

Report

“Brazilian Biomes under Global Change”



Corinna Bruder
Nils Reinecke
Martin Thiele
Cristina Urrutia
Adriana Valenzuela

OFFERED BY:



PARTNERS:



PARTNER SUPPORTERS:



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Travel Route



Travel Schedule

DATE	VISIT	BUSINESS	LOCATION
02.08.2013	UFPR	University	Curitiba, R�o
04.08.2013	Biovert	Tree nursery	Silva Jardim, R�o de Janeiro
05.08.2013	Fibria	Eucalyptus plantation	Quelez, S�o Paulo
07.08.2013	ICMBio	National park	Chapada dos Guimar�es, Mato Grosso
08.08.2013	SESC Pantanal	PPN (Private conservation unit)	Pocon�, Mato Grosso
09.08.2013	Floresteca	Teak plantation	C�ceres, Mato Grosso
11./12.08.2013	Seringal Cachoeira/ Natex	Latex extraction/ production	Xapuri, Acre
15.08.2013	Parque Nacional de Machu Picchu	National park	Machupicchu, Peru
16.08.2013	Fabrica de pisos Xapuri	Saw mill	Xapuri, Acre
	Natex	Condom factory	Xapuri, Acre
17.08.2013	Floresta	Reforestation	Acre
19.08.2013	EMBRAPA	Forestry research facility	R�o Branco
20.08.2013	FUNTAC	Foundation for technology of the state of Acre	R�o Branco
21./22.08.2013	FUNTAC	Foundation for technology of the state of Acre	Antimary
23.08.2013	Madegran/ Laminados Triunfo	Saw mill/ ply wood producer	R�o Branco

Introduction

By Renato Robert, Project Coordination “Brasil Norte-Sul”, Prof. for Engineering and Forest Technology (UFPR)

Brazil has a total area of 851 million hectares, 477.7 million of which are covered by natural forests, grouped into six Brazilian biomes: Amazon, Caatinga (xeric scrubland and forest), Cerrado (savannah), Atlantic Forest, Pantanal (tropical wetland) and Pampas (grassland), besides 5.6 million hectares of plantation forests. Alone, the Amazon biome corresponds to 49.29% of the national territory, being the largest continuous area of tropical forest on Earth. Also, it harbours a quarter of all fauna species on the planet and more than 20 thousand different plant species that grow exclusively in that region. It plays an important role in climate regulation, water quality maintenance, erosion control, and the provisioning of other ecosystem services. However, according to the National Institute of Amazon Research (INPA) (on www.amazonia.org.br as of March, 2013), the Amazon has had 207.6 km² of its area deforested between the months of November and December of 2011, an area equivalent to over 20 thousand soccer fields and 50% more than what was registered over the same period the year before.

For some years there has been a growing concern with the sustainability of our economic models. Along this tendency, the year of 2011 was declared by the United Nations as the International Year of Forests. This aimed at raising awareness in the global society as to the importance of the conservation and preservation of forests in order to ensure the continuation of life on the planet. In 2012 Brazil hosted the UN world conference on the Environment “Rio+20” in Rio de Janeiro, which was the sequel to the Earth Summit in 1992. These events also considered the growing concern of the general community, scientific as lay, regarding the policies that have been made in the Amazon region. And despite the discussion about adopted policies in 2011 and international efforts to increase awareness, there are still many setbacks to be overcome.

Thus, there stands, still, the importance of the year of 2012 in the political, historical and economic context in Brazil, as much as the basic functions of public universities, i.e., the role of teaching, research and extension. The extension is the most efficient interaction between students - future professionals that represent the mentality of the university - and the community in which they are inserted.

Study tours, field trips and summer courses are one of the main examples of extension programs, which provide to the participants complementing knowledge and fulfilment of academic learning through hands-on experience. Accordingly, it is intended to bring to the 42 students of Forestry from the Federal University of Paraná and from partner universities such as the Rural Federal University of Rio de Janeiro and the German Universities of Eberswalde and Freiburg, the reality of Forest Management in the Brazilian Amazon associated to concepts of Sustainable Development, Forest Based Industries, teaching institutions and companies which use non wood forest products.

It is the purpose of this report to provide valuable insights into the realities of forest management in the Brazilian Amazon as well as an account of the experiences during the Brasil Norte-Sul study trip. The reports have been prepared and peer-reviewed in groups of students from various backgrounds and regions as mentioned above.

Travel Reports

Biovert – tree nursery – 04.08.2013

Silva Jardim, Rio de Janeiro (state), Brazil



The first two days of our trip we spent on the bus, going 700 km from the Federal University of Paraná in Curitiba to the Rural Federal University of Rio de Janeiro to collect all students and get to know each other. On the third day of our trip, the bus took us from the Grael Institute in Niterói, where we had spent the night to the

Silva Jardim municipality near Rio for our first visit. Arriving in a beautiful valley, we were welcomed by Marcelo de Carvalho, forest engineer and owner of the environmental consultancy and tree nursery Biovert. 30 years ago he bought this 1000 ha plot of land for R\$ 1 million in instalments and founded a tree nursery. Today, the 58-year old owner has 4450 plants/ha, works with 80 species (15 of which are considered rare in Brazil) and can produce 3 million seedlings per year.



Marcelo de Carvalho presenting his tree nursery

Biovert is a company which provides a series of services in the forestry sector as a consultancy. Their main focus is on the production of seedlings of native species (mostly trees) for the restoration of degraded areas, urban greening, carbon credits and environmental compensation. The tree nursery produces its own substrata for the seedlings. The sand part comes from dredging their rivers. The organic material comes from the trees and plants they remove from the areas which are deforested by companies in their construction projects. Our

tour went through the whole production process of a tree. Usually, a team of biologist marks the 'matrix trees' for seed collection. 12 matrix trees per species are mapped and monitored. The matrix trees provide the best genetic material for the subsequent growing of trees. The rate of loss of seeds, seedlings and samplings is kept to a minimum, so that the owner guarantees that one out of two seeds eventually becomes a tree.

