme at the university and to verify the perception of sustainability among professors, technicians and students of the Federal University of the Pará West (Ufopa). It was chosen the qualitative quantitative approach (GERHARDT; SILVEIRA, 2009), once both of them offer appropriate methodological tools to research the object of study. Considering the research procedures it was adopted the bibliographical, documentary and field research. The research in the environmental area reveals the necessity to dialogue with the different areas of knowledge and this doctoral study aims to contribute significantly in the debate about curriculum greening as a way of thinking the university and its regional insertion in the Amazonian context.

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Is the Porto Alegre sustainable innovation zone moving towards holacracy?

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Considering the fact that urban areas are growing and world is changing fastly, new forms of organizational management systems emerge in response to the new challanges that arise in different contexts around the world. The SDG 17 become, thus, an important objetive to be attained, specially, regarding its capacity-building target. In this light, the paper aims to analyse the management system, currently, adopted in Porto Alegre Sustainable Innovation Zone – ZISPOA that is an independent citizen-led movement rised from the implementation of the first Sustainable Innovation Zone, the ZIS model idealized and designed by Marc Weiss from Global Urban Development. The method of analysis adopted was participant observation, a qualitative research methodology largerly used in sociology that was applyed in depth in a particular group, ZURB, as a sample, in order to understand the entire organizational system. The results indicates that new forms of management are rising as a natural need, at the same time it is possible to perceive that cultural issues and behavioral patterns influence the system.

Movimento Roessler para defesa ambiental - How an NOG is influencing the environmental, social and political life of the city of Novo Hamburgo in the south of Brazil

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Since 1978 Movimento Roessler (MR) is working in Novo Hamburgo. It is the second oldest NGO in Rio Grande do Sul. With almost 40 years of action, the NGO is an important institution in the city. Throughout this period, two generations of volunteers have been participating. Nowadays the third generation is starting to share the work. This 40 years also means 40 years of changes in the acting way. In the beginning, the movement used to protest against the environmental pollution of industry. This challenge has been taken by with strikes, sit ins, closure of streets, etc. Today, these noisy manifestations have developed into political contacts with neighbors and campaigners, and also working together with environmental state and city office. In the last 20 years MR has been working more and more in projects and the financial support has risen significantly. For example, MR had made an upset of trees in public streets as a working basis for town planning. One of the biggest success was in 1987, the preservation of a private area, which had been chosen to serve as a housing sight, and turning it into a public park, the *Parque Municipal Henrique Luis Roessler*. This park is today preserved by state law and also one of the most frequented leisure areas in the city. This success gave MR a name as a respectable organization, which lasts throughout its history. Since the opening of the environmental town council, in 1990, MR is working together with other NGOs and institutions, taking part in the work of the environmental secretary. Despite the management changes, MR is the only organization which has participated this council permanently. Since 1997, MR has been publishing its own journal. Anyone can contribute sending content. The paper is distributed freely and the costs are covered by advertisement. Today the printed paper has been nearly substituted by internet posts at MR's website. One problem, which appeared the last years, is the lack of well written texts for environmental projects funding. To change this, MR has developed and executed seminars for leaders and participants of groups in this area. A lot of new projects started in these seminars. Every last saturday of a month MR is organizing a day of walking, called *Fim Da Picada*,in the beautiful nature of the valley of the river Rio Dos Sinos. Since 18 years this event is permanently offered freely for everybody. One of the next projects will be publishing a photo book over this trails and sites visited. All these facts show that MR is participating actively in the environmental, social and political life of the city. MR is a respected organization and is proud to be helping in a lot of environmental problems. The presentation shows this in details and also talk about how the development process has been happening in the last years, with the usage of the new communication possibilities which emerged from internet.

The Brazilian Solid Waste Policy as a way of implementing the SDGs: reflections on sustainable consumption

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The phenomenon of globalization has resulted in a substantial increase in entangled economic relations and, of course, in an increase in consumer relations in the world. The expansion of production with the development of new consumer markets within and beyond the national frontiers of the States, starting with the Industrial Revolution, originated a very characteristic phenomenon of the contemporary society, that is, hyperconsumption, where it is possible to perceive the central role of human beings, notably in what concerns the maintenance and nourishment of the 'culture of consumption', in which appearances are confused with the very essence of man, causing uncontrolled and irresponsible consumption. One of the major reflexes that this sudden growth of "production" and "possessions" generate in the community is on the environment, given the growing production of garbage, mainly formed by fragments that do not decompose; the uncertain destination of goods, which, today, are largely non-durable; among other problems that result in a global ecological crisis. Such problem is being tackled by the United Nations, which, in line with the Millennium Development Goals, launched in September 2015, during the 'Sustainable Development Summit', a new agenda to stimulate States and civil society to seek practices to achieve the improvement of the living conditions of humanity – for the present and future. Among the Sustainable Development Goals (SDGs) that were shaped, sustainable consumption and production (Goal no. 12) is found, advocating for a greater awareness of the need to observe the environment while carrying out an economic activity. This objective can be effectively materialized in Brazil through the implementation of the National Policy on Solid Waste – created by Federal Law n. 12.305 of 2010, and regulated by Decree no. 7.404 of 2010. After all, its purpose is to encourage conduct aimed at addressing the social, economic and environmental consequences of solid waste management, seeking to organize the way that the public and private sectors deal with the debris produced, in favor of environmental awareness as well as consumption. This Policy, thus, encourages the adoption of practices that lead to 'sustainable consumption', among which the incentive to reuse and recycle rubbish are examples.

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Technology without borders: students implement regional sustainability projects in Brazil

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The non-governmental organisation “Technology without borders” (TwB) is located in Höchstadt in South Germany. The organisation’s goal is to improve living conditions in developing countries. In order to achieve this goal, activities are centred on three frame conditions: Firstly, the concept of development aid is put into practice, adapted to each local situation and needs, which is reflected by the association motto: “as sophisticated as necessary, as simple as possible”. Secondly, projects are planned considering the capacitation of local residents to ensure the continuation after completion. Lastly, all projects include potential for microbusinesses to ensure independent continuation after project end. TwB is organized by regional groups (RG) that are located in different universities in Germany. Currently there are RG in Gambia and a Brazilian group is starting its activities. The NGOs activities are mainly conducted by students who work voluntarily and raise funds in their local communities. This approach aims to enable its members to work and connect to people with they are cooperating[1]. Between October and November 2016 the first TwB project was executed in Brazil. In cooperation with the State University of the Central West in the city of Irati, Parana, family farmers were introduced to a low-cost solar hot water system. This was invented by the Brazilian NGO Sociedade do Sol in São Paulo[2]. The cost effective system consists of components from hardware stores, it is easily installed and offers cost reduction for low income households. By utilizing this system, the monthly costs for the common electric boiler system can be offset, which is providing a benefit considering rising electricity prices in Brazil. Three systems were installed: Two in centers for farmer cooperatives near Irati and one in the local institute of Paraná. Through workshops, the local community leaders, professors and students were included as leaders and multipliers in order to install more systems in their city. After project completion, the German team of TwB met with professors of the Federal University of Santa Catarina (UFSC) in Araranguá. The experience in Irati was presented at UFSC. A group of UFSC professors and students decided to implement a pilot-project in order to start a TwB RG in Brazil, which involves the construction of a low-cost biogas digester for small farmers. Financial support is provided by local businesses and research institutes. Students can apply their academic and technical knowledge and improving project management skills, while local businesses supporting social and environmental engagement in their community. Through the development of further projects between the German and Brazilian RGs, it is expected that knowledge and technology can be transferred in both directions and to strength the cultural and academic exchange between the universities in Brazil, Germany and Gambia.

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Environmental education activities in Lajeado, Rio Grande do Sul, Brazil

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Environmental education is a guidance process that orients the development of critic awareness about environmental issues and activities that leads to community participation in the preservation of environmental equilibrium. Therefore, the fundamental aspect of environmental education consists on the study object - the environment - considering the physical, chemical and biological characteristics, but mainly on the human subject participating in the process, including the socio-economics, cultural, political, ecological and ethical relations. In that sense, the current work presents the activities develop in Lajeado, Rio Grande do Sul, Brazil, that pursuit to develop awareness for the environmental issues and that arouse the interest for taking action in minimizing the ambiental impacts. The environmental education actions are developed taking in consideration the local reality in Lajeado linked to global reality foreseeing the awareness as a mean for transforming these realities. The Environmental Education Center (CEA) is located in the Secretariat of the Environment and promotes several awareness actions through activities carried out in the Botanical Garden of Lajeado, Parque do Engenho, in schools of the education network and municipal sanitary landfill for school students as well as for public and private companies, residents associations and groups. The activities carried out at the Botanical Garden of Lajeado are mainly guided ecological trails where various themes are addressed. The actions carried out by the CEA are periodically evaluated based on the level of satisfaction and suggestions of the participants in relation to the educational proposals, with questions about the methodology used, resources used and attendance of the monitor. Based on this fact sheet, CEA analyzes what can be improved and included in the planning of activities for the coming year. It is expected each year to increase attendance and improve the quality of activities offered by the Center for Environmental Education, over 100,000 people were cared for between 2005 and 2016. Environmental education is essential for the transformation of man-nature relations and to determine how present and future generations can act to enable survival and promote the quality of life of all beings.

Environmental consciousness and ecological consumption as an indicator for environmental projects at school

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Regarding environmental policies in Brazil, the Ministry of Education decreed the Resolution nr. 2 from 02 June, 2012, which establishes the national curricular guidelines for Environmental Education (EE). These guidelines should be observed by the entire education system, including Elementary Education and Higher Education institutions, and instruct on the implementation of the Federal Constitution determination and of Law nr. 9.795 from 1999, which details the EE and institutes the National Policy for Environmental Education (NPEA). Also, according to the United Nations Convention on the rights of children, which define a child "as anyone under the age of 18, where the basic rights of the units are available for education in respect of the natural environment and voice in decisions that impact their lives (UNITED NATIONS, 1989). But are the students aware about the environment? To find this answer, the present study was conducted in the city of Ivoti, RS. The research was conducted in two weekly meetings held separately with the students of each educational level, using some scientific questions to analyze the student´s answers. After the questionnaires were answered by the students, the answers were analyzed and transformed into graphs to measure the environmental awareness and the ecological consumption of the eighth, third year and EJA students. With the calculation of the correct scores, we found that the high school and EJA students score = 3, which places them in the category "consumers with potential environmental awareness", which we no longer observe in the Eighth year that presents the score = 2, with "few traces of environmental awareness". It´s interesting to shows that the final stage of high school should be the generator of new postures and an even greater environmental awareness than observed. The intervention of the subjects in these realities with new postures is fundamental so that changes can occur. The understanding of how subjects perceive their local environment and their social representations on this provides important feedback to the teacher for the implementation of projects in this area. It is an important way to generate new life paradigms which consider the critical environmental and education-humanizing aspects to increase the environmental consciousness from the students not only here, but everywhere in Brazil.

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Training in agriculture and urban composting

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From global to local scale, environmental education has been discussed as an important tool for social transformation (Zaneti, 2003), a permanent process in which the individual is aware of his environment and acquires the skills to act in favor of it, Protecting it and solving problems generated by environmental impacts (Tbilisi, CEI, 1977). In this context, Re-Ciclo, a company based in Porto Alegre/RS understands that one of the main negative impacts to the environment are caused by the use of pesticides, food waste and undue disposal of organic waste. In order to mitigate this impacts, Re-Ciclo developed a training project in urban agriculture and composting for socially vulnerable young people in an idle space in the capital of Rio Grande do Sul(Brazil). For this,an action model based on the circular economy was proposed that aims at the reduction, reutilization and recycling, promoting the recovery of young people's contact with biological cycles (EMF, 2012). Developed at the IAPI (Institute for Child Care and Protection), located in the district of Santo Antônio, Porto Alegre, which receives children from the local community in the opposite shift to the school, the five-month project attended 25 students aged 12 to 15 years old. Through a methodology based on action learning, with theoretical-practical classes, an area of the institute was restructured by implanting an agroecological garden free of pesticides and to enabling students and staff to maintain these structures. The planning, content and schedule of the activities were subdivided into three items: i. Dreaming - moment of connection with the students and the space destined to the garden, instigating and giving them the autonomy to dream the area based on the philosophy of permaculture (Holmgren, 2013); ii. Composting - aiming at the recycling of the institution's organic waste; and iii. Urban agriculture - approaching methods of agroecological cultivation and permaculture, instructing from the preparation of the soil to the harvest. In the period of the project the construction of an urban vegetable garden with capacity for cultivation of 300 herbaceous plants, distributed in beds of cultivation, hugelkultur, vertical beds and spiral of herbs, also it had it's on own irrigation system and nursery of seedlings. In addition, we made a vermicompost to transform up to 900 liters of waste per month into fertilizer. Also, the pilot project enabled the students to act and reproduce the processes of permaculture, composting, agriculture in other places and in their houses, being then responsible for the care of the space and according to future needs, will receive support from Re-Ciclo and volunteers.

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Urban Sustainability: A discourse approach by spatial scales

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Discussing sustainability is a major challenge today, especially without repeating ready speeches, without being superficial or controversial. The objective of this study was to present a vision of the discourse on urban sustainability, through spatial scales - global, local and individual. Therefore, the understanding of the spatial dimension and the imperatives of spatiality that set up conflicts, allows the differentiation between what is spoken and what is really desired and achieved. Thus, initially a bibliographical research on the conceptions of space was necessary, in order to understand the relations of these perspectives with the potentials and limitations of each spatial scale. We are based on studies of authors such as Lefebvre (2001, 2009), Harvey (2008, 2012), Massey (2001) and others. The development of the work is characterized as an experimental research, in which raised factors that have real potential to influence the bases of social and work relations. The greatest understanding was not that the way opens through education, however, only through integrated, contextualized and critical learning, it is possible to awaken the sense of responsibility and participation necessary to take from the discourse the essence of what needs to be said and done. And for that, the geographical perspective has a lot to contribute with its concepts, categories and analysis.