Meanwhile, de Carvalho elaborated on unfavourable legislation, the Brazilian political situation, labour issues and how he treats his workers. This business, de Carvalho argues, can only be successful in Rio de Janeiro state if law enforcement is sound and construction companies and real state agencies are pressured to mitigate the impact they cause by restoring areas. Despite the heat, the students showed vivid interest in the matter. Marcelo seems to be a 'man of vision' and as a forest engineer who graduated from UFRRJ he is a role model to the forest engineers and professionals in general in Brazil. De Carvalho is planning to expand the nursery to 3000 ha in the coming 7-8 years before going into pension. He expects the demand for seeds, seedlings and trees to increase with the implementation of the new Forest Code. However, since there is no ambitious successor in sight to replace the owner it remains questionable whether or not the business will survive afterwards.

After the tour, the study group was invited to a big traditional Brazilian lunch: Feijoada and Pudim for dessert. Lastly, we conducted an interview with Marcelo de Carvalho and received a tree, which was planted later near the Forests Institute on the campus of the Rural Federal University of Rio de Janeiro (UFRRJ).

Further information/ Link:

<http://www.biovert.com.br/>

Fibria – Eucalyptus spp. plantation – 05.08.2013

Queluz, São Paulo (state), Brazil

The eucalyptus plantation of Fibria in Queluz, São Paulo State embraces a territory of 50.000 ha, which is exclusively cultivated with eucalyptus trees. While operating 24 hours a day the annual harvest rate is about 150.000 m³. The record of harvested wood has been 65.000 m³ per month. Also steep terrain (with a maximum gradient of 35°) can be harvested completely automatically. According to Brazilian law, 20% of the territory has to remain natural forest in areas of Atlantic Forest. The remaining 80% are released to other land uses. After a 5-7 years growing cycle, a clear cut takes place in a selected terrain. The yield per tree is approximately 0.18 m³. After the clear cut of the selected area, scientists will recommend soil treatment, if soil conditions deteriorate. Fertilizer will be added, if soil conditions are poor and denuded. If this is not the case, the terrain will be cultivated again



A forwarder collecting logs at a slope

after a (fallow) period of 45 days.

Spending an hour in the plantation observing the harvesting process in steep terrain, we realized that the eucalyptus plantation has nothing in common with what is commonly considered a “forest”, but rather a well-organized factory. Biodiversity is extremely low in the territory of the plantation, although we were told that there are different species, living in and

from the eucalyptus plantations. In view of the activity, the presence of noisy machinery and the short rotation cycle, this seems unlikely. The company also mentioned an environmental impact assessment, which has been conducted. Unfortunately, they did provide rather vague information about this. Nevertheless, weighing the options of satisfying market demands, the eucalyptus monoculture is perceived by us as less bad than a monoculture soy farm.

After harvesting 90% of the ISO and FSC certified wood, (the end product) is exported to Europe and the United States to meet the demand of the paper industry. We learned that as hardwood, eucalyptus trees serve to produce short fibre pulp which is then processed to paper. Eventually, 3.4 m³ wood equal one ton of cellulose. Fibria is planning to expand its operations. Nevertheless, the expansion of territory will take place outside of the state of Rio de Janeiro, since it is a metropolitan area and underlies strict land regulation. Yet, plans exist to expand into the region of Mato Grosso do Sul.

Further information/ Link:

<http://www.fibria.com.br/en/>

Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio) ***- National Park - 07.08.2013***

Parque Nacional Chapada dos Guimarães, Mato Grosso, Brazil



Next stop: A National Park. The entrance in Chapada dos Guimarães National Park gave way to a wooden plank path leading through the Cerrado. After walking for a short while along the path the view opened up and presents a scenic waterfall in a beautiful canyon filled with lush trees. Among the different shades of green were also a few purple spots from flowering trees. While we were taking pictures and enjoying the view, we saw parakeets and a pair of macaws. An introductory talk to



the National Park was given to us in the visitors' centre and then we started our hike. From the headquarters we crossed to the other side of the canyon and followed a path through the Cerrado to several beautiful waterfalls. It was a very

hot day but most of the shrubs and trees were carrying leaves and some were even flowering. Parts of the trail were sandy and there were signs of past fire. A few of us managed to see an elusive monkey and we also encountered leaf cutter ants. The hike took us to seven different waterfalls along a river in which we could take refreshing baths in cold water. We were lucky to visit the waterfalls because access to the trails at that time was limited due to maintenance.



Waterfall in the national park

The Chapada dos Guimarães National Park protects an area of 32.630 ha of the Cerrado Biome. It was created in 1989 and is located in the state of Mato Grosso in the municipalities of Cuiaba (65%) and Chapada dos Guimarães (35%). The national system of conservation units (Sistema Nacional de Unidades de Conservação) was created in 2000 and implemented in 2002. Under this system, the Chapada dos Guimarães Park is categorized as a permanent conservation area. Such protected areas have the aim to preserve the flora and fauna and

special features of an area. The main entity managing all protected areas in Brazil is the Chico Mendes Institute. Additionally, each conservation area has a consultative council that includes the relevant local stakeholders, from farmers to businesses and conservationists. The management plan for the park was issued in 2009 under participation of the council and consideration of studies regarding biotic, abiotic, cultural, historic, social and economic factors of the park and its surroundings. The park holds a wide variety of plant species (659 species) and is also home to very interesting mammals such as tapirs and jaguars. It is located at the point where three biomes meet and thus not only holds elements of Cerrado flora and fauna but also from the Mata Atlantica and Amazon rainforest.

INFOBOX

The Cerrado can be described as a tropical savannah. However, it holds very different types of vegetation and is thus further classified into ten subtypes.