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Urban welfare: going beyond socioeconomic status in school inequalities

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The uncontrolled growth of population and cities in Brazil segregates people in socio-spatial terms and distributes urban public resources unfairly, threatening student's access to the structure of educational opportunities (Ribeiro, Koslinski, Zuccarelli, & Christovão, 2016). Despite the tantalising evidence for Brazilian students' socioeconomic status being one of the leading single predictors of their school achievements (dos Santos, 2017), this measure does not account for the complexity of the 'real income' (Harvey, 1971) that shall be provided by the city and used collectively by the people, in terms of material conditions of life, in the form of housing, transportation, and quality education. Consequently, this concept of 'real income' allows one to evaluate better how the uneven distribution of urban conditions among social groups in the city favours social inequalities (Ribeiro & Ribeiro, 2013, pp. 9–11). We expanded the study of Ribeiro et al. (2016) about Brazilian metropolises to all 5,564 Brazilian municipalities to investigate the relation between the residential segregation and segmentation and school inequalities. There are 20 indicators that compose the Urban Welfare Index (IBEU), including existence of public lighting, paving, sidewalk, wheelchair ramp, open sewage and garbage accumulated around the homes, electricity and water supply, sanitation, material of the walls of the houses, and number of residents per bedroom and bathroom (Ribeiro & Ribeiro, 2013). These factors were studied as predictors of school achievements as measured using their average ENEM (National High School Exam) outcomes and IDEB (Basic Education Development Index) values, using Data Science methods. Correlation analysis indicates a moderate positive correlation between the Urban Housing Conditions dimension of IBEU and IDEB, while students' socioeconomic status correlates better with ENEM than with IDEB. Nevertheless, multicolour bivariate choropleth maps across each of the municipalities reveal that IBEU does not work well as a predictor for those situated in the Northeast Region of Brazil. Our results suggest that some factor is missing in IBEU definition; nevertheless, they also seem to confirm that the uneven distribution of urban conditions reduces educational opportunities and engenders social inequalities that are incompatible with a sustainable society.

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Philanthropic organizations in Manaus practical solidarity by population in street situation

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Introduction: In the city of Manaus live on average 1,200 people occupying urban space where they live and carry out their productive activities. Besides not having conventional housing these people have several problems among which highlights the misuse of alcohol and drugs being met mainly by charities. **Objectives:** Mapping the territory where the people on the streets; Identify and profile the philanthropic institutions that develop work with this population and the population served. Method: exploratory research was carried out to map the charitable service network; We used the interview and participant observation as a data collection instrument. **Results:** We identified 04 charities of a religious nature which assist the homeless population, carrying out cleaning, guidance and referrals to social network and health and, above all, distributing food to more than 600 people on the streets in the city of Manaus . As for the population identified, these were reported in the streets due to family conflicts and violence suffered, especially in childhood and adolescence. Many problems also stem from extreme poverty, lack of employment and health problems. **Final Thoughts**: It is in the street space that people develop their productive practices and establish interpersonal relationships and create their way of life. Institutions develop the work voluntarily and with their own resources and links are well defined with establishment of mutual trust and partnership between institutions and between them and the population served. The government is also present with policies and programs targeted to homeless people, however, the greatest demand is still being met by philanthropic organizations that have made a solidarity work and recognized by the people living in the streets.

Study of soil contamination by heavy metal derived from emissions from a battery industry

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The preservation of the environment, the rational use of natural resources and the change of postures of the society in the face of environmental issues have led the industries to seek a better performance in this area. Lead is often used as an indicator of pollution. Once released into the environment, this pollutant can follow different routes, being able to be converted into more soluble species, becoming bioavailable. In this paper, the lead as a pollutant is summarized, where average levels of lead concentration in the soil ranged from 900 to 60 ppm, decreasing as it moves away from the industry chimney.

Energy efficiency in control systems of particulates in the furniture Pole of Ubá

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The Excavation system of the cutting area of the company Modecor had several capture points, which are inoperative due to the variations of demand in the process. In order to avoid that the suction points referring to these machines were operating unnecessarily, the adopted measure was to apply the Solution defined by Racional and its partners, Weg and Renner Têxtil, to the system of Manhole Filters. The solution consists of a measurement and specification process, where we apply the Wmagnet Drive System and the DPF-Reg20 pressure controller from Renner Têxtil, so we keep the system within its characteristics, and there was a 56% The exhaust system. The gain was also obtained by increasing the useful life of the filter sleeves and reducing the use of compressed air to clean the system, as well as reducing pipe wear and material accumulation in the line.

Energy efficiency in powder collection systems in porcelain industry

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The Oxford Porcelain Industry has decided to evaluate its facilities and the potential for energy savings to be achieved within its production process. In the pre-design stage, energy diagnostics were developed in electric motors applied to ball mills, used for grinding materials and are a fundamental part of the ceramic and porcelain products manufacturing process. Through the energy analyzer, the operation curves were monitored to detect the starting conditions, torque, inertia and load characteristics. The new engine ensures greater efficiency, lower noise and performance levels than conventional motors. This motor, with frequency inverter, offers constant torque in a wide rotation range guaranteeing the operation at low speeds, with lower temperatures and consequently longer service life. The financial analysis of the project shows that the annual energy savings are R$ 6,649.86, considering the current local tariff. As the investment to implement the solution was R$ 15,977.21, the return on investment is obtained within 2 years and 4 months. With this complete solution, about 7.38 tCO_2 will no longer be emitted which is equivalent to the work of absorbing 37 native trees.

Design of energy efficiency in filter of mangas in the fabrimóveis industry

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In order to avoid the reduction of electric energy consumption in the hoods 01 and 02 of the Fabrimóveis industry filter, the solution was to apply the high efficiency motor (WEG WMAGNET) with frequency inverter (CFW11) and pressure transmitter (DPF REG 20 of Renner Têxtil). The solution is composed of a measurement process and system pressure controller, stabilizing and modulating the needs in the process of collecting wood dust. The energy efficiency project provided energy savings of 73.4% in hood 01 and 71.3% in hood 02. This application also provided greater control and stability in the exhaustion process, with a six-month increase in the useful life of Filter sleeves. It reduced the annual operating cost of electric energy by R$ 53,298.00 and increased productivity in the industry as a whole.

Energy efficiency design in ceramic industry sleeves filter

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The project to reduce energy consumption in the bag filter aspiration process in the Cardall Cardoso industry was applied the Wmagnet Systems solution of 125 CV-IV poles, controlled by WEG Frequency Inverter of the CFW11 line of 180 amps. The solution is composed of a measurement process and system pressure controller, stabilizing and modulating the needs in the process of collecting ceramic powder. Compared to the W22 Plus induction electric motor expense, there was a reduction of 46 kW in power consumption due to the reduction of rotation to keep the system depression constant at 55 mmca. In the process there was a reduction in the consumption of compressed air and in the exchange of the filter elements, due to the adjustment of time for the beat of the sleeves. The energy efficiency project provided a six-month return on investment and an annual energy savings of R$ 69,490.08. The complete solution reduces some 157 tonnes of CO_2 that will no longer be emitted.

Socioenvironmental diagnosis of a ceramic located in the state of Pernambuco, Brazil

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The environmental degradation of the ceramic industry has attracted the attention of many experts and authorities because of the large number of companies of this branch in Brazil promoted by the growth of civil construction. Some of the main externalities generated are air and sound pollution, unsustainable extraction of wood for burning, besides the imperative consequences for the health of the population living in the surroundings of the firms and the workers themselves directly affected by the physical and chemical risks (FORT et al., 2010; FARIAS et al., 2012). In this way, the objective of this research was to understand the impacts that affect the physical, biotic and socioeconomic of this branch of activity, exposing the mitigating measures that can be implemented. The present study was carried out in a ceramic industry in the state of Pernambuco (Brazil), in a local productive arrangement that contains 150 ceramic industries that generate great impact on the environment. The investigation came from an on-site visit and questionnaire application to the partners of the organization to identify and diagnose the socio-environmental impacts generated through the ceramic industry and to outline their socio-environmental profile. It was verified that in the entity investigated there is a low incidence of diseases among workers, showing concern for protection measures (both individual and collective), acquisition of firewood from legalized reforestation programs, own plantation of wood (*Prosopis juliflora*) with a high calorific value in adjacent area, use of water resources legally granted by the State Environmental Agency (CPRH), as well as the acquisition of clay in a responsible manner, authorized by the National Department of Mineral Production (DNPM). In view of the foregoing, the organization under study maintains its socio-environmental sustainability, complying with current laws and adopting environmental management measures that stand out in relation to most of the state's ceramics.

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Labor and income generation in popular classes as in a group of waste pickers

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This research deals with the theme of labor and income generation in the waste pickers' group. After around two years of social and productive follow-up of families of scavengers related to the municipal program of income and labor generation "Todos somos Porto Alegre", I realized the need to deepen the knowledge from previous field experiences through the use of social research concerning both the reality of these workers and the public policies designed for them. In this context, the question that guides the present research emerges: how does the relationship between waste pickers and their work is constituted? This question also refers to the discussion about the quality of the public policies of work and income directed to the popular classes. Concerning the methodology used in this research, I used the qualitative method of biographical narratives as developed by sociologist Gabriele Rosenthal in the Interpretive Sociology. This research intends to contribute to the research theme of labor and income in the group of waste collectors using a methodological approach that is not widely used in Brazil. Nevertheless, this approach is held in high esteem by the academia due to its systemic character and the quality of the results it provides.

Historic, destination and exploitation of urban solid residues in brazil: preliminary studies

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In Brazil the correct management of urban solid residues still represents a big challenge. From the historical point of view this is a very recent issue included in the political agenda. This work aimed at discussing the thematic of solid waste management in the country. Topics covered include: history, composition, amount produced, selective waste collection and biogas production. This qualitative study was carried out thought literature and documentary reviews. It was considered urban waste management policies, regulation and technologies. Among the technologies it was especially considered biogas as an important alternative to urban waste treatment and energy production. Moreover, it were discussed the socioeconomic aspects and environmental advantages of selective garbage collection and using solid waste for biogas production. The social economic benefits to garbage colletors are related to employment, income generation, improvement of their health and safety conditions and recovery of citizenship. Environmental benefits are related to soil and water protection among others. The investments in new technologies to obtain biogas give room to new opportunities. These refer to opening of new markets by selling the energy obtained or the subproducts like biofuels and biofertilizers, accessibility of energy for distant communities, descentralization of energy production and energy safety. The environmental advantages of biogas include: reduction of the greenhouse gases in the atmosphere and consequent mitigation of climatic changes; benefits for the health of humans, plants and animals due to the reduction of contamination by infectious diseases; prevention of pollution in rivers and aquifers, minimization of environmental impacts originated by waste disposal. This study also presented examples of some biogas plants which are operating in Brazil. They are Minas do Leão RS, Itajaí SC, São João SP, Rio de Janeiro RJ, Itajauba MG. These are interesting experiences with positive results. Nevertheless, Brazil is a very big country and there is still the possibility for the development of many other biogas projects. The expected results of this research it is the achievement of scientific subsidies which can give support to the public policies oriented to selective garbage and biogas production in urban areas in Brazil, especially, in the Araranguá region, Southern of Santa Catarina.

The impact of irregular disposal of leather waste on local population: case study in Novo Hamburgo / RS - Brazil

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The difficulty to find the perfect balance between economic activities and environmental pollution is worldwide. In this connection, the footwear-leather segment is considered with great environmental impact, due to its production process that gives rise to excessive polluting loads. In Rio Grande do Sul, the hides and skins industry are responsible for generating 128,578 t / year of hazardous industrial solid waste (FEPAM, 2015). The legal framework for change in the management of hazardous wastes by companies was Federal Law n. 6.938/1981 and CONAMA Resolution n. 237/97 and finally, Law n. 12.305/ 2010, which established that waste generators are responsible for the control the stages of collection, intermediate disposal, treatment and final disposal of the solid waste generated by the company's operations. In Brazil soil contamination problems began to appear in the mid-eighties and have intensified in last years with the discovery of hazardous waste deposits in areas such as wetlands, depressions and slopes and riverbanks, which reduces the ability for the restoration of these ecosystems and often causes irreversible degradation (GARCIA, 2003). Therefore, the objective of this study was to evaluate empirically, between May and June 2017, the environmental impact in an area of disposal of leather waste, which is highly polluting, and may contaminate water, soil and air. The waste disposal was happening in the area called "Vila Kipling", in the Canudos neighborhood, in the city of Novo Hamburgo in the state of Rio Grande do Sul - Brazil, and it was discovered in 2011. The town has 3,000 inhabitants, representing 4.5 percente of the neighborhood's total population, the most populous of the municipality. The waste was disposed in the open air, in the middle of the houses, many of them built on layers of leather waste, used as material with drainage potential. Leather waste were also found on the banks of the Arroio Pampa, one of the tributaries of the Sinos River, where the water is collected to supply the municipality. The characterization of the contaminants present, the immediate removal of the contaminated soil and soil, the plants cultive for the rehabilitation and the floristic recomposition with native species, can reduce the impacts to the environment, the local community or even the population of the municipality and the municipalities along the Sinos River Basin.

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Female entrepreneurship of PUCRS

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Around 1940, entrepreneurship has emerged effectively as a subject of study, and currently, it is seen by many scholars as one of the most capable resources of generating economic and social transformation (MORAIS, 2013). According to the Global Entrepreneurship Monitor - GEM (2015) survey, one of the hallmarks of Brazilian entrepreneurship is the balance between men and women, who are equally active as to the specific rates of initial entrepreneurship, which reinforces the importance of the contribution of the women. The participation of the women as entrepreneur has been growing; however, there are many cases of female entrepreneurship that are linked to a non-formalized professional action. In addition, these women have little or no help on how to manage it. The difficulties faced by the entrepreneur women are often repeated and they can be minimized through training, courses and support channels to the entrepreneurship. An entrepreneurial educational institution do not only includes subjects or courses of entrepreneurship in its pedagogical project. According to Campelli et al. (2011), the institution is the one that adopts a new educational paradigm, becoming, itself, an entrepreneurial institution. The *Pontifical Catholic University of Rio Grande do Sul* (PUCRS), started in 2016 the project "Female Entrepreneurship". It is a free activity that aims to create an environment, where women can have a better qualification, to clarify their doubts and to increase the network. In 2017, there was the fourth edition of the project with the theme: time management. A survey was carried out in this edition with the purpose of mapping the profile of the entrepreneurial woman and her expectations. It is a strategic study that aims to promote propitious conditions to increase the female entrepreneurship in the southern region of Brazil. The result of this survey comprises an audience of entrepreneurial women between ages of 25 and 44, with 76.8% having completed higher education or more qualifications. The main reasons for women to be entrepreneur are: flexible schedules, freedom of creation, personal challenge and financial stability. The role of the women in the labor market is being redesigned, as they have taken over higher positions with greater responsibilities and they also gained more confidence, even amidst of gender bias. The old patriarchal structure of male domination, according to Winkler and Medeiros (2011), is still found in society, even if in a more discreet manner. Even so, 65% of the women interviewed believe that there is no greater difficulty to be an entrepreneur due to the issue of being a man or a woman.

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Mapping of the environmental behavior of the academic community of PUCRS

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The universities are an important place for knowledge production and they must to be aware to their socio-environmental responsibilities in order to minimize environment impacts resulting from their activities. In this field, they appear as the drivers of changes and undertake an essential responsibility in preparing the future generations for a more sustainable future. In Brazil, these Institutions are gradually introducing the socio-environmental dimension in their activities, seeking to be guided by the principles of sustainability. They are being challenged to discuss and rethink their impacts as an educational space, with regard to the commitment to the environmental responsibility (WACHHOLZ, 2017). This research aims at mapping and analyzing which are the pro-environment behaviors of the academic community of *Pontifical Catholic University of Rio Grande do Sul* (PUCRS) and, from theses dada get subsidies to begin the construction of an Environmental Management Plan of the University. PUCRS is a University with more than 40 years and its current academic community is about 25 thousand people, and, therefore, it has a relevant role in building a more sustainable society. The methodology applied is a questionnaire based on environmental psychology studies (PALAVENCINOS et al, 2014). It has sixty objectives questions about the socio-environmental behavior of PUCRS students in and out of the campus, their involvement with general local and global environmental issues and the spirituality view of the participants. The data that were stratified are being analyzed from the social, economic and environmental profile mapping. Although the research is still ongoing, the results already obtained indicate a general environmental concern of the participants (at home, in the neighborhood, in the city) and in the daily attitudes of the students. The concerns are as for the choice of the means of transport to the university, the waste separation at the campus and the lightening of the environments, the choice of subjects that involve the theme of sustainability in their courses. The students also show that they are attentive to the involvement of their courses and the university with environment issues. These results are proving to be very significant and we believe that it will strengthen the insertion of the environmental education as a cross-cutting theme and reinforce the importance of creating an Environmental Management Plan for a more sustainable University, with a strong and applicable methodology in other Institutions.

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Female entrepreneurship: non-silent profile of maternal entrepreneurship

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The first business revolution with women participation, in the nineties, emerged with their executive positions in the job market. Women demonstrated competency to execute roles, until then, mainly executed by men. They left behind the house work to dedicate themselves to the professional career. The second revolution started with the insertion of women in entrepreneurship, creating their own business. Inside of the feminine entrepreneurship emerged a highlight movement: to undertake and be a mother at the same time. This study is based on maternal entrepreneurship in Porto Alegre and the metropolitan region, and the main objective is to describe the profile of this category of entrepreneurs. Interviews will be conducted with entrepreneurial mothers residing in Porto Alegre and the metropolitan region, in person and online, in events related to entrepreneurship, social media's discussion groups and women's associations. The interviews will have qualitative and quantitative data and it's objective is to map the profile of the entrepreneurial mother, their motivation to start their own business and the challenges they faced in the job Market. The interviews will be held during August and September 2017, tabulated and subsequently analyzed. For the theoretical basis of the article, entrepreneurship materials will be used altogether with data from Global Entrepreneurship Monitor, SEBRAE and UN Women, and other scientific articles related to women's entrepreneurship. The initial approach relates to entrepreneurship in the global and Brazilian context. In relation to female entrepreneurship, there is a reflection on the role of women in the modern society and the segment of the entrepreneurial mother, a non-silent profile of women that is revolutionizing the way of undertaking in the gaúcho Market.

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Projeto uso sustentável da energia

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The current preoccupation with the environment gained impetus in a time when the technology despite being responsible for the increase in energy demand, was able to disseminate widely the fineness of natural resources. Such prospecting has resulted in a global alert. Since then, the concept of sustainable development has been gradually broken. The emergence of new studies and ideas occur daily, as a consequence of a more apprehensive society look of this theme, which mainly comprises the future of the next generations. Sustainability actually means meeting the requirements not only of the present but also of the future, engaging in essential values to act in the development of society by the institutions. In order to maintain the commitment to tomorrow, rooted in the different cultures through education and encouragement of good, both individual and collective, being also socially responsible, environmentally correct and economically viable. In this context, the Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), created the interdisciplinary Project Uso Sustentável da Energia (USE). The Project aims to articulate actions and research related to the efficient use of energy and the fomentation its capture - leading, for example, energy and environmental studies, management evaluation systems and improvement plans. Thus, besides the potential to the accomplishment of technical analysis, its characteristic is its educational actions, which objectives are sensitized the largest number of people to the sustainable use of energy. Besides that, realizing directed actions to the academic community, campaigns are developed to offer a more critical thinking about the economics of natural resources at the Campus. These initiatives are guided by innovation and the promotion of knowledge, favoring the cultural development of the ideal of sustainability in the spheres of contemporary society. The awareness and the engagement of the public are of great significance to make PUCRS an environment of reference in sustainable education, and may even influence the reduction of the use of natural resources by the University. It is worth dismissing that the actions are developed by academics, to benefit the Institution itself in both economic and educational economic issues with a broad technical view on the subject. In this search for the knowledge and the innovation are encouraged and available for a possibility to the employees to create sustainability actions with the ability to use resources instead of great results.

Energetic and environmental aspects in the replacement of lightning technologies

Duarte, OFP[1]; Ortiz, AP; Siqueira, ACB; Baldasso, BV; Amado, CK; Braga, CA; Freitas, CO; Brancher, EF; Hopperdizel, KF; Costa, LGR; Carmo, MR; Salla, MB; Mattos, NP; Almeida, PF; Lantmann, RV; Canossa, RD; Silva, SS; Kunzler, SB; Machado, V

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The generation of electricity and the production of other energies are the most responsible for the environmental impacts. According to Intergovernmental Panel on Climate Change (IPCC, 2014)[1], its contribution reaches 34%. Of this portion, a great part is destined to illumination and, therefore, society has been looking forward to allying the concern with the environment to the energy saving in this usage. Historically, incandescent lamps were the first to propitiate the coming of artificial lighting. However, due to their high heat and low light emission, its application has been losing validity throughout the technology's evolution, being succeeded by fluorescent lamps. Nonetheless, these products contain mercury, which is highly polluting. The Departamento Municipal de Lixo Urbano (DMLU, 2017)[2] quote that "The quantity of mercury inside a fluorescent lamp is capable of contaminating about 20 thousands liters of water". Thus, such artefacts cannot be treated as common garbage; yet, only 6% receive the proper selection process in Brazil (Tocchetto, 2014)[3]. With the further improvements on illumination technology, the LED was born. These lamps are able to produce the same amount of luminosity with less consumption, causing energy saving and hence averting pollutants emissions from the means of generation. Furthermore, its heat dissipation is minimum, contributing for the retrenchment of the energy destined to air conditioning. Additionally, when comparing to the fluorescent, most of LED's components are recyclable and its lifespan is greater, shortening the material discarded. A study carried out by the Energy Efficiency Laboratory (LABEE) in a teather allowed a reduction of 91.872 kWh in consumption during 20 years. This quantity represents about 149 tons of CO_2 not emitted and 944 trees preserved, whose planting cost would be R$ 18.800,00. Considering this, the poster covers the illumination substitution impacts at several applications and uses LED as the major focus of the study, demonstrating when to replace the system and when not to, maintaining the emphasis on the appropriate discard of the other technologies. Thusly, the aim is to sensitize society about the usage and recycling of lighting equipment, raising awareness of its risks and benefits to help providing the knowledge necessary to minimize the impacts caused by energy generation.

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Measurements evaluation of thermal load reduction

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The United Nations (UN) Sustainable Development Goals (SDGs) are composed of 17 items. The 11th objective considers that cities and communities should have as their goals: increase urbanization and inclusive and sustainable interaction; choose alternatives that minimize the temperature change and reduce it internally, such as the insertion of double-glazing. In this context, a real-scale experimental analysis was carried out in the Building 1 of Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS). Considering this, the contribution of the implementation of this technology by the reduction of inside temperature, seeking to identify and characterize the influence of this as to thermal comfort. In order to accomplish this study, the USE Project (Uso Sustentável da Energia) of PUCRS, carried out the application of a methodology for determination of thermal load and which parameters can be modified to increase the overall energy efficiency of the system. Among the considered precept, the factors that contribute to the establishment of thermal load are windows, ceiling, floor, walls, people and equipment's. In the next step, analyzing the data, it was found that in the prior period to the implementation of the technology, the contribution of the components to the thermal load with single glazing represented 9.213,5 (BTU/h), on the day of measurement. In the later period, where double glazed windows were used, the contribution of the components to the thermal load was 6.533,4 (BTU/h), on the day of measurement. The data were evaluated and the double glass window allowed the mitigation of the thermal load by 29%, due to the reduction of the global coefficient of heat transmission and the solar factor. In this way, the new technology was able to isolate the thermal load from radiation, conduction and convection. Prior to the application, the global heat transmission coefficient represented 5.7 (kcal/h. m².°C) and the solar factor resulted in 90%. With the use of double glazing, the new values are 0.73 (kcal/h. m², °C) and 20%. It was concluded that the studied technology offers a number of benefits and can be seen as a good solution for the energy usage. The study was positive regarding the stability of the internal temperature of the buildings, also, a protection method of the building against external climatic factors[1]. In addition, it acts in the reduction of the thermal exchanges between the outdoor and the indoor.

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Social and environmental responsibility in civil construction in Brazil: practices and impacts of large infrastructure projects

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Infrastructure works are important for the economic development of the country, are characterized by their size, purpose and consequent impacts, positive or negative. In recent decades, the construction of the Rio-Niterói Bridge, the Itaipu Hydroelectric Power Plant, the São Francisco River Transposition Canal, the Coari-Manaus Gas Pipeline, the Black River Bridge, the Santo Antônio and Jirau Hydroelectric Power Plant, The Belo Monte Hydroelectric Plant, Transnordestina Railway, Açu Port, Itaguaí Port, among others, confirm the expansion of the national sector. All constructions were licensed and all significant impacts were diagnosed, described and evaluated in the EIA / RIMA of the projects. For each impact, one or more prevention, control and mitigation measures were defined that during the execution were monitored by the Environmental Agency and the Ministry Public. It was used the Descriptive Research method because it describes the characteristics of a given population (GIL, 2008), with parts of Applied Research because it intends to generate knowledge for practical application directed to the solution of specific problems involving local truths and interests (GERHARDT and SILVEIRA, 2009). The definitions of environmental impact of CONAMA Resolution no. 01/86 (BRAZIL, 1986) and the social impact of the International Association for Impact Assessment (IAIA, 2003). The results of the research have shown that environmental impacts include altering the natural ecosystem, changing the landscape, scaring wildlife, removing native vegetation, increasing vehicle circulation and heavy machinery, emitting particulate matter, soil degradation, deterioration of quality air and water generation, generation of waste and effluents, alteration of sound pressure levels, increase of fauna disturbance factors. Social impacts mainly involve prostitution, sexual exploitation of children and adolescents, drugs, alcoholism and epidemics. Prostitution is a serious problem because of the consequences of transmitting sexually transmitted diseases (STD / AIDS) and high rates of adolescent pregnancy. The further away from urban areas, the more deprived of financial resources and the higher illiteracy rates in neighboring communities, higher are the occurrences of prostitution practices associated with the construction, with prices of pre-defined sexual programs varying from U$ 2.00 to U$ 10.00 (two to ten dollars). It is concluded that compliance with environmental compensation actions, when applied, benefits the community and reduces impacts, however, as there are not always professionals specialized in social issues in the construction team, partnerships with municipalities, educational institutions and research, epidemiological and sanitary surveillance, facilitate the implementation of these actions.

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Efficient measures for a historic future

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In recent years, energy efficiency and thermal comfort in historic buildings have become topics of high interest among scholars. The adaptation of buildings to current standards of energy efficiency and thermal comfort is essential to improve sustainability and energy performance and to maintain the built heritage of historic structures. This work aims to present some proposals, measures, that can be taken to improve energy efficiency in historical buildings. The objective of this study is to study the Gama D'eça Educational Museum and Victor Bersani, Federal University of Santa Maria. We know that the adaptation of historic buildings, considered as patrimony, are laborious and arduous, but not impossible and indispensable for an adequate urban growth and respectful of its history. The objective is to demonstrate the feasibility of maintaining the heritage values constructed of historical buildings, while at the same time achieving significant improvements in its energy efficiency and thermal comfort.

I teach, but do I put it to use?

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It is not uncommon to discuss about the importance of sustainable development nowadays. In the academic world, Brazilian universities are increasingly addressing sustainability in their classes' topics. Thus, more than teaching, it is up to universities to set an example by implementing actions which promote sustainable development. However, with that, emerges the doubt: What is real applicability of these sustainable principles in their other activities and not only as didactic content? Thus, the analysis of the management and disposal of durable goods on its post-consumption phase in Federal Institutes of Higher Education (IFES) from the point of view of sustainability was conducted. By means of a qualitative exploratory study, based on semi-structured interviews and on-site study, information about the flow process of disposal of such goods was gathered, limiting the range of search for Federal Institutes of Higher Education of the state of Rio Grande do Sul (IFES/RS). As of the mapping of the processes adopted by the IFES/RS, these were evaluated through the Pressure – State – Impact – Response (PSIR) model. Considering the favorable and unfavorable aspects of sustainability, it was noticed a great divergence between the levels of sustainability existing in the process of disposal adopted by each IFES/RS. Although they must legally comply the same rules of procedure, in practice constitute different forms of applicability and effectiveness. As a main result, it was found that the IFES/RS still face difficulties to structure a systemic process for disposing assets; Comparatively, it was verified that the IFES whose process covers more sustainable procedures, meets 80% of the analyzed variables, while the IFES with the smallest indicator has only 20% of the variables of procedure favorable to sustainability; This shows that some cases only present palliative solutions, with difficulty to incorporate the basic principles of sustainable development into the process. Thus, it can be seen that the IFES still have difficulties in applying the necessary procedures to sustainable development in their activities, since the more sustainable the process, the more complex its constitution and execution becomes.