1. *Campo limpo*
2. *Campo sujo*
3. *Cerrado ralo*
4. *Veredas*
5. *Campo sujo úmido*
6. *Cerrado*
7. *Cerrado sentido restrito*
8. *Campo rupestre*
9. *Mata de encosta*
10. *Mata de galeria*

The national park protects one of the last extensive areas of Cerrado. This biome is very threatened due to expanding agriculture and settlements. The issues park managers have to face include dealing with settlers, fire management and maintenance of visitor infrastructure.



Forest fire near the national park

Before the establishment of the park a number of farmers lived in the area, now the strict protection category does not allow settlements within the park. People that were requested to leave the area received a government compensation for the land they lost. Still, there are problems with illegal settlers coming into the park and trying to establish agriculture. They

have to be forced to leave the park by the police.

Huge fires threaten the park's vegetation for most of the year. Natural fires can occur in the

Cerrado in the dry season. However, natural fires used to be less intense and less frequent than the ones that occur today. Current fires are mostly caused by fire incursions from agricultural fields. Burning fields is common practice to stimulate grass regrowth. Fire is especially dangerous for the park's flora originating from lowland rainforest and from the Mata Atlantica because it lacks the adaptation to fire. The park is understaffed considering the extensive area under protection. The few fire fighters have to travel long distances to reach fire-spots and extinguish them. To combat the fire, breaks of 5-6m are cut in the vegetation, fire is extinguished by hand with rubber fans and sometimes a counter fire is set.

Today less than 3% of the park's area is open for visitors and a system of trails exists that is used by visitors as well as by fire fighters. However, these trails were established by former settlers and were created without any prior planning. It is a challenge for the current park managers to work with the existing trails in the best possible way even though they were not designed for visiting and fire fighting purposes.

There are plans to expand the road that currently crosses the park. The solution proposed by the park's management is to build a new road around the park. Even though this alternative would shorten the travel distance on the route close to the park, the government is still planning to expand the road across the park. The extension of the road poses a serious threat to the park due to the increased accessibility for settlers and businesses. A more direct threat will arise for the fauna from the fragmentation of their habitat because a bigger road may be an insurmountable barrier and increase the number of road kills.

For more information:

<http://www.icmbio.gov.br/parnaguimaraes/>

SESC – Reserva Particular do Patrimônio Natural – 08.08.2013

Poconé, Mato Grosso, Brazil



On 8 August 2013 our group visited the Pantanal which is a tropical wetland biome. The visit was to the private reserve “*Estancia Ecologica SESC Pantanal*” located in the city of Poconé, in the state of



Mato Grosso in Brazil. This reserve is the biggest private reserve of natural patrimony (RPPN) of Brazil. It holds 106.644 ha and is

managed by the Servico Social do Comercio (SESC), an association of Brazilian enterprises. This reserve was the first private investment initiative of the SESC in natural conservation.

The Pantanal is a biome which is characterized for having periodical inundations. It has three seasons of four months each (dry, flooding and transition period). Its functions include the regulation of the water cycle and the preservation of biodiversity. This biome exists as well in other countries such as Bolivia and Paraguay however, 65% of the Pantanal are located within the state of Mato Gross in Brazil. 1.3% of the Pantanal in Mato Gross are recognized as a UNESCO world heritage, as well as a Biosphere reserve and two protected areas within the Pantanal, the SESC Pantanal Private Natural Heritage Reserve and the Pantanal Matogrossense National Park, are recognized as Sites of International Importance under the Ramsar convention The “*Estância Ecologica SESC Pantanal*” was created to preserve the biome of Pantanal. It offers multiple education activities including:

- An environmental education centre
- A butterfly zoo
- A collection of various insects
- An ant laboratory
- boat tours through the Pantanal rivers

In Portuguese the center is called Centro de Integração Ambiental (CIA). It has a variety of



Butterfly coccons in the borboletário

interactive resources and educational materials which include poster and videos. The centre receives national and international tourists on a daily basis. It aims to create public awareness regarding the importance of the Pantanal biome and its biodiversity. Mr. Manuel Domingo, local guide of the centre expressed

that Brazil has approximately 650 species of birds and it is the third country in the world with more species of birds. He said “Pantanal is our patrimony and we need to preserve it for us and for the future generations”.

The Butterfly Zoo Known as the “Borboletário” is a space where different species of butterflies can be observed. It runs a project to involve local communities in conservation initiatives. The project aims at preserving local butterfly species and at the same time creating job alternatives for the local inhabitants. Currently the Borboletário is working with 25 species of Butterflies. The families collect the eggs and take care of them until the caterpillars spin their cocoons. A family receives approximately \$R 430 per month for its work.

The lack of information regarding the biodiversity of the Pantanal inspired the creation of the insect collection. This collection was developed in partnership with universities and researchers. It provides a very precise classification of different insect species in the region. The reserve also possesses an ant laboratory for visitors and researchers to observe the colony structure and social behaviour of these insects in play.



Caiman on a river bank

The last activity of the visit finished was a one hour tour by boat. During the visit the local guide explained the principal characteristic of the region. The Pantanal is a biome with a high biodiversity. A variety of vegetation and animals including birds, reptile, fish, snakes and mammals could be observed during the trip. It was an

extraordinary experience expressed a student. She said “It was my first time in this region and I have learned a lot”.

During the time on the river we could also observe how the surroundings are having a negative effect on the protected area. The entrance to several billabongs was closed by dense floating islands of water hyacinths (*Eichhornia sp.*). Although this is a water plant native to South America and only known to cause problems as an invasive plant in other parts of the world (Africa, Asia, North America, New Zealand, Australia), we were told that now its reproduction is out of control due to the high nutrient influx from agriculture to the rivers.