Sustainability and social housing: integration of potential of innovative technology in the development of housing projects – container architecture

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The construction industry, as one of the largest waste generators, energy demandand consumer of natural resources, needs an important focus on its development in relation to sustainability. The project concept, constructive quality, and therefore sustainability associated with the housing production chain are fundamental aspects for our quality of life and reduction of environmental impact. In addition, the construction sector presents a great potential for mitigation of several unsustainable factors that could affect projects in the area of social housing, an area of great relevance mainly in a context that presents an expressive housing deficit in Brazil. Based on this perspective, the objective of this researchproject is to analyze and verify the feasibility and reuse potential of discarded containers for the production of social housing – with the aim of contributing to the recycling of materials, optimization of the constructionprocess, time of execution, quality and reduction of the cost of work. The research method that guides the project is the case study and from theoretical activities, study and research practices where the following specific objectives of the research were achieved: a) bibliographic review b) elaboration of a matrix of construction materials enabling various sealing systems; C) thermal analysis of the proposed construction systems according to standards NBR 15575 and 15220; and d) modulation proposals for housing in containers, appropriated according to standards NBR 9050, NBR 15575 and projects promoted by the Federal Government Program My Home, My Life (PMCMV). The partial results indicate that the developed matrix – materials and construction systems of facade, development of four layouts according to PMCMV guidelines, with four different typologies, as well as the adequacy of the dwellings to the standards of performance –that converges to the potential of container integration in social housing. The application of the container proves viable in proposals of interventions characterized by environmental risks and in the production of pass houses passing dwellings. Thus, it can be confirmed that the construction of buildings with modular systematization in containers presents qualitative and quantitative potential, resulting in quality control, waste reduction and efficiency in the production of the construction system, demonstrating itself as a technology with potential to be explored in sustainable housing production.

Sustainability in architecture and urbanism: projects promoted by the Federal Government Program My Home, My Life (MCMV)

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The integration of more sustainable strategies in the architectural and urban project has been receiving increased attention in discussion topics, be they of local, regional, national or global scope. Formulating more sustainable proposals demands an interdisciplinary effort involving the civil society, public management, the academy, professionals in the field, and the civil construction industry, among other actors, in order to contribute towards the mitigation of negative environmental, social and economic impacts and results of projects on the urban space and built environment. Recent studies undertaken by the National Secretariat for Housing of the Ministry of Cities on the field of Affordable Housing estimate that the demographic growth rate and the economic trajectory of Brazil demand an average yearly production of 1.520 million new housing units in the years ranging from 2012 to 2023, amounting to 24 million units. According to the Brazilian Institute of Geography and Statistics (IBGE), the housing deficit in Brazil reached 5.8 million units in 2010, which represents 10.1% of the households in the country, highlighting an extensive demand for new housing until 2023. Lately, we have been witness to the relevant role of the civil construction industry in economic development, job creation and construction of the urban space. The production of the civil construction sector is stimulated through Federal Government's public policies, such Program My Home, My Life (MCMV). Between 2009 and 2012, PMCMV contracted the construction of 1,728,555 housing units out of a production goal of 3 million units up to 2014. The production of Affordable Housing must be understood as part of a cities' configuration and not as an isolated element. The project should consider the urban, architectural, technological, social, economic and environmental dimensions of the targeted area and public. It is through the understanding of these dimensions that some relevant urbanistic and architectural aspects can be highlighted: the housing unit – architectural projects which provide comfort to the end-user (thermic, acoustic, and spatial), energy performance (energy efficiency), and typologies which are adequate to local realities; the enterprise – prevision of different uses, provision of service to different social ranks, urban design and road layout integrating green and leisure areas, density and volumetrics befitting the area of intervention; and the relation between the enterprise and the city – integration to the urban fabric, access to services and social facilities, and decreased need for mobility. The research area and developed projects have as their goal to contribute to the advancement of the knowledge on Affordable Housing and Building Performance, supporting the public offices and areas of the applied and social sciences which investigate and seek the formulation of more sustainable proposals for the production of the urban and architectural space. The relevance of the research area is validated by the increased demand for new housing and the extensive production of deficient or low-quality affordable housing complexes. Studies point out that a large amount of the Affordable Housing projects developed and produced by both private and public sectors fail to consider more sustainable strategies and require further evaluation and improvement in order to reach a higher standard of quality. Starting from this reality, some aspects inherent to the architectural and urban project will be highlighted so as to contribute to the reflection about and research of the potential for improvement on Affordable Housing: the project usually presents typologies, materials and technologies which are not appropriate to the local physical, climatic, and geographical characteristics of the area of intervention, resulting in negative effects on project performance; the project is characterized by a morphology which doesn't acknowledge the targeted public's specific traits in what concerns social and cultural aspects, design, landscaping, infrastructure, and is often disconnected to the city. The methodological procedure adopted involves both practical and theoretical activities, with the participation of the targeted social group as well as governmental and nongovernmental organizations, among other actors, bringing together the academy, researchers, students, and the society. The research is performed in laboratories counting with the participation of an interdisciplinary team of professors, researchers and students of the Faculty of Engineering (FENG), of the Research Faculty of Architecture and Urbanism (FAU) of Pontifical Catholic University of Rio Grande do Sul (PUCRS) and of Group of Research Sustainability and Energy Efficiency in Architecture registered by National Council for Scientific and Technological Development (CNPq).

Session 11A. Public Health I: Translational Medicine

Convener:

Prof. Dr. Fernanda Bueno Morrone, Faculdade de Farmácia (PUCRS)

A major challenge in modern medicine is bringing latest results from basic research to clinical application, meaning crossing the valley of death between basic science and the patient. Academia is the place to do that as both all disciplines are located there and should be linked together much stronger and even institutionalized. The session will focus on examples which worked out and give case studies, how to become more translational. There is a strong need to improve as currently results from basic science are translated too much slowly in clinical application and daily practice.

Keynote Lecture:

Prof. Dr. Lars Zender, Director Medical Clinic VIII, University Hospital Tübingen

Prof. Dr. Ghazaleh Tabatabai, Department of Neurooncology, University Hospital Tübingen

Oral presentations

Session 11A

Effect of ATP and P2X7 receptor on gliomas progression

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Gliomas are the most common malignant brain tumors in adults, and are highly lethal and aggressive. Despite recent advances in current therapies, which include the combination of surgery and radio/chemotherapy, the average survival rate remains poor. The purinergic signaling consists of nucleotides and nucleosides, purinergic receptors and ectonucleotidases. In fact, adenosine triphosphate (ATP) acts as a trophic factor, and it is the main source of adenosine. The P2X7R is a cation channel and, when activated by high concentrations of ATP for a long period, can be converted to a large nonselective transmembrane pore, which causes cell death. Since the purinergic system has been implicated in the pathogenesis of several cancers, we investigated the effect of ATP-P2X7R activation on gliomas growth. Firstly, we implanted C6 rat glioma cells, that have a low expression of NTPDases, in the rats and co-injected with an enzyme that hydrolises ATP (apyrase). Gliomas co-injected with apyrase had a significant reduction in the tumor size when compared with the rats injected only with gliomas. Previous studies have demonstrated that tumor cells that respond to ATP-P2X7R citotoxicity express more P2X7R when compared to a less sensitive subpopulation. Therefore, we investigated the importance of ATP-P2X7R in the response to radiotherapy in a mouse glioma model and using human samples. The human glioma cells U-138 MG and U-251 MG were resistant to death when treated with P2X7R agonists (ATP or BzATP), but the radiosensitive M059J glioma cells displayed a significant decrease of cell viability. Furthermore, the selective P2X7R antagonist A740003 significantly decreased the cell death caused by ATP-P2X7R activation or irradiation (2 Gy). Interestingly, the M059J P2X7R KD cells presented a decrease in annexin V incorporation after radiotherapy, showing that ATP-P2RX7 is an important pathway to the radiotherapy success. Using human samples, we also showed that high P2X7R expression is a good prognostic factor for glioma radiosensitivity and survival probability in humans. In addition, we evaluated the hydrolysis of adenine nucleotides in the blood serum of brain tumor patients. Preliminary data showed that AMPase (5'-NT) activity was significantly increased in high-grade gliomas. These results indicate that 5'-NT/CD73 activity may be useful for monitoring patients with high-grade brain tumors.

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Functional genetic screening and academic drug discovery to improve treatment of patients with liver disease

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Liver disease is the only major cause of death still increasing year-on-year and currently twice as many people die from liver disease in industrialized countries as in 1991. Moreover, it is predicted that liver disease will continue to rise and double within the next 20 years, resulting in a situation where about 1% of people in all populations will suffer from liver cirrhosis (chronic liver failure). Despite the fact that the eradication of hepatitis C virus infection now seems a reachable goal, there will be an increase in liver disease due to the rapid increase of non alcoholic fatty liver disease (NAFLD), which e.g. affects 20% of all Americans and often progresses into non-alcoholic steato-hepatitis (NASH), the most severe form of non-alcoholic fatty liver disease . The pathogenesis of the various types of chronic liver diseases is complex and multifactorial, but a common feature are repetitive waves of hepatocyte death and compensatory regeneration, which finally leads to an exhaustion of the regenerative capacity of the liver, the development of liver cirrhosis and liver failure. Liver cirrhosis represents the most important risk factors for the development of liver cancer (hepatocellular carcinoma, HCC), a highly aggressive cancer which constitutes the second most common cause of cancer death worldwide. Non cancerous (acute and chronic liver failure/liver cirrhosis) and cancerous liver disease have in common that treatment options for patients are sparse. Acute and chronic liver failure can be treated by liver transplantation, however, the number of donor organs is limited and more than 1.5 million people worldwide are dying of liver failure each year. Liver carcinomas show intrinsic resistance to cytotoxics, and although the multikinase inhibitor sorafenib is available as the only systemic treatment for patients with advanced HCC, the survival advantage conferred to these patients from sorafenib therapy averages only 2.8 months. In my talk I will give examples how innovative mouse models of liver disease and cancer can be combined with stable in vivo RNAi or Crispr/Cas9 screening technology to identify new therapeutic targets for the treatment of liver failure and liver cancer. I will discuss the pivotal role of academic drug discovery infrastructures for rapidly translating validated therapeutic target structures into clinical applications and will give an example of a novel and promising drug for the treatment of liver cancer which entered the phase of clinical testing in less than two years after completion of preclinical testing.

Personalizing treatment strategies in Neuro-oncology

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Novel anti-glioma strategies are urgently needed for improving the prognosis and overall survival of glioblastoma patients. In this regard, novel strategies and synergistic combination of available therapies are currently under consideration. Oncolytic virotherapy might be a promising treatment option in this regard. Yet, the systemic application of oncolytic viruses is often not effective. Open questions include (i) how to deliver the virus and more importantly, (ii) how to combine this with currently available standard treatment options. Based on our previous work we have used peripherally mobilized hematopoietic progenitor cells as cargoing vehicles to deliver oncolytic measles virus (MeV) to experimental LNZ308 glioma in vivo. We investigated potential treatment combination strategies with radiation and alkylating chemotherapy in vitro and in silico. We will present and discuss our results of this ongoing work.

More health program: integrating research and extension: interventions in hypertension, diabetes and cancer

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The Federal University of Ouro Preto (UFOP) 's More Health program was founded in 2005 and is aimed at improving the quality of life of federal employees of UFOP Campi (Ouro Preto, Mariana and João Monlevade, MG). The program team is made up of health professionals from the areas of: work medicine, cardiology, geriatrics, gynecology, endocrinology, nursing, dentistry, clinical and sports nutrition, clinical pharmacy, psychology, social work, phytotherapy and homeopathy. These services offer individualized care: health / quality of life and improvement of working conditions. Among the daily challenges of academic life are correlating clinical research in primary care and extension activities that aim to promote quality of life. It is highlighted that the most prevalent causes of illness of the federal servers are hypertension, diabetes and cancer. In basic care, preventive actions are the tool for interventions, diagnosis and differentiated clinical care. The multi professional team supports numerous biases for the host and increased adherence to therapy. The treatment options offered are nonpharmacological and pharmacological according to the clinical picture of each employee. The program has the participation of 1200 servers that periodically evaluate the functionality of the individualized service. The actions are itinerant where the professionals go to the sectors/ departments of work of the employees for the host, preventive diagnosis and basic data acquisition. In the service, a questionnaire-survey (snow-ball type) is carried out, with a study of the patient's clinical history, a family and functional history survey for therapeutic counseling in the clinics (CAAE- 0023.0.238.000-08). As a result of differentiated care, there is greater adherence to pharmacological treatment and health interventions that provide clinical follow-up. It is emphasized that in understanding the challenges imposed by comorbidity, the patient/ server becomes manager of its clinical follow-up, becoming an information multiplier agent, which increases the effectiveness of the program. Among the actions with the greatest impact is the "Solidarity Wire" campaign, thought of alluding to October Rosa and focused on prevention, diagnosis and follow-up of patients with breast cancer (frequent cause of withdrawal from UFOP employees) With full adherence of the academic community (in force for the fourth consecutive year). Another relevant aspect is what concerns "health fads", such as popular recipes for weight loss, hypertension and diabetes that become the subject of clinical research studies by the faculty of the University whose results are presented to the university community in the form of workshops or informative lectures. The program allows to combine technical knowledge, innovations with popular information, demystifying and allying sciences. Acknowledgment: CNPq, CAPES, FAPEMIG, FUNARBE.

Session 11B. Public Health II: Academic Expertise in Drug Development

Conveners:

Dr. Otávio Sarmento Pieri, Instituto Oswaldo Cruz (FIOCRUZ)
Prof. Dr. Stefan Laufer, Director Baden-Württembergisches Brasilien-Zentrum, Dept. of Pharmacy and Biochemistry, University of Tübingen

Academia is playing an increasing role in pharmaceutical drug discovery. More than 60% of new molecules entering clinical development stages (phase 1) are currently no longer originated by inhouse research of big pharma. Both Brazilian and German academic consortia are playing substantial roles in this field. Examples are e.g. INCT-Inofar for new drugs in Brazil or ICEPHA and TüCADD in Germany, both working on sustainable sources and pipelines to foster academic drug discovery. Academic expertise is also of crucial importance in public-private partnerships (PPPs) for the development of new drugs or new drug formulations aiming, for instance, to end the neglected tropical diseases by 2030 (SDG 3.3).

Keynote Lecture:

Prof. Dr. Eliezer Barreiro, Instituto de Ciências Biomédicas, LassBio (UFRJ)
Prof. Dr. Stela Maris Kuze Rates, Faculdade de Farmácia (UFRGS) e Instituto Nacional de Ciência e Tecnologia Translacional em Medicina

Oral presentations

Session 11B

Developing a child-appropriate medicine for treating schistosomiasis: “leaving no one behind” under the Sustained Development Goals (SDG)

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One of the SDGs (target 3.3) is to end the epidemic of neglected tropical diseases (NTDs) by 2030. Schistosomiasis, a major source of illness among NTDs, is caused by trematode worms that infect people living in poor communities without safe water supply and proper environmental sanitation. Control strategies are mainly based on regular treatment of infection carriers and high-risk groups with praziquantel (PZQ). The World Health Organization (WHO) estimated in 2015 that 218 million people required PZQ treatment annually, 54% of which school-aged children (SAC). Children are particularly vulnerable to infection due to their frequent contact with contaminated water bodies. However, there is no child-appropriate PZQ formulation available for use in control programs. Thus, the Pediatric Praziquantel (PEDPZQ) Consortium, a public-private partnership, was established in 2012 under the leadership of Merck KGaA (Darmstadt, Germany) aiming to develop, register and provide access to a suitable pediatric praziquantel formulation for treating schistosomiasis among preschool-age children. The Consortium has benefited from various areas of expertise, including academic, towards the development of small, orally dispersible tablets (ODTs) with an acceptable taste, for use under the conditions faced by control programs. In Brazil, the Institute of Drug Technology (Farmanguinhos) of Fiocruz will provide expertise in the production and distribution of the new formulation. A phase-III clinical trial is planned for 2018; if successful, it is hoped to have the product available by 2020. A pediatric praziquantel formulation will contribute to the global pledge of “leaving no one behind” by addressing SDG 3: ‘to ensure healthy lives and promote wellbeing for all at all ages’. However, it must be stressed that elimination of schistosomiasis and other poverty-related diseases will only be accomplished if preventive measures such as safe-water supply (SDG 6.1) and adequate sanitation and hygiene (SDG 6.2) are properly addressed.

Tübingen Center for Academic Drug Discovery TüCAD2

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Our research in RNAi- and Crispr/Cas9 based functional genomics especially focuses on the identification of new cancer genes and therapeutic targets in therapy-resistant solid tumors. For such studies, clinically relevant mouse tumor models, which closely resemble the human disease, were are available. Specifically, we are combining so called mosaic mouse models with stable RNAi technology to dissect tumor suppressor networks in gastrointestinal tumors and to identify and validate new therapeutic target genes. Together with a limited number of other laboratories worldwide, we have the expertise to conduct RNAi screens for new cancer genes directly in orthotopic and immunocompetent cancer mouse models in vivo. To best translate data from our unique RNAi platform into new cancer therapies, we recently systematically connected our RNAi expertise with the research areas virtual screening/modelling and medicinal chemistry to build an academic drug discovery unit, designated TuCAD2 (Tübingen Centre for Academic Drug Discovery). Our unit was recently approved as a member of the worldwide acting Academic Drug Discovery Consortium (ADDC, http://addconsortium.org/drug-discovery-factsheet.php?ddc_id=DC1000196). TuCAD2 represents an interfaculty and interdisciplinary endeavor and was founded by the Dept. of Pharmaceutical/Medicinal Chemistry (Stefan Laufer) and the Dept. of Internal Medicine VIII (Lars Zender). In our talk we will discuss the pivotal role of academic drug discovery infrastructures for rapidly translating validated therapeutic target structures into clinical applications and will give an example of a novel and promising drug for the treatment of liver cancer which entered the phase of clinical testing only 13 month after completion of pivotal preclinical proof of concept.

INCT-INOFAR: a Brazilian Network to Drug Drug Discovery and Development

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In 2008, the Brazilian government issued public notice with a goal of recruiting scientists to work in networks, in research areas strategic to the sustainable development of the country. At the time, an important number of active scientists in drug discovery process, accepted the challenge of the National Institutes of Science and Technology in Drugs and Medicines (INCT-INOFAR). The INCT-INOFAR is a research network that brings together renowned scientists of different research institutes and Universities in Brazil. Its missions are to act in the process of drug discovery and in the search for new synthetic routes for generic drugs. In addition to these research goals, INCT-INOFAR aiming to contribute for professional graduate and undergraduate training in Medicinal Chemistry and Pharmacology, central disciplines pharmaceutical innovation. This presentation will concern with the main INCT-INOFAR results performed in the drug discovery process.

N-phenylpiperazine derivatives as prototypes for developing drugs for treating cognitive deficits found in schizophrenia and other central nervous system disorders

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Aiming at developing new drugs to treat positive and cognitive symptoms of schizophrenia our group has been working on the design and synthesis of new *N*-phenylpiperazine derivatives. Among them we highlight LASSBio-579 (1-[1-(4-chlorophenyl)-1*H*-4-pyrazolylmethyl]-4-phenylhexahydropyperazine) and LASSBio-1422. LASSBio-579 was designed by molecular hybridization between the prototypes clozapine and L-741, a D_2 antagonist ligand. In vitro assays indicated that LASSBio-579 could act as an agonist at pre-synaptic dopamine D_2-like receptors and binds to D_2-*like*, D_4 and 5-HT_{1A} receptors. In vivo studies have shown that LASSBio-579 acts on dopaminergic and serotonergic neurotransmission and is effective in rodent models of schizophrenia positive and cognitive symptoms, but also induces sedative extrapyramidal symptoms. By functionalization of the lead compound LASSBio-579 we obtained LASSBio-1422 in order to promote a dissymmetric ortho-effect on the *N*-phenylpiperazine side chain that could adopt a more fixed conformation and, as consequence, present a differentiated molecular recognition profile by the target receptors. LASSBio-1422 was effective by oral route in different rodent models predictive of efficacy in the treatment of schizophrenia positive and cognitive symptoms, without inducing sedation and extrapyramidal symptoms. Furthermore, LASSBio-1422 was also effective in preventing memory deficits induced by ketamine in the novel object recognition task, a rodent model of visual learning and memory. Noteworthy, LASSBio-1422 has a binding profile different from LASSBio-579 and the known atypical antipsychotic drugs. It does not bind to AMPA, Kainate, NMDA, glicine and $mGluR_2$, receptors, which are seen as possible targets for antipsychotic action. Indeed, LASSBio-1422 has affinity for D_4 and, to a lesser extent, for 5-HT_{1A} receptors, considered important for the activity of some atypical antipsychotics such as aripiprazole. The beneficial effects of these *N*-phenyl derivatives on cognition encourage further studies using this molecular scaffold for treating attention and cognition disorders. The investigation of other neurochemical targets as well as the effects of these compounds in animal models of negative symptoms of schizophrenia should further substantiate the usefulness of this molecular scaffold in the search for new antipsychotic drugs. In addition, our results reinforce other studies demonstrating that dopamine D_4 receptor antagonists are effective in animal models of schizophrenia cognitive symptoms. All of these studies were supported by INCT-INOFAR and developed in partnership with UFRJ research groups, led by Professors Eliezer Barreiro, Carlos Alberto Manssour Fraga and François Germain Nöel.

Urca and the bioprospection of new drugs within the Araripe Geopark

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Natural products are historically known to be the first source of disease fighting agents. The Araripe Plateau, located in the semi-arid region of northeastern Brazil, state of Ceará, has a remarkable biological diversity, which gives rise to a wealth of molecular substances. Scientific international interest on this region dates back to early 1800's, as can be inferred from the expedition of naturalists Spix and Martius (von Spix, 1823). Nowadays this is a unique region, for it comprises a set of protected areas, namely: Araripe National Forest (FLONA), Araripe's Plateau Environment Protection Area (APA Araripe), Sítio Fundão state park, and Calderião historical park. All this, together with the abundance of fossils and different geological formations, lead the UNESCO to acknowledge the Araripe Geopark as a member of the Global Network of National Geoparks. At the bottom of the plateau lies Universidade Regional do Cariri (URCA), which contributes to enhance the knowledge of local diversity in a number of ways, specially by means of its graduate research programs in Molecular Bioprospection and in Biological Chemistry. Research activities are developed by various laboratories, covering a wide range of drugs prospection pipeline, i.e.: extraction, isolation/purification, structural characterization, microbiological/*in vivo* and *in vitro* tests. These laboratories include: Natural Products Research; Microbiology and Molecular Biology; Pharmacology; Molecular Simulations and Spectroscopy; Physiology; Zoology; and Herpetology (Cunha et al., 2016; Costa et al., 2017; Bernardino et al., 2017). In addition, an herbarium and a biotery are also available. Together with universities from neighboring states, namely UFRPE and UEPB, URCA comprises the excellence center of Etnobiology, Bioprospection and Nature Conservation, a National Institute of Science and Technology (INCT), taking drugs bioprospection from natural products to a new level.

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Challenges and opportunities in the design of novel protein kinase inhibitors as antitumor drug candidates

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Cancer is the second leading cause of death worldwide, accounting for 8.8 million death in 2015[1]. Protein kinases catalyze the phosphorylation of substrates, mediating a range of cellular signal transductions and playing a key role in the regulation of several processes related to cancer progression, including cell proliferation, differentiation and survival. For that reason, protein kinases are direct correlated to cancer pathogenesis[2]. The approval of the first small-molecule protein kinase inhibitor (Imatinib, Gleevec®, Novartis) in 2001 for treatment of chronic myeloid leukemia (CML) has established a new era in cancer therapy. Since then, a large number of kinase inhibitors designed as antitumor drug candidates have been reported. There are currently more than 30 small molecules acting as kinase inhibitors on the pharmaceutical market, and the great majority is approved for cancer treatment[2,3]. Besides the great success of this approach, several challenges have also emerged during the last decades[2,3,4]. Most known small-molecule kinase inhibitors are recognized by the ATP binding site of the target protein. Since this region is highly conserved among the human kinome, inhibitors tend to present a promiscuous inhibitory profile, lacking selectivity[3,5]. This poor selectivity is usually associated with stronger side effects, but, on the other hand, the clinical efficacy of some inhibitors is related to their multi-target action[5]. Regarding the establishment of primary or secondary resistance to the available drugs, it is commonly driven by compensatory mechanisms or by mutation of the target kinase, resulting in a reduction of the affinity to its inhibitors[6]. These drawbacks encourage the search for novel and more effective drugs. In this context, our research team in LASSBio® has dedicated efforts to the identification and development of new protein kinase inhibitors as antitumor drug candidates, aiming to contribute to the progress in this field, as illustrated by several scientific publications and patent applicantions[7,8,9].

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Metabolism studies in drug discovery and development process

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Metabolism study is an essential step during the processes of drug discovery and development. It can be carried out employing *in silico*, *in vitro* or *in vivo* methodologies. Hepatic microsomes from different species are one of the most popular *in vitro* approaches to study drug metabolism. From this approach the stability and the half-life of hits, leads and drug candidates can be determined, and their oxidative metabolites can be identified and characterized. In this work, we will discuss the vitro microsomal hepatic metabolism of new prototypes that have been previously described as anti-asthmatic and anti-diabetes lead-candidates. CYP isoenzymes and their major oxidative metabolites will be also discussed.

Poster presentations

Session 11B

Can a multimodal physical activity intervention modulate brain-derived neurotrophic factor levels and improve cognition in older women? An exploratory study.

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The global population is aging and the increase in longevity is associated with an increase of older individuals with cognitive impairment. Considering the devastating effects of cognitive decline on life quality and general health, the establishment of appropriate interventions to prevent, rehabilitate and/or manage these age related dysfunctions are important goals for public health. Physical activity has been proposed as a promising intervention to improve cognition and decrease the risk of dementia in older adults. Brain-derived neurotrophic factor (BDNF) appears to mediate, at least partially, these effects of exercise. However, intervention studies of the effects of multimodal exercises on cognition and BDNF levels are scarce and composed by small samples. In order to contribute to the knowledge on the field, the present study evaluated the effects of a physical activity intervention composed by muscle strengthening and aerobic conditioning on BDNF levels and cognition in older women. Independent and non-demented subjects (n= 32, ≥ 75 years) were assigned to a threemonth physical activity intervention (60 min exercise sessions three times a week) or to a control condition (no exercise). Clinical (anxiety and depression symptoms), neuropsychological (attention, processing speed, working memory, declarative memory, inhibitory control capacity), physical (upper and lower limb strength, aerobic conditioning) and physiological (serum BDNF) parameters were evaluated immediately before, one and three-months after starting intervention. Results indicated that the intervention group improved on physical fitness, depressive symptoms, cognitive performance and BDNF levels. Moreover, aerobic conditioning and BDNF levels showed a significant positive association. In conclusion, our results give support to former studies that showed the positive effects of multimodal exercises on BDNF levels and cognition. Moreover, our study reinforces the notion that multimodal exercises are promising, low-cost, and low-risk interventions able to simultaneously improve physical fitness and mental health.

Hovenia dulcis Thunberg compounds: the role in *diabetes mellitus* by system-biology approach

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The natural compounds and their derivatives have historically been important as a source of therapeutics agents for the treatment of human diseases since the dawn of medicine. *Hovenia dulcis* Thunberg (Rhamnaceae) have been widely used as a natural health product and functional food in East Asia. Quercetin, a flavonoid present in *H. dulcis,* was able to normalize glycemic levels, to increase hepatic glycogen significantly in rats with diabetes induced by alloxan (1). Moreover, quercetin is known to suppress macrophage-secreted *TNF-α* but also to reduce levels of pro-inflammatory cytokines and chemokines such as *IL-8* and *IL-6* in *in vitro* experiments (2). Some studies suggest that individuals who progress to type 2 diabetes display features of inflammation years before the disease onset where this inflammation has been proposed to be involved in the pathogenic processes causing type 2 diabetes (3). In this context, we used Systems Chemo-Biology tools to investigate how the *H. dulcis* flavonoids act on the glucose control and inflammatory process that are key mechanisms for the diabetes development. For this, we performed a systematic review of *H. dulcis* chemical compounds in the PubMed database. Proteins and chemical compounds subnetworks were created using mining tools STRING 10.0 and STITCH 5.0 and were merged using Cytoscape 3.4.0. The cluster analysis and assessment of bioprocesses were performed using Complex Molecular Detection (MCODE) and the Biological Network Gene Ontology (BiNGO) tools, respectively. The centralities analysis was performed using CentiScaPe plugin. A network containing 198 nodes and 1819 connectors were prospected. Of these nodes, 11 were *H. dulcis* chemical compounds and 187 were proteins present in *Homo sapiens*. The clustering analysis indicated 7 modules and gene ontology analysis showed bioprocesses as: MAPKKK cascade, I-kappa B kinase/ NF- kappa B cascade, regulation of transcription DNA dependent, regulation of gene-specific transcription, cellular response to insulin stimulus, glucose transport. The centrality results showed nodes hub-bottlenecks as, quercetin, *HDAC1*, *MAPK1* and *GSK3B*. Therefore, it seems *H. dulcis* flavonoids can have an epigenetic regulation role on *HDAC1*, which would result in a lower activity of *MAPK1*, *NF-kB* and *GSK3B*, generating a lower release of pro-inflammatory molecules such as *TNF-a*, *IL-1*, *IL-6*. In addition, *HDAC1* action could increase the glycogen synthesis by transcriptional repression of *GSK3B*.