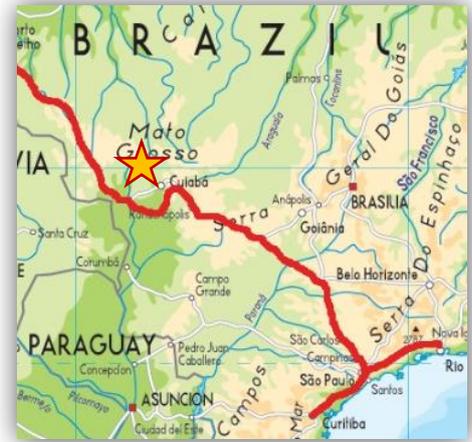
Further information:

<http://www.sescpantanal.com.br/index.php?l=en>

Floresteca – Teak plantation – 09.08.2013

Cáceres, Mato Grosso, Brazil

Completing the first week of our collaborative study trip “Brazil Norte-Sul”, we received the opportunity to visit the biggest teak producer in Brazil, Floresteca. Based in the state of Mato Grosso, the company established teak plantations in Rosário Oeste, Cuiabá, Cáceres and Redenção – Pará state with a cumulative area of 24’000 ha. Since 18 years Floresteca aims to produce and market their teak products with “social & environmental responsibility to ensure best economic return”. Two important milestones in this regard are the establishment of the first private tissue culture laboratory in 2001 and the FSC certification status since 2006.



Students in the teak plantation.

Approximately 200 employees are in charge of selecting appropriate plantation sites, producing seedlings or plant, manage and harvest the teak plantations. While 50% of all seedlings come from natural seeds, the other half consists of genetically modified clone seeds, says Aline Galdino do Nascimento, research coordinator at the company laboratory. In a multiplication process of micro propagations, material from superior trees is treated with proteins and hormones to produce cloned seedlings. The research coordinator contends that this makes the end product grow faster in higher volumes and more resistant towards sickness.

Since its inception in 1995, Floresteca predominantly bought land which was either deforested or already in agricultural use to plant their teak seeds. After 18 years of constant growth, the first big harvesting is expected to take place within the next year depending on the international market price as well as tree growth scenarios. Selective and systematic thinning

can take place all 4, 7, 10 and 15 years. This way, the company produces logs (800m²/month) and square wood (1200m²/month) for export mainly to India. Other products include lumber (400m²/month) and biomass to satisfy the high demand of the internal market. Floresteca also produces seedlings, most of which are used by the company itself. Responding to the question why the company decided to produce teak in Brazil, do Nascimento highlighted that teak, as an alternative to eucalyptus and pines, produces high quantities of wood while providing high quality for manufacturing.

The controversies around tree plantations are manifold and diverse, but despite the fact that oftentimes tree plantations reduce biodiversity and produce unwanted environmental side effects, Floresteca provides a case for a more sustainable approach. The plantations grown on formerly degraded areas reduce the pressure on cutting primary forests by satisfying demand for wood and forest area. Furthermore, Floresteca uses biodegradable bags for seeds and also complies with the Forest Stewardship Council in providing better socio-environmental conditions. On the other hand, however, one could criticize that extension plans of plantations mainly depend on demand and therefore still take away space for further biodiversity conservation. Similarly, questions regarding the use of fertilizers in the field were answered vaguely assuming that soil quality will be maintained even after harvesting. Nevertheless, company representatives referred to research currently conducted assessing the best alternatives for fertilization.

Further information/ Link:
<http://www.floresteca.com.br/>

Seringal Cachoeira – Rainforest/ Latex Extraction – 11.08. /12.08.2013

Xapuri, Acre, Brazil



Landscape near Xapuri

Deforestation along the road

“During our bus ride to Seringal Cachoeira we got the chance to see a lot of the surrounding landscape through the bus windows. Although I generally like getting impressions of the land I’m passing through, it was very depressing this time. Knowing that we were driving through a country that would naturally be covered by rain forest, it was strange to see nothing but cattle grounds. Every now and then I thought I got a glimpse of forest, always far away from the road. Of course I had heard before that deforestation starts along the roads crossing through and that, cattle follows the chainsaw to finish this process of land degradation. Still, seeing this process happen along hundreds and hundreds of kilometres is something completely different. Dry grass, dying castanheiras (Brazil nut trees) that were leftovers from the old forest, bare red soil and a land that seemed ill made me incredibly sad.”

– impressions of Isabel Stasch about the journey from Porto Velho (Rondônia) to the Seringal Cachoeira (Acre)

The group arrived in the village of Xapuri (Acre) close to the border triangle of Bolivia, Peru and Brazil around midday. The famous *seringueiro* (rubber tapper) Chico Mendes, born December 15, 1944, lived in Xapuri. Chico Mendes was a trade union leader and environmentalist. When the Brazilian government legalized clear cuts of land in the west of Brazil in order to create incentives for land owners (“fazendeiros”) to develop the region he

started an environmental movement in order to save the rainforest he and his community depended upon. The Xapuri Rubber Tappers Union was created in 1970, and Chico was elected as its president. The rubber workers union asked the



government to set up reserves as they wanted people to use the forests without destroying them. Mendes also played a central role in the creation of the National Council of Rubber Tappers in the mid-1980s. On December 22, 1988 Chico Mendes was assassinated in his Xapuri home by the rancher whose logging activities had been stopped by Mendes' successful campaigning earlier that year. Today, his home is open to the public and a museum nearby is dedicated to his work. We had the opportunity to visit both. Chico Mendes was the leader of a peaceful movement for the protection of the Amazon.

“While we had lunch in Xapuri, Professor Renato Robert told me an anecdote about the rubber tappers in Xapuri. When the machines came which were supposed to destroy the forest, the seringueiros formed a human wall out of men, women and children signalling that they will rather die than watching the forests being destroyed. They started singing the Brazilian anthem. Chico Mendes is the reason why natural forests still remain in the region”

- Corinna Bruder

“At first I thought I was fighting to save rubber trees.

Then I thought I was fighting to save the Amazon rainforest.

Now I realise I am fighting for humanity.”