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Role of food taboos in energy, macro and micronutrient intake of pregnant women in western Kenya

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The objective of this paper is to examine food taboos/habits and dietary patterns of pregnant women in Kenya. Two hundred and five individual 24-hr recall interviews were conducted face to face to collect information on pregnant women dietary intake. Women focus group discussions were conducted in seven villages in Kakamega County to determine which foods are avoided during pregnancy and the reasons for avoiding them. The concept of 'baby becoming big' was common advice to pregnant women to reduce intake of large amounts of starchy or high caloric foods. Restriction on the consumption of some parts of cow and chicken and consumption of eggs was widespread. Women with the highest education had significantly higher intake than women with lower education for; energy (1718 vs 1436 kcal, p=0.007), protein (45 vs 38 g, p=0.03), vitamin C (59 vs 39 mg, p=0.000), calcium (275 vs 222 mg, p=0.04) and iron (8.5 vs 7.2mg, p=0.03). Multivariate binary logistic regression showed, that participants with higher education were more likely to reach estimated average intake (EAR) for energy (OR = 2.82, 95% CI = 1.2-6.5) and vitamin C (OR = 4.14, 1.5-11.0) than women with lower education level. The observed link between reduced intake of nutrients and low education levels suggests that education is a possible intervention strategy. Incorporating nutrition education in school curriculum and improving knowledge on nutrition among women with low education may help overcome unhealthy food taboos in pregnant women.

Compound *HPHY* as a potent p38δ mapk inhibitor

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The mitogen-activated protein kinases (MAPKs) are a family of specific serine/threonine protein kinases that act by phosphorylation of target substrates. This family, including the extracellular signal-regulated kinases (ERKs), the c-Jun-N-terminal kinases (JNKs) and p38 isoforms, control important cellular functions, such as gene expression and apoptosis. MAPK pathways modulate the expression of matrix metalloproteases (MMPs), which are involved in several stages of tumor development, including growth, angiogenesis, invasion and metastasis[1,2]. Inhibition of the activity of p38α and p38δ decreases the expression of collagenases and consequently control malignant cell invasion. Moreover, p38δ activity is required for cell proliferation. However, p38δ is a relative novel target and for that reason, no specific inhibitors are currently identified[3]. The aim of this study is to evaluate the HPHY-induced p38δ inhibitory effect and its antitumorogenic activity. The p38δ inhibitory potency (IC_{50}) of HPHY was evaluated and compared with other known p38 inhibitors by ELISA assay. Also, the effect of HPHY on LPS-induced TNF-α release in human whole blood and isolated mononuclear cells (PBMC) was assessed by ELISA. Cytotoxicity of increasing concentrations of HPHY on PBMC was evaluated by trypan blue assay. A broader kinase selectivity profile of the compound was evaluated by measuring its inhibitory activity against a panel of 16 tumorigenic-involved kinases. HPHY potently inhibited p38δ kinase activity in a dose-dependent manner. In addition, it showed the highest activity against p38δ when compared with other p38 inhibitors. Given that p38 MAPK pathway is closely related to inflammatory and cell proliferation responses, we examined the inhibitory potency of HPHY in cell-based assays. HPHY caused a dose-dependent inhibition of TNF-α release from LPS-stimulated whole blood. No cytotoxic effects were observed on HPHY -treated PBMC. Then, in response to LPS stimulation, PBMC released significantly more TNF-α than control cells. However, when LPS-stimulated cells were pre-treated with HPHY, the cytokine stimulation was completely inhibited. The compound also inhibited the activity of members of TK family (SRC, 60% and IGF1-R, 54%). HPHY is a potent inhibitor of p38δ MAPK suggesting an action mechanism with selective potential and antitumor activity.

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Session 12. Environmental Law and Ethics

Conveners:
Prof. Dr. Ricardo Timm de Souza, Escola de Humanidades (PUCRS)
Prof. Dr. Thomas Potthast, International Centre for Ethics in the Sciences and Humanities (IZEW), University of Tübingen

The enforcement of sustainable development needs the conjugation of Law and Ethics. Laws are responsible to regulate the use and exploitations of natural resource, as well as to stimulate financial instruments like subsidies or market mechanisms. Environmental Law is a broad and interdisciplinary subject that involves human rights, climate change, energy production, air, water, soil, nature, animal rights, nature and landscape protection, conflict management and waste. Sustainable development through Law must naturally approach several of those subjects, conjugating them to find the best possible result to the modern issues. Ethics is intrinsic with the human behaviour and its content carry along the studies of moral and philosophy. The triumph of sustainable development politics depends on the capacity of human society and its leaders to convince the world that the change is urgent and that it need to be made with respect to the human morality and reason.

Oral presentations

Session 12

Sustainable development, moral pluralism, and interdisciplinary ethics – challenges for theory and practice

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30 years ago, the United Nations' Report "Our Common Future" coined the hitherto most widespread understanding of Sustainable Development (SD): "… *development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains two key concepts: the concept of "needs", in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs*." Very often, only the first sentence is quoted, hence ignoring both the decisive social justice orientation and the complex idea of societal relations with nature and innovation. The UN Sustainable Development Goals of 2015 might be still seen as a working agenda to what was set up already 1987. 30 years later SD its global and universal orientation is facing a polycentric world with plural values and increasing skepticism against science and technology. In that sense, und late modern or post-modern conditions, the grand challenges are met with both an ethical and epistemological paradox. 1) We live – at least we should from an enlightened perspective – beyond moral orthodoxy in a plurality of values and norms. 2) At the same time we live beyond scientific orthodoxy in the sense that we have to accept uncertainty, intrinsically limited predictability and objectivity – which is, to be sure, the contrary to alleged 'post-truth': Nevertheless there is a broad consensus on the following judgment about the state of global affairs: development in the past decades was and still is unsustainable! Following this, we have the agreement on the need to link natural scientific knowledge, economic and social robustness, and – mainly – justice in order to aim at more sustainability. We are asking for forms of sustainable transformation under conditions of cultural plurality, universal/global obligations and conditions of uncertainties: epistemic and moral. This paper shall provide some ideas on an ethical theory of SD and the way how interdisciplinary cooperation in research for SD could include natural and social and normative fields. An example case for a value sensitive plural account – including, e.g. non-western ideas of nature – in the context of policy oriented research is conceptual framework of the International Platform on Biodiversity and Ecosystem Services (IPBES). The ensuing challenges for biodiversity and SD will be critically discussed.

Resilience and sustainability – emerging principles of environmental law in the anthropocene epoch

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This paper stems from a short study of the relations between economics and ecology and faces how the environmental perspective can be incorporated in the judicial and administrative decision making, and by the law producers. In times of economic crisis, the tensions are even more acute, as the myth of economic growth tends to appear as the miracle to save businesses, public accounts and the population of poverty. The study approaches the strong sustainability and the resilience principle from a vision that links one to the other and presents both as emerging principles of environmental law. Sustainability and resilience in the Anthropocene Epoch must colonize the actions and decisions about environmental resources management at all levels: local, national and international.

Biosafety, public health, and social-environmental responsibility: a normative reconstruction of sustainability

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The present paper reflects the partial results of an ongoing, interdisciplinary research program in Critical Theory and Applied Ethics ("Critical Theory, Naturalism, and Normativism: Normative Reconstruction and Social Neurophilosophy," CNPq Proc. No. 305728/2015-6) which seeks *both* to avoid reductionist interpretations that tend to regard social and political philosophy as applied ethics *and* to address *normative orders* intertwined in the legal, institutional, ethical, and sociocultural challenges posed by current legislation, such as Brazil's *Biosafety Law* (Law No. 11105/2005), especially with regard to genetically modified organisms (GMOs), the production of radiopharmaceuticals and the use of stem cells and cognitive enhancers for brain research and therapy (esp. for patients with epilepsy, Alzheimer's and neurodegenerative diseases). From the threefold standpoint of *public health, sustainability, and solidarity*, the research seeks to investigate the ethical, normative implications and concerns that entail biomedical, clinical, legal, social, cultural and moral aspects in the fulfillment of such safety standards and mechanisms in activities involving GMOs, through the implementation of public policies, the reflexive measurement of their social-environmental impact, and the effective improvement of public health, particularly among low-income citizens, thus contributing to *human enhancement* and raising the public awareness of social and environmental responsibility among Brazilian citizens, political representatives (on the three levels of public governance –municipal, state, and federal), and entrepreneurs. I will argue for a normative-reconstructive conception of *sustainability*, so as to avoid the *relativism* inherent in communitarian, teleological, and deep-ecological models, on the one hand, and the *normativism* and *foundationalism* of universalist and deontological models of ethical normativity, allowing thus to account for legal-juridical, economic, and social-cultural normativity. By starting from an *immanent critique of Brazilian social ethos* and current *environmental legislation*, I argue that a critical theory of normative justification is one of the best, reasonable articulations of law and morality to account for social and environmental accountability.

The Judicial review of sustainability of administrative decisions

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This paper deals with the administrative public decisions and the judicial control under the perspective of the sustainability. The attention of this study lies, initially, on the emergency of new tendencies in Administrative Law. The Public Administration has to coexist with the contemporary pluralism and complexity, needs to be focused in citizen's interests and in exposing good reasons for public choices, through collaboration mechanisms, to promote the multidimensional sustainability. The socioeconomic and environmental crisis, the climatic changes and the risks arising from technological and scientific development induce, more and more, the society, the countries and international organisms to consider the sustainability in decision making. Moreover, the understanding that some activities may have systemic effects and negative externalities creates great concern about present and future generation's rights and the environment's intrinsic value. Considering that the Public Administration in the 21st century, mainly because of the new public governance's influences, is undergoing dramatic change[1] and has to be a Sustainable Administration, is correct to state that the sustainability is not in the field of free discretion of public decisions. So, the Judicial Branch has the power to control the sustainability of the administrative acts (including omissions), contracts and procedures. In other words, judges can be the "voice of the future generations" in a political system which usually can't hear them. As stated by Chistina Voigt, "sustainable development as a legal principle awaits the craftsmanship of concerned and serious judges to shape it into a practical means of balancing conflicting interests in a sustainable manner"[2]. Judges, politicians, regulators and civil servants can't be insensitive to this new reality. So, they have to act in convergence so that the administrative decisions are sustainable and take into account their systemic impacts and the costs and benefits of public choices, in a sustainable sense. Therefore, the Judiciary plays a crucial role, either by encouraging consensus solutions or by controlling to protect the rights of present and future generations.

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Scientific domination and transgenic animals: an analysis based on the oncomouse's patentability in Canada

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The current face of human domination over nature is science. Through the most diverse techniques, human beings instrumentalize the resources and beings that compose the natural environment, shaping them according to their own interests. Given this context, this article intends to examine the domination perpetuated by science on the environment and the legal scope. The analysis will be based on a decision of the Supreme Court of Canada on the patenting of the oncomouse, an animal genetically modified to contain a cancer-promoting gene, making it suitable as an object of studies about the disease. In addition, it is intended to refer to the relation that the animals` genetic manipulation presents with some fundamental problems in environmental law, such as the invisible and uncertain character of its consequences. In order to achieve these goals, the deductive approach method, the monographic procedure method, and bibliographic and documentary research techniques are used.

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Human rights and the SDG

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This article aims at discussing possible relations concerning the United Nations Sustainable Development Goals (SDGs) and Human Rights. The SDGs were established by recommendation of the United Nation's Conference on Sustainable Development (Rio + 20, occurred in 2012) to serve as direction for Humanity as the Millennium Development Goals' period ended in 2015. The SDGs should be accomplished in the next 15 years and aims at the realization of human rights. In spite of that fact, it has been observed that the language employed in the Human Rights texts was not used in a relevant way in the SDGs wording (KNOX, 2015 e TASCIONI, 2016). Of course, this is not an impediment for implementing the human rights, as their objects such as life, health, work, equal treatment, housing, *etc*. are part of the SDGs. Moreover, as some SDGs lack sufficient indicators (KNOX, 2015), their definition may be improved by discussions on the content of human rights. Therefore, SDGs can be an important way of greening human rights, as those rights will be interpreted at the light of concepts like sustainability and resilience. The preamble of the Agenda mentions that the SDGs balance the three dimensions of sustainable development – the economic, social and environmental. This balance is often interpreted as considering those dimensions to be equally important and; when necessary, priority should be determined according to any given situation (BOSSELMANN, 2016). The greening of human rights is a way of overcoming this view, as it relates environmental issues to social and/or economic goals through individual or social human rights. However, it is not enough. Both the SDGs and human rights should be construed in order to be coherent with the needs of ecological sustainability and resilience (BOSSELMANN, 2016). This proposal implies in defining human rights as the rights of humans, being part of the environment and recognizing the independent human right to a healthy environment.

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“It’s not just a planet, it’s a womb. #maenatureza #naturemother”

“She looks like me. Amidst the adversities of life. #MãeNatureza”

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The way that a person conceptualizes the planet could make an impact on the way that they make decisions in life. Indigenous communities in the US and Brazil have adopted Earth Mother and Mother Nature as metaphors. Evidence suggests that these metaphors have been a part of their tradition of respecting the land. The modern day conceptualization of owning land and thinking of the environment as a backdrop for humans may systemically contribute to the current planetary environmental crisis. This study was conducted to compare speakers from the US and speakers from Brazil to determine how commonly these metaphors are adopted today. Furthermore, we seek to understand the cross-cultural similarities and differences in conceptualizations of the Earth Mother Metaphor and how men and women’s embodied, engendered perspectives shape the way that they think about the planet. In a pilot study, we asked 15 Brazilian speakers living in a urban area to answer a series of open ended questions to gain some insight into their conceptualizations on Mother Earth as well as two Likert Scale questions used to measure the degree to which they find the Earth Mother to be fierce and cruel or benevolent and caring. This project seeks to take on a collaborative nature so that we reflect participant’s voices and narratives in a way that they would want to be portrayed. The data will be discussed in relationship to Conceptual Metaphor Theory (Lakoff/ Johnson, 1980), embodiment (Gibbs, 2006), and ecofeminism (Gebara, 1999). Future work will implement our insights from the pilot study to improve the questionnaire. We also plan to collect data from indigenous communities, such as the Pataxo community in MG. Finally, future studies will investigate whether this metaphorical framework affects decision-making behavior.