—Chico Mendes



Chico Mendes (1944 – 1988)

In the afternoon the forestry expedition arrived at Seringal Cachoeira, a rubber extraction reserve of a seringueiro community. Chico Mendes' cousin Nilson Mendes welcomed and hosted us. The first activity after arriving was a long awaited soccer match: Expedition team against seringueiros. After an exhausting match the seringueiros team won 3:0 against the students. In the night a majority of the group had the opportunity to participate in a night hike through the forest under the starlit sky. After a long day in the bus and the exhausting match in the afternoon sun of Xapuri we were rewarded with some cool drinks and billiard matches in a small bar in the middle of the forest.

The following morning, at 5.30 a.m. we had the opportunity to meet with Nilson who worked as a seringueiro in the Seringal Cachoeira before, but now works as a guide, in order to share his knowledge about natural forests and about the traditional life of a seringueiro. We entered the forest, where the seringueiros extract rubber before the sunrise. At our first stop Nilson showed us how to extract rubber from the seringueira (rubber tree), to give a practical example. Mr. Mendes explained that one seringueiro works between 150 and 280 rubber trees during one working day. The trees are slightly slit in a characteristic manner with a tool named cabrita. After a few seconds, a milk-white creamy liquid drips out of the bark of the tree. It is collected in a small bowl, for instance a coconut. 15 litres of rubber can be extracted from every tree; 2 litres of sap equal 1 litre of latex. The rubber extracted in the Seringal Cachoeira is further processed in the nearby factory "Natex", which produces condoms.



Using their "cabrita", the seringueiros carve an incision in the tree's bark, which cuts through the latex vessels

The seringueiros start working before sunrise. After 4 hours of slitting trees the seringueiro collects the rubber from the bowls, which accounts for another 4 hours of work. A seringueiro walks around 15 km a day and extracts up to 7.5 kg of rubber/day. Besides this, the seringueiros communities live from small scale cattle farming and the extraction of wood. Mr. Mendes' community of 318 people owns 600 cows. 10% of the land is used for cattle farming. He also told us that before families were big (up to 10 children per family) but nowadays the seringueiro communities practice birth control, because they

realized that their rapid growth will hinder sustainable use of the forests. Thus, nowadays the average family has 3 children. Also today education is very important for the seringueiros. During the resistance against the fazendeiros, young people did not attend schools. This has changed today. They also cooperate with scientists and try to exchange knowledge, as well as integrate scientific knowledge into their work and lifestyle.

After the introduction into the life of a seringueiro, Nilson guided us deeper into the forest. The sun had already risen, showing us the overwhelming beauty of a primary forest in the Amazon. During several stops, the guide showed various Amazonian species with different medicinal uses, as traditional knowledge tells. The juice extracted from the stem of an Açaí (*Euterpe sp.*) for example can be drunk to fight a snake's venom. To drink this juice, a cup can be made out of the leave of sororoca.



A leave of the sororoca formed into a cup.

Another example is the use of the leaf of the barba de paca, which helps to stop bleedings. The quina-quina (*Chinchona sp.*) can be used as a medicine against malaria. Tea made of the cipocurimbo helps to clean the spirit. Another species that is used a lot in cosmetics is the “joao borandi”, as Nilson calls it. With other people, however, it is mostly known as “jaborandi”. Locals use this species to stimulate the senses of smelling and tasting.



Girls hugging the “Samaúma” tree (lat. *Ceiba pentandra gaerth*, also known as “queen of the forest”)

encountering snakes. Snakes raise their head and measure the height of victim and the location of the head. In order to disturb the snake, you have to raise your hands beside your

He also shared several stories about encountering wildlife. For instance, if you come across a jaguar you have to look directly into his eyes. In this situation two things are essential to have: a hat and a machete. The hat will be used to distract the jaguar, the machete to kill him. Mr. Mendes shared another useful hint about

head and start squeezing your wrist in order to increase the blood flowing through the wrist. Snakes can sense the blood running through the veins; with this trick, three pulsating spots are created. The snake will feel confronted with a three-headed monster and will decide not to attack the victim. Another lesson by Nilson applied when crossing a river between 4 and 7 pm.

In the afternoon, it is likely to encounter snakes and caimans. In order to avoid being attacked by wildlife you have to carry salt in your pockets and a knife in your mouth. He also said, that nature and forests itself are created in a perfect balance. If we want to make use of the environment and forests it has to be sustainable.

To illustrate this, Nilson shared a motivational seringueiro song, which was sung to unify people and protect the planet.

Let's go my people, let's unify
Won't let this forest fall down
If we lose the forest we lose ourselves
Climate and region will be out of control
Instead of winter summer will come
We will see the Amazon turn dry
The forest is beautiful, god gave it to us
For us to preserve with a lot of love
Hiding place for animals and shelter for men
The composer's inspection
It is the green carpet of the planet earth
The biggest richness left by nature
We have the seringueira, the mother of nation
If it weren't for the rubber, airplanes wouldn't
fly
There wouldn't be football, no fun.
It would be a sadness this piece of land.

Free translation from Portugues

Travelling from Puerto Maldonado to Cusco in Peru

Cusco, Peru, August 13, 2013



Students at the border to Peru

Puerto Maldonado is a city located in the in the state of Madre de Dios. The city has approximately 92.000 inhabitants spread out over 85.000 km². The temperature in Puerto Maldonado is around 30 degrees Celsius and it is located at 139 meters above sea level. The principal economic activities include gold mining, forest extraction and eco-tourism to the Manu National Park, the Tambopata National Reserve and the Bahuaja Sonene National Park. Puerto Maldonado is located in the Peruvian Amazon rainforest. Peru holds the second biggest territory of the Amazon rainforest after Brazil. In 2010 it was the fourth country of the world with the highest percentage of primary forest (FAO, 2010). Peru has a population of roughly



Primary forest near Puerto Maldonado

30 million people, and indigenous communities represent around 48% of the population. According to the Convention of Biological Diversity, Peru has 14 linguistic families, and 44 distinct ethnic groups, of which 42 are in the Amazon. Therefore, Peru is a multi-ethnic and pluricultural country.