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The *Plural Sector* in the New Urban Agenda: assessing ZURB potential for best practices for independent community organizations

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According to the latest UN-DESA (2017) and EU studies (Paresi *et al*., 2016) the 21st Century will be marked by massive urbanization globally. Therefore, in the context of sustainability it is safe to consider urban development as one of the determinant forces (Alberti, 2003). The New Urban Agenda (NUA) and the Sustainable Development Goals (SDG) present strategies to address unsustainable and unequal urbanization on a global scale, but are constantly challenged by local inefficiency and ineffectiveness. On this sense, scholars like Manzini (2007) and Mitzberg (2015) suggest that the necessary radical renewal from unsustainable development should not be based only on initiatives from the public and the private sectors. They propose that communities establish local learning processes towards sustainability that tap into the potential of initiatives of the so called *plural sector*. It is with this purpose that the Sustainable Innovation Zone of Porto Alegre (ZISPOA) aims to be an agent of the *plural sector* connected to the NUA and SDG. Coupled with the challenges of the *glocal* problematic, the current local context is arguably less favorable to sustainable development than its history of innovative social practices would suggest. This increases the importance of clarity of purpose and action for social movements, indicating the need for socio-environmental impact monitoring systems. This paper seeks to evaluate the processes and activities performed by ZISPOA's ZURB group. As a part of a larger independent movement, ZURB aims at supporting SDG #11 in local, innovative actions, but also comprises the development of novel social organization structures and processes, closely connected to SDG #17. This paper proposes to report the initiatives developed by ZURB and to assess its potential socio-environmental impact as an agent of the *plural sector* aimed at the SDGs. It proposes to measure the group's goals against its effective practices through the lens of the IRIS framework (Gelfand, 2012). The expected results are to measure ZURB's potential for implementing the NUA at the local scale, for setting best practices for independent, community organizations oriented at sustainable innovation on the *plural sector* and to establish the bases for an impact self-evaluation system.

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Session 13. Binational Programs and Cooperation

Convener:
Dr. Martina Schulze, German Academic Exchange Service DAAD

This session will give an overview over the different binational programs and cooperation between Germany and Brazil.

Oral presentations

Session 13

DAAD's contribution to the german-brazilian academic exchange

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The German-Brazilian academic exchange has a longstanding tradition. In 1951, the first DAAD scholarship was awarded to a Brazilian student. From the nineteen-nineties onwards, the cooperation was essentially driven by the partnership with CAPES. Several joint programs were developed for specific target groups and disciplines, such as advanced students of engineering and law, as well as the still existing program PROBRAL, which allowed hundreds of PhD-Students of both countries to gain their first academic merits in research projects involving a Brazilian and a German team. In 2011, DAAD became Brazil's German partner in the ambitious science without borders mobility program. Today, only about 30 percent of the Brazilian-German academic exchange funded by DAAD is realized by the selection of the best candidates with the best research or study proposals for a stay in the other country. Driven by the needs of the (German) universities for exchange models which better serve their international cooperation aims in accordance with a comprehensive development strategy, now the bigger part of the exchange is realized through funds given directly to the universities. Thus, funding lines like the *'strategic partnerships'*, *'thematic networks'*, *'double degree'* and several other schemes of cooperation and development partnerships, all of them allowing a vaster range of staff and student mobility, have become more and more important to the German-Brazilian academic cooperation. Now, after a profound institutional reform, the DAAD is rethinking the German-Brazilian cooperation in order to develop a plan for the next years.

The merian centre conviviality in unequal societies: perspectives from Latin America

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The Maria Sibylla Merian International Centre for Advanced Studies in the Humanities and Social Sciences **Conviviality in Unequal Societies: Perspectives from Latin America** examines past and present forms of social, political, and cultural conviviality in Latin America and the Caribbean. It introduces conviviality as an analytical concept to describe ways of living together in specific contexts characterized by diversity and inequality. To this end, it links studies about interclass, interethnic, intercultural, interreligious and gender relations in Latin America and the Caribbean with research on conviviality beyond the region. In doing so, the Centre aims to make a distinguished contribution to international discussions on conviviality. The centre is driven by a consortium composed of three German institutions: Freie Universität Berlin (coordination); Ibero-Amerikanisches Institut, Berlin; and Universität zu Köln, Cologne, as well as four Latin American institutions: Universidade de São Paulo and Centro Brasileiro de Análise e Planejamento, São Paulo, Brazil, Instituto de Investigaciones en Humanidades y Ciencias Sociales (CONICET / Universidad Nacional de La Plata), La Plata, Argentina, and El Colegio de México, Mexico City, Mexico. While the Centre's headquarters have been established in São Paulo (Brazil), further nodes are developed in La Plata (Argentina) and Mexico City (Mexico). The Centre draws on the existing long-term cooperation between these institutions. It is financially supported by the German Federal Ministry of Education and Research (BMBF) from April 2017 until March 2020. After this preliminary phase, the consortium can apply for a main of six and a final phase of two years.

Ethnicity in motion. Converging GER-BRA PhD procedures

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We want to share our 3-year experience with co-tutelle PhD students (all in all 8 students, 4 BRA + 4 GER) who spent part of their time during the dissertation at each of the two universities. Other activities during the co-tutelle period involve fieldtrips for data gathering in Brazil and elsewhere in Latin America or Europe. As part of a DAAD/CAPES ProBral program the candidates receive two PhD titles, a Brazilian and a German one. With regard to the languages of both the thesis and the defense, they can choose between either one of the hosting countries' languages or English. The two organizers of the program, who are also the two supervisors in most of the cases, offer all participants of the program to publish the final monographs as part of the series "Linguistic Construction of Social Boundaries: Identities and Belonging" published by Peter Lang (https://www.peterlang.com/view/serial/SKSG). Together, we successfully organized video-conferences using DFG's DFN technology, several workshops and shared fieldtrips. Another crucial part of the program are regularly offered courses at the exchange department abroad and vice versa. The administrative recognition of the procedures, which are in some aspects quite different from one another in timeline and form in Brazil and Germany, needs endurance and a lot of effort. Despite the challenges, both universities collaborated successfully on the different levels of the faculty, three international offices, vice-presidents and presidents. By implementing this project all stakeholders shared the aim to establish a best practice model for GER-BRA PhD joined projects, which may be useful as an exemplary case for universities interested in creating EU-LA relations on a bi-national level.

Exzellenz verbindet – be part of a worldwide network

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The Alexander von Humboldt Foundation promotes academic cooperation between excellent scientists and scholars from Germany and countries around the world. To this end, it grants more than 700 research fellowships and research awards annually to individual researchers who become life-long members of the international network of more than 28,000 alumni, the so-called "Humboldtians" (http://www.humboldtfoundation.de). During the information session the manifold sponsorship opportunities will be outlined.

EPUSP Double Degree Experiences with German Engineering Schools

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Escola Politécnica da USP (Poli USP) has more than 15 years of experience with international double degrees. This talk addresses this subject reporting our thoughts from different perspectives, from the initial approaching steps towards the operation of student exchange programs, particularly with German engineering schools. The following subjects will be discussed in the talk: Designing the programs

• Regulatory issues: Poli USP Double Degrees;

• Understanding the commonalities and differences between the German and Brazilian engineering programs – structures and curricula;

• Approaching the partners: first contacts, presentation of goals, getting a deeper understanding of the other institution, including stablishing contacts with international office personnel and professors;

• Performing adjustments: once identified that there are common interests, starts the tuning phase, when common goals should be cleared stated, and both sides should work internally (supported by international commissions advisory or by performing discussion on local councils and boards) to come up with a document draft;

• Agreement design: technical and legal issues must then be clearly defined and written in the agreement (number of credits, duration – number of semesters, internships, thesis)

o A good practice is to divide it into two parts: the main contract (generalities) and an appendix for each course refining the exchange process, and curricula details (trying to keep them as general as possible and handling it as package);

o Aspects as the formal degree must be clearly stated (Bachelor or Master in German / Engineering in Brazil).

o Main issues from selection up to degree award must be presented.

• Approval processes: Once ready both sides start their local approval, which might differ deeply from one school to the other. Institutions have different structures and procedures and this impacts in the formal approval process until the signature. Running the programs

• From advertising to selection: both sides should announce the program (social media, talks to students), prepare the calls, run the application process, and select the students (considering CV, student records, letters, interviews), indicating finally pre-selected students to the partner institution;

• Acceptance: the partner institution analyze the candidates, accepting them or not;

• Trip preparation up to arrival at host: with the acceptance letter students apply for a visa, and for funding support. At arrival the new issues are registering and accommodation;

• Follow up: being in touch with students through the studies abroad is very important. Issues as internships and final thesis normally have impacts on both sides, requiring talks to professors from both schools.

REBRALINT: An initiative to strengthen Brazilian-German academic cooperation

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Brazil and Germany have a long standing and successful tradition of academic cooperation going back, at least in official terms, to the 50's. Nevertheless, there is a real need to foster, deepen, and spread these bonds in the face of increased number of global players in the academic scenario and the new social, economic and political trends in both countries. In this sense, this plenary talk will present the recently founded REBRALINT: Rede Brasil-Alemanha para Internacionalização do Ensino Superior (Brazilian-German Network the Internationalization of Higher Education). REBRALINT is a non profit Academic Brazilian-German Network of people engaged in bilateral cooperation, composed by willing professors and researchers from both sides. The main purposes of REBRALINT are to disseminate information and connect relevant people, thus establishing *cooperation to cooperate*. The presentation will bring out some aspects of the bilateral cooperation and the constitution, relevance and the line of action of the network. With the firm belief that Brazil and Germany have a natural affinity on the basis of its complimentary attributes, REBRALINT is an effort to leverage and take the bilateral cooperation to an upper ground.

Sustainable use of fish and seafood as well as efficient and safe processing for the food industry

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Brazil and Peru are two of the largest fishing countries in the world. Despite the fact that it has a very small fishery harvest, Germany belongs to the leading fish and food processing technology suppliers. Worldwide the fishing industry faces challenges related to food security, employment and economic development. One can find answers for the challenging sustainable use of fish and seafood and their efficient and safe processing for the food industry combining local and global knowledge – the "glocal" approach. The appropriate answer depends on geography, national market situation and technology standards.Our project is the implementation in practice of this "glocal" approach and involves Brazilian, Peruvian and German academia and a German middle-sized enterprise. The co-funding program develoPPP by the "German Development and Investment Corporation DEG/KfW" supports this initiative. The "Pontifícia Universidade Católica do Rio Grande do Sul" (PUCRS), the "Pontificia Universidad Católica del Perú" (PUCP), and the "Universität Rostock" are the scientific partners. The German mechanical engineering company "ROSOMA GmbH" (ROSOMA) co-finances the project and for decades has been working globally for the careful processing of fish. Additionally, the German small-sized enterprise "envitecpro GmbH" acts as project developing company, strongly supporting the international networking. Local contacts with the fishing industry are done via the German Chambers AHK Porto Alegre and AHK Lima. Furthermore, the local industry associations are invited to collaborate with the project. This consortium, operating since May 2017, assures a holistic approach overall the process, beginning with the fishery and aquaculture until the fish processing and distribution. In particular, "life-cycle assessment" shall be the benchmark to evaluate technical solutions under sustainability aspects. At least three workshops each in the two Latin American countries with German specialists and one workshop with all participants in Germany will happen during two years. The project includes also student mobility to Germany, common publications and a project-specific website. Targeting the local market conditions, ROSOMA promotes B2B meetings, trade fair participation, and discussion with local associations. Positive outcomes are expected: **a)** creation of new sales opportunities for ROSOMA, then fully understanding the local conditions; **b)** sensitization to sustainable standards; **c)** transferability of the results to all local fish processing companies in Brazil and Peru; **d)** high impact with development effects on food hygiene standards and working place conditions; **e)** increased wealth in the regions while respecting nature and diversity; **f)** generation of scientific knowledge and training of students involving participants of the three countries, setting a proficuous basis for further international projects.

The role of the german house for research and innovation in the german-brazilian cooperation

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The German House for Research and Innovation – São Paulo (DWIH-SP) started its activities five years ago. It acts as a platform for enlarging and strengthening the bilateral cooperation between Germany and Brazil in the areas of science, research and innovation. Thirteen organizations (funding agencies, universities, non-university research institutions and a state representation) are members of DWIH-SP; most of them have own representatives in the facilities of the House. This lecture will show examples of the contribution of DWIH-SP and its members for the German-Brazilian cooperation, as well as of possibilities for new cooperations.

Center for German and European Studies - CDEA: an opportunity

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The paper aims to present and analyze the CDEA - Center for German and European Studies. The CDEA, inaugurated on April 10, 2017, is a scientific center for teach, research and information, promoted by DAAD with funds from the German Ministry of Foreign Affairs, hosted at PUCRS and UFRGS. It is a project of 5 to 20 years, which aims to foster a new generation of Brazilian scientists and researchers in interdisciplinary studies on current issues of Europe and Germany useful to the Brazilian and Latin American context. The Center for German and European Studies housed in PUCRS and UFRGS will be dedicating itself in an interdisciplinary way to the discussion of three key phenomena - globalization, sustainable development, and cultural diversity - in the context of different experiences and constructions in Europe / Germany and Brazil. It is the first Center for European and German Studies in Brazil and Latin America and was jointly entrusted to UFRGS and PUCRS, and the main headquarters of the center will be at the PUCRS Humanities School and at UFRGS (Faculty of Law, Central Campus and ILEA, Vale Campus), in order to reach the entire academic community of both Universities and their campuses. The CDEA will maintain contacts with all the German Universities and European Research Institutes, especially those that have Agreements with UFRGS and PUCRS and have among their functions to participate in the networks of excellence and partnerships with the 20 European and German DAAD Centers in the world , Which represent more than 30 leading universities. The DAAD-supported project identified three strategic partners of the CDEA, the universities of Heidelberg (Ruprechts-Karls-Universität Heidelberg), Bonn (Rheinische Friedrich-Wilhelms-Universität Bonn) and Erlangen Nürnberg (Friedrich-Alexander Universität Erlangen Nürnberg). The CDEA will help ensure the continuity of academic cooperation between Brazil and Germany and promote links between disciplines dealing with topics related to Germany. We intend the CDEA to become a visible and active part of the network of ZDE centers of excellence in the world. The CDEA goal *is:* - Implement master's programs in European and German studies, such as the pilot project PPGDir UFRGS and adopt a specific orientation of doctoral students in the areas of German and European studies, attracting students from different universities; - To be a center of reference in 'German and European studies' and to promote interdisciplinary approaches in teach and research, essentially in the areas of humanities, social sciences, law and philosophy; - Cooperate closely with the German and European Studies Centers promoted by the DAAD around the world; - Reach a more general audience by holding high visibility events and lectures, as well as reaching the international scientific community. The Brazilian center, the CDEA UFRGS-PUCRS in Porto Alegre, aims to ensure the knowledge and expertise of the young generation of scholars from Germany and Europe in order to ensure continuous cooperation between Germany and its international partners. It is therefore a great opportunity to further deepen and consolidate the academic friendship between Brazil and Germany.

Status quo and perspectives for bilateral research collaboration between Brazil and Germany

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Brazil's scientific potential has been constantly growing during the last decades so that Brazilian-German research collaboration has become increasingly visible and important. The German Research Foundation (DFG) as the principle funding organization for curiosity driven research in Germany can approve this development by increased numbers of funded research projects during the last years that involve Brazilian researchers or institutions. Since 2009 until May 2017, DFG has funded at least 233 German-Brazilian projects with a budget of over 43 Mio. Euros. Concurrently, the number of jointly financed projects have increased which can be attributed to the long-standing trustful cooperation with Brazilian federal and state funding organizations. From the view of DFG, the presentation will provide an overview about the status quo of research collaboration between Brazil and Germany as well as current joint initiatives between DFG and its Brazilian partner organizations. It will be embedded in the general measures Germany and the DFG have undertaken in order to enhance internationalization in research. Moreover, the various instruments will be presented that are applied in order to attract scientists to perform research in Germany and to enhance research collaboration between Brazil and Germany. Furthermore, perspectives and ideas for future activities fostering research collaboration between scientists from both countries will be provided.

Poster presentations

Session 13

International cooperation for the development of the amazon: study on german cooperation agencies in amazonas state

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Introduction: The work is a partial result of research done on international cooperation between Germany and Brazil. Among the objectives of the project are: To list the projects supported and maintained by the International Cooperation agencies in the Amazon, especially the development projects for indigenous peoples and to analyze socio-environmental projects for training and income generation. Methodology: A bibliographical, documentary and field research was carried out, giving priority to data in official sources and documents in the institutions that develop projects with the support of the German government. We also conducted interviews with the coordination of GIZ in the Amazon and identified and analyzed several documents as reports made during the field research. Results: In the Amazon, where socioenvironmental projects are implemented for indigenous peoples and traditional communities, an empirical study was done in the Environment Secretariat on projects with external financing and data on the target populations of these projects. Ten projects under development in the State of Amazonas involving traditional communities, indigenous communities in several municipalities such as: Rio Preto da Eva, Mura Indigenous Communities, Presidente Figueiredo, Silves, Rio Solimões, São Gabriel da Cachoeira among others, whose investments between 2011 and 2013 Total more than 14 million reais. Final considerations: According to the interviews there is an interest of the German government on the investments and who controls is the Brazilian state being a gain for the benefited populations which diverges somewhat from the bibliography produced on the subject studied here.

Cooperation for sustainable develpment between germany and Brazil: a critical approach.

Novaes, AF[1]

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This work explores the bilateral relations between Brazil and Germany following 1992 in order to review the main projects related to the field of sustainable development through the exchange of knowledge and technology. The analysis specifically focuses on some of the projects within the scope of the Cooperation for Sustainable Development. For this purpose, Veiga's (2015) perspective on sustainability and development has been adopted, seen as a means of expanding individual liberties without compromising the ability of future generations of doing so. On the account of the scientific methodology, I have used a qualitative approach through exploratory research, including secondary research, by reviewing available literature and data, as well as discussing and interviewing staff related to the topic. After such analysis, I gathered four ongoing projects carried out by Germany and Brazil under the Cooperation for Sustainable Development and presented them under critical perspective, by taking into account socioeconomic disparities, underlying interests and the perpetuation of international political rationale regarding the North-South axis. The first project relates to heliothermal energy conversion in Brazil with grounds on technology exchange and lobbying for specific bills on taxing and environmental licensing. The second project aims to conciliate both the private and the public sectors on addressing biodiversity conservation. The third project attempts to reinforce foreign financial control mechanisms when it comes to environmental related issues, in partnership with the Brazilian Federal Court of Auditors and the Organization of Latin American and Caribbean Supreme Audit Institutions (OLACEFS). The fourth project regards the protection and sustainable use of rainforest areas. Further minor cooperation projects were mentioned throughout this work, but were not examined in greater detail. Finally, I have come to the conclusion that there is enough space for both countries when it comes to environmental commitment at international level, even if Veiga's perspective on sustainability is adopted. Nevertheless, I aimed to raise awareness regarding two concerning points. First, by addressing the arbitrary use of such projects as part of some soft-power policy that perpetuates socioeconomic disparities between the North (economically developed nations) and the South (developing nations). Second, we note that some of the projects on technical capacitation and financing – such as several ongoing projects in the Amazon rainforest area – may indeed echo the idea of sustainability proposed by José Eli da Veiga, even if only to a limited scope.

References:

Veiga, José Eli da. (2015) *Para Entender o Desenvolvimento Sustentável*. Ed. 34 Ltda. 1st Edition. São Paulo, SP.

Exhibitors

STIHL is the Brazilian market leader for portable power tools, with a complete mix of high quality and durable products. With products aimed at the forestry, agricultural, construction, cleaning and conservation, gardening and household markets, the company offers a comprehensive line of portable power tools which can be found in over 3,000 points of sale across Brazil. In the country, STIHL is located in São Leopoldo (RS), where approximately 2,200 employees work.

The group's head office is in the city of Waiblingen, in Germany. Renowned for its technological leadership, innovation and the quality of its products, the company operates in over 160 countries through distribution channels comprised of more than 40,000 points of sale in the world. To serve the global market, STIHL has production units in Germany, Brazil, USA, Austria, Switzerland, China and Philippines. In 2008, STIHL Brasil was certified with ISO 14001 and OSHAS 18001, both of which were recertified in 2017. The STIHL Group also has ISO 9001 certification.

DAAD Deutscher Akademischer Austauschdienst
Serviço Alemão de Intercâmbio Acadêmico

German Academic Exchange Service (DAAD)

The DAAD promotes academic exchange and cooperation between Germany and other countries. Annually, the DAAD supports over 100,000 German and international students and researchers around the globe – making it the world's largest exchange funding organization. The funding opportunities range from a year abroad for undergraduates to doctoral programs, from internships to visiting lectureships, and from information gathering visits to assisting with the establishment of new universities abroad.

The DAAD was founded in 1925 in Heidelberg on the initiative of a single student. Since then, around two million scholars from Germany and abroad have been awarded with scholarships, fellowships and other grants. But the activities go far beyond simply funding students and researchers. The DAAD also supports the internationalization of German universities, promotes German studies and the German language abroad, provides developing countries with best practices in establishing universities and advises the German cultural, educational and developmental policy.

The DAAD focuses on three strategic fields of activity to meet the challenges of the future while drawing on its strengths and expertise:

– Scholarships for the Best: supporting students and researchers in Germany and abroad who have demonstrated outstanding academic merit and wish to assume responsibility.
– Structures for Internationalization: creating university structures which promote international qualification, mobility and dialogue, and thereby improve the quality of research and instruction.
– Expertise for Academic Collaboration: making our expertise in educational cultures and academic systems available in order to facilitate collaboration between academics and institutions.

On the institutional level, the DAAD is a non-profit association of the German higher education institutions and student bodies, and relies on a strong organizational structure. The DAAD and its programs are largely financed through public funding bodies, mainly the Federal Foreign Office, the Federal Ministry of Education and Research, the Federal Ministry for Economic Cooperation and Development and the European Union. In 2015, the DAAD had a budget of 471 million euros.

The DAAD is represented by a worldwide network, including 15 branch offices across the globe and 50 international information centers. In Brazil, the DAAD has a regional office in Rio de Janeiro, which was founded in 1971 and coordinates several scholarship programs for Brazilians, some in partnership with Brazilian agencies. Additionally, the DAAD established an Information Center in São Paulo in 2001. Both welcome Brazilian students and researchers interested in studying in Germany and provide information about scholarships, Bachelor, Master, PhD and other programs at German institutions of higher education. The DAAD team is also present at various exchange fairs and international events throughout Brazil.

Moreinformation:
www.daad.org.br
www.facebook.com/DAADBrasil

Goethe-Institut Porto Alegre

The Goethe-Institut is the cultural institute of the Federal Republic of Germany with a global reach. We promote knowledge of the German language abroad and foster international cultural cooperation. We convey a comprehensive image of Germany by providing information about cultural, social and political life in our nation. Our cultural and educational programs encourage intercultural dialogue and enable cultural involvement. They strengthen the development of structures in civil society and foster worldwide mobility.

With our network of Goethe-Instituts, Goethe Centers, cultural societies, reading rooms and exam and language learning centers, we have been the first point of contact for many with Germany for over sixty years. Our long-lasting partnerships with leading institutions and individuals in over ninety countries create enduring trust in Germany. We are partners for all who actively engage with Germany and its culture, working independently and without political ties.

Our Cultural Program Department encourages international cooperation, through cultural and academic activities developed and carried out jointly with local partners, discussing the German, Brazilian and Brazilian arts, sciences and politics. The Goethe-Institut is a traditional cultural space in the city, having been awarded several prizes in recognition of its work. With an auditorium and a gallery, the Goethe-Institut serves as a stage for contemporary performances of theater, dance, music, cinema, lectures and visual arts, strengthening the exchange between Brazil and Germany.

Our Library is open to the general public. It provides information on current aspects of cultural, social and political life in Germany, highlighting philosophy, literature and German as a foreign language. In the context of encouraging reading and library cooperation, there is close collaboration with public and school libraries, associations, and publishing houses. In addition, the Goethe-Institut encourages the translation of works of German literature as part of its translation promotion program.

Our wide range of German Courses in Porto Alegre and in Germany provides learning of German for adults, young people and children in different modalities (extensive, semi-intensive and intensive courses). The Department of Pedagogical Cooperation assists German institutions and teachers through free pedagogical advice. Activities for improving teaching skills and help with choosing teaching materials are some of the opportunities that can be found at the Goethe-Institut. Furthermore, events and didactic-pedagogical activities are also organized, enhancing the support for teaching German as a foreign language.

Artistic project: Art Wear

Art of dress... wearing ART

By Jeannine Krischke

Creation of prints signed by the visual artist Jeannine Krischke in digital palette Fine art with thematic focus on the preservation of nature and artistic heritage, applied to the garments: Dresses and Pelerines, Scarves, ties, ecobags and others accessories.

PURPOSE:
Sensitization for the preservation of the environment and sustainability through inspiration in the aesthetics of nature and its integration into everyday life in urban areas.

OBJECTIVES:
To democratize art, by connecting the applied arts to fabrics in wearable multipurpose authors. Contribute to the preservation of the cultural memory by the rescue of artistic, ethnic and historical heritage, as a source of inspiration and re-readings.

CHARACTERISTICS:
Originality, Timelessness, Portability, Practicality and Ecological Compatibility. Artisanal work in the segment of the creative economy. Portfolio with collections and permanent series simultaneously and custom creation services.

COLLECTIONS:
Living Botanical Garden, Amazonian Lights, Tribute to Emílio Goeldi Museum and Viva a Mata.

EXHIBITION LAUNCH COLLECTION VIVA A MATA!

Exhibition of Arts to wear. Pró-Mata / PUCRS was the source of inspiration and capturing images for the creation of the prints: Reflections of Aurora, Moonlight reflected in the lake, Dawn, Mirror of the sky, Dawn tones, Van Gogh Gardens, Flowers for Miró , Secret Trails, Natural Day Orchid, Daisies in the Swamp, Reflexes of the Dusk, Sunset in the Araucarias.

JEANNINE LIMA KRISCHKE
E-mail: vestindoartejk@gmail.com
Fanpage: @jeanninelk
Visual Arts UFRGS, Psychology and post-guaduation in Education PUCRS Works in exhibition and sales from October 3 to 5, 2017. Hall of Prédio 50, PUCRS



KOBE

Kobe is a Brazilian company focused on the development of mobile applications. We work on the creation of high quality software for smartphones and wearables, including the use of virtual and augmented reality technologies. We are composed of eleven people with complementary skills such as: coding for backend and frontend (Server, Web, iOS & Android), design, project management and executive relationships.

(Kobe Team, Porto Alegre, 2017)

Pró-Mata Center for Research and Conservation of Nature/PUCRS

The Pró-Mata Center for Research and Conservation of Nature was conceived by PUCRS in partnership with the University of Tübingen, Germany. It is an area devoted to research and conservation of nature, dissemination of scientific production and sustainable development.

PUCRS began the Pró-Mata project in 1991, with the support of the University of Tübingen, Germany. It was officially opened in 1996, as the Pró-Mata Center for Research and Conservation of Nature.

Pró-Mata is home to PUCRS researchers and researchers from other partner universities in Brazil and overseas, as well as undergraduate and graduate students working on mandatory school activities, research projects and environmental conservation projects.

Pró-Mata is located in São Francisco de Paula, near the cities of Maquiné and Itati, and is close to several Conservation Units. Overall, there are six Conservation Units of sustainable use and eight for complete protection, accounting for 128,000 ha of protected area in one of the largest regional mosaics devoted for the preservation of Brazilian biodiversity.

Pró-Mata sprawls over an area of 3,100 ha of diversified vegetation including Araucaria Forests, Atlantic Rainforest and natural grasslands. When it comes to its flora, Pró-Mata has reported more than 700 vascular species, including endemic and endangered species. Pró-Mata is home to more than 200 species of birds and at least 40 animal species inhabiting the grounds are categorized as critically endangered under IUCN criteria.

List of Contributors

You will find the addresses at the beginning of the respective contribution

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