One of the most recent cooperation projects in Puerto Maldonado between Peru and Brazil is the high way “The Interoceanica” for its name in Spanish which connects the Atlantic with the

Pacific Ocean. This has increased the transit of persons and trade in the region. Likewise it has increased the deforestation rates along the road and conservationists are worried that the road may have negative impacts on the nearby located Tambopata national reserve. Although there are economic advantages arising from the new road, it remains to be seen how the likewise new or increased threats to the forest will be handled.

The public transportation system in Puerto Maldonado consists of taxis, buses and the “moto-taxi” which is an adapted scooter that can transport 3 persons. The cost is very cheap from 3 to 5 soles and it has the advantages of bringing the person from door to door. The moto-taxi works 24 hours per day and creates an alternative income source. The number of paved streets has increased albeit the poor infrastructure that persists.

One of the marked differences between the cities in Peru and Brazil are related to urban transportation. In Brazil the transportation system is more expensive than in Peru. In small cities in Brazil there are only moto-taxis for single persons. The vast majority of the people using the moto-taxi as their favourite means of transport in Puerto Maldonado are tourists travelling to Cusco and the tropical forest in the Peruvian Amazon. The trip to Cusco started at 10:00 from Puerto Maldonado city and took around 9 hours by bus. From the road we observed a variety of landscapes and corresponding forest types and vegetation. It included Amazonian rain forest, flat terrain with forest and cultivated clearings, mountains and steep river valleys, higher mountains with cloud forests, and grasses and shrubs above the tree line near mountain passes.



Peru's flora above 3000m.



Peruvian subsistence farming at 4000m.

The bus crossed the Andes, the biggest mountain chain in Latin America. It arrived at 19:00 pm to the city of Cusco in the state Cusco. Cusco is located at 3.300 meters above sea level. It is known as the Capital of the Inca Empire and is characterized by a mixture of Spanish and Inca architecture. The city has a lot of national and international tourism to visit Machu Picchu and the Inca ruins.

Differences identified on the way from Brazil to Peru:



Brazilian landscape (Acre)



Peruvian landscape (Madre de Dios)

Some of the differences identified on the way from Brazil to Peru include: i) the landscape, ii) the forest and iii) the economic activities. The Brazilian territory has evident changes in the land passing from the Amazon rainforest to the grassland. The principal activity observed from the bus is cattle grazing. In Madre de Diós illegal gold mining activities have become the main cause of deforestation. A recent over flight by the Carnegie Airborne Observatory from the Stanford University showed that in the basin of the Madre de Dios River alone, around 50.000 ha of forest have been lost to mining activities. In addition to the forest losses, gold mining charges the region with contamination by heavy metals such as mercury. There are some small towns located at high altitudes with lack of infrastructure and some restaurant for travellers.



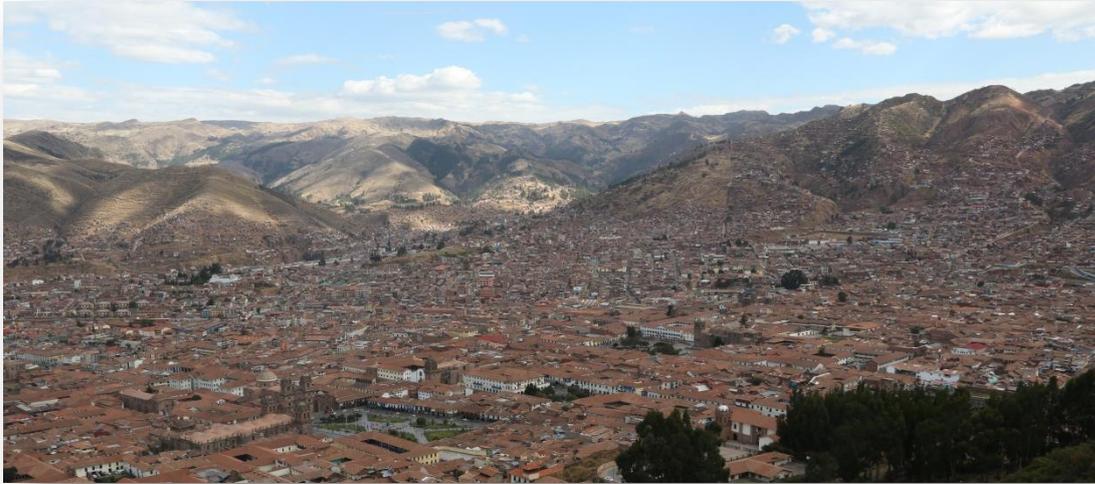
Forest destruction through gold mining in Madre de Diós (Image © Carnegie airborne observatory, 2013).

The gradient of forest types by stand structure and forest use was evident. Initially, the lowlands had patches of primary rainforest similar to those found in Brazil and in lower elevations of the Andes. As elevation increases, the continuity of primary forest cover increases due to less human utilization. Average stand diameters and heights decrease and certain species are lost due to climatic changes resulting from increasing elevation. Eventually the tree line is reached, above which grasses and scrubs leave little bare soil visible. The greatest challenge to the rainforest is the intensity and extent of human use. Especially in the lowland areas, human activity was widely spread and intense.

The trip was an excellent opportunity to discover the landscapes in Peru. The students enjoyed the trip. Their journey finished at the hotel in Cusco with a nice dinner.

Cusco & Machu Picchu – Cultural Heritage Sites - 14./15.08.2013

Cusco, Madre de Deus, Peru



Cusco, Cultural World Heritage

Halfway into our study tour through Brazil and Peru, we observed the scenic landscapes of the Andes at +4000m above sea level. While the sunset captured the wide mountain meadows in light orange, our bus passed the unique mountain flora supported by small-scale subsistence farming and grazing Alpacas of the local population. After the 10-hour drive from Puerto Maldonado, we arrived in Cusco, Latin America's Archaeological Capital and Cultural Heritage of the World.

Machu Picchu

The 14th August, 2013 a group of 11 students left Cusco around 2 am in the morning in order to visit the famous Machu Picchu. After a 6 hours ride in a small bus, we missed the connection train, which was to bring us to a town called Aguas calientes, from where the buses leave to get to the mountain top and the citadel of Machu Picchu. Thus, we had the opportunity to go on a hike alongside the track of the train, which enabled us to perceive the wonderful and breath-taking environment which surrounded us.

Machu Picchu is said to have been built under the rule of the Inka Pachacútec Yupangui around 1450. It is located on 2360 m on a mountain top between the Huayna Picchu and the Machu Picchu in the Andes, above the Urubamba valley, 75 km northwest of Cusco. Machu Picchu is connected with Cusco, which was the former capital of the Inca empire, via the so called Inca trail. Machu Picchu consists of 216 stone buildings, which are constructed on

terraces and connected via a stairway system. Scientists today assume that Machu Picchu could supply enough resources for up to 1000 people.



Machu Picchu, 15th century Inca site at 2430m.

Machu Picchu is divided into two sections; one section is the housing section with a market place and areas used for agriculture, the other section is dedicated to spiritual purposes and mainly consists of temples. Nowadays, Machu Picchu is crowded by tourists, which impose a threat to the conditions of the ruins. Due to the load of tourists the foundation of Machu Picchu is said to drop 1 cm every year. Although the government of Peru has set a maximum number of 2500 tourists daily, this number is ridiculously exceeded every day. Full of new knowledge and impressed by the design of the ruins, we left Machu Picchu around 4.30 and reached the car that brought us back to Cusco shortly after sunset. We were exhausted but all of us felt: It was worth going to Machu Picchu. 24 hours after we left the city, we returned to Cusco.

After spending two instructive days in the historic city of Cusco the study group headed back to Brazil. We crossed the frontier to Brasil at Inambari in Peru on the 16th of August, 2013 early in the morning. After a long and winding ride across the Andes, the familiar lowlands of Acre welcomed us back. Having crossed the border, the students entered the bus of the Universidade Federal do Paraná and continued the study tour, eager to learn about forest management in the state of Acre.

Complexo madeireiro industrial Xapuri – industrial wood complex – 16.08.2013

Xapuri, Acre, Brazil

The saw mill in Xapuri exists since 2005. It is part of an initiative from the former government of Acre, in order to sustainably develop the region and generate jobs for the population. It is one of the four main projects of the former governor Jorge Viana, a forest engineer trying to develop projects for the forest sector.

Other main projects are the condom factory Natex, a rubber ball factory and a Brazilnut factory. Viana calls Acre the “state of the forest” and the people of Acre “florestania” (city → citizenship, forest → forestship). The government invested 28 Million Reais into the establishment of the saw mill. The company is run by the private sector through a concession.



Workers at the saw mill

The private company pledged to buy the saw mill, the proposal is currently being analysed by the government of Acre. The wood processing company generates 112 jobs, although during peak of production up to 180 people are working in the saw mill. 30 different species are processed, all to which the machines can be adjusted to. The sources of timber are various. Nevertheless, all the timber comes from areas which have a management plan. One source is the Projeto de Assentamento Extrativista (PAE) Chico Mendes. The wood in the saw mill is partly FSC certified. During the rainy season no wood is harvested in the forests.

The wood is mainly used for the construction of doors, houses, floors and furniture. 50% of the production is for domestic purpose, the rest is exported to e.g. China and Spain. 25% of the production are left overs. Sawdust and woodchips are used for energy generation in order to supply the energy demand of the machines.

After the sawing process the wood is dried and treated with chemicals. This surprised some of the German students, since the use of this kind of chemicals is already abandoned in Europe. The treatment prevents the infestation by fungi and termites. We were impressed by the tree

trunks “waiting” to be processed in front of the saw mill. Some of them had a diameter of around 150 cm, making some of the smaller students disappear behind them.

The trees are harvested with chainsaws and pulled with a skidder, which causes high soil compaction. A harvester, as it is used in plantations in the south of Brazil, would have a smaller negative impact, however the costs for investment and maintenance are high.



Some of the tree species mainly processed.

Natex - condom factory - 16.08.2013

Xapuri, Acre, Brazil

The traditional method of collecting rubber from native latex trees has not changed in the past 200 years. Now that we had seen the latex collection method and could appreciate the trees in the forest, we continued our trip to explore some of the modern uses of latex. The condom factory Natex is located in Xapuri and it was created in 2008 by the federal government of Acre. It is a very interesting example of how the use of non-timber forest products can be combined with the creation of income and sustainable development.



The factory has 167 employees which are all from the region and from Xapuri. Thus, the factory is very important for creating jobs and income. Another benefit of the factory is that it provides a perspective for young people that are well educated and trained to return to the region and find good jobs. The two ladies who showed us around the factory told us that they had left Acre to study but then had returned to work at the factory.

In the region of the factory the forest is divided into seringais, which are patches of rainforest that contain a number of rubber trees. Each seringal is harvested by one family. The existence of the factory enables the rubber tappers (seringueiros) to continue practicing their traditional profession and it provides a secure income. Furthermore, it provides an incentive to maintain as much forest with rubber trees intact since the rubber gained from wild latex trees has a much higher quality than the one from plantations and since the factory pays around three times for the litre of latex than the normal market.

Latex is collected by 500 families that live in the region around the factory. They are given collection buckets that can hold between 30 and 50 litres of latex and have two weeks to return them. The buckets are also filled with between 1.5 and 2 litres of ammonia which is important because it maintains the rubber in liquid conditions. For families that do not directly depend on the recollection of latex there are smaller buckets available of 10 litres with which they also can deliver latex to the factory. Before the latex is delivered to the factory it

has to pass a quality control. Latex samples are weighted and then dried and weighted again, also a mixture of different buckets is tested in the same way in order to see if the quality stays at the same level. Latex of low quality is not discarded since it is used to make rubber for other purposes. Once the latex buckets reach the factory they are emptied and washed, a bucket can be used for six months and after wards it is passed on to the municipality which turns it into a trash bin to be used in cities. After another quality analysis, the latex is passed on to a centrifuge, there most of the ammonia and impurities are separated from the latex. The cleaned latex can then be stored for up to two years in tanks, but usually it only stays for two months to become more resistant. After wards the latex is ready for condom fabrication. To make the condoms, the shapes are passed two times through a bath of liquid latex which has to be at a temperature of between 25 and 45°C. Otherwise if the latex gets too cold it becomes stiff and if it gets too hot it coagulates. After two layers of latex are applied and dried, the characteristic border of a condom is shaped. The condoms are ready now but they need to be cleaned. They are put in big washing machines and then they are dried. Now the very important step of quality control takes place. A laser checks every condom for holes and imperfections. Those that are found to be useless are passed on to the production of tires and shoe soles. The same machine that does the quality control is also used to roll up the condoms.



Packing station at Natex. Source
<http://www.flickr.com/photos/valfernandes/5078620452/>

They are then passed on to the next production step, where they get applied some lubricant and are packed. The factory produces around 90 Million condoms a year and one litre of latex can be used to produce 333 condoms.

What is very special about these condoms is that the health ministry of the federal

government distributes them free of cost. Mainly the northern states of Brazil are supplied with condoms from Natex. However, there are distribution problems and for example the state of Tocantins is still not supplied with condoms.

The factory is an enterprise by the Brazilian government and is thus subsidized. In the near future the plans for the factory include an expansion of the condom production capacity as well as starting the production of rubber gloves. We asked if a higher demand for latex would maybe lead to an over-harvesting of rubber trees but we were told that sustainable use of rubber trees was not in danger since in the radius of 180 km² around the factory there were still many families waiting to deliver latex.

The visit to the factory was a great experience. We were able to see the whole production process and it was interesting to see how a well designed and implemented government project worked. The seringueiros deliver the rubber, the locals get jobs, the factory produces condoms and these are distributed without cost to the population. In addition there is a strong incentive to manage the forests sustainably to guarantee the continuity and expansion of this project.

Floresta – forestry company – 17.08.2013

Río Branco, Acre, Brazil



Forest politics in the state of Acre and Floresta

We arrived in Rio Branco, the capital of Acre, close to midnight and set up our tents on a camping site. For the next day we had scheduled a visit to Floresta, a young forestry company that is trying to establish plantations with native trees and Eucalyptus in the state of Acre.



The activities of the day started with introductory talks on the political framework of Acre. This was very interesting because the state of Acre in Brazil is a pioneer in implementing laws and establishing institutions that have

led to the reduction of deforestation rates. Today 87% of the state's area is covered by forests and a system of protected areas covers 50% of the total state area.

We learned that Acre is the only state in Brazil that has an institutional framework for promoting environmental services (Sistema estadual de incentivos a serviços ambientais). This framework was implemented in 2010 after extensive and very important public consultation. There is an incentive programme for carbon (ISA Carbon) which according to the WFF (2013) is the most advanced regime in the world implemented at a state level. Additionally, the state of Acre is being visionary in including other ecosystem services (climate regulation, biodiversity, scenic beauty, water provision, cultural values and traditional knowledge) into its policies and incentive programmes. Another positive aspect of the environmental payment scheme of the state is that any person or group, that preserves or restores environmental services, counts as a provider and can thus participate.

Since 1999 the government of Acre has implemented a series of social and environmental policies that have slowed down deforestation. That year the so called "Chico Mendes law" introduced subsidies for rubber production out of natural forests. Now the state has laws to promote the sustainable use of forest products as well as prize incentives for these products

and public investments in processing industries. The condom factory and the sawmill we visited are examples of these investments. In 2000 and again in 2007 an extensive ecological-environmental zoning was performed which now allows for a better territorial planning. Since a law can only fulfil its purpose if there is law enforcement, the state also developed an advanced system to consistently monitor forest cover. Further state policies include the management of public forests and the very important aspect of the restoration of degraded areas.

In line with the progressive forest politics of the state, a government tree nursery was created in 2005 by the governor Jorge Viana. We visited the nursery and were told, that it produces seedlings of 70 native species, including fruit trees and woody species. Around 1 million seedlings are produced each year and they are donated to people. The idea



Learning about the tree nursery

is to produce material for urban arborisation or the restoration of degraded areas. The tree nursery also included an agroforestry testing area where some timber trees were combined with smaller seedlings. There is a separated area to produce seedlings of the very valuable Brazil nut trees, because they have a five month germination period. Interestingly, there also was a centre for the micro-propagation of pineapple and bananas. One small piece of pineapple can be used to produce around 1000 seedling. Especially bananas suffer from plagues (*Cigatora negra*, *Cigatora amarella*) and the seedlings distributed by the state were developed to be able to resist it. In comparison to the tree nursery Biovert which we visited in the State of Rio de Janeiro, this nursery uses an industrial substrate that contains all the required nutrients for growing all the tree species. The state government will provide funds only until 2016. Therefore, the nursery will probably start to sell plant material at production costs.

Our day ended with a field trip to the experimental plots of Floresta. We saw small plantations of Eucalyptus, Mulateiro (*Calycophyllum spruceanum*) and Paricá (*Schizolobium amazonicum*). As we were told by our Brazilian colleagues, the company is doing an important job in a threefold way. First, it is doing research on eucalyptus plantations for which there are good growing conditions in the state of Acre but no experience. They plan to use the Eucalyptus and Mulateiro for energy production in small thermoelectric power stations. Second, it is doing research on plantations with native species, like the Mulateiro tree but also with Paricá and Samaúma (*Ceiba pentandra*) which will be used for producing (ply) wood. Third, the aim is to have plantations on formerly degraded areas and thereby recover them. The biggest stepping stone for creating a company like Floresta might be the significant initial investment. At least in the first seven year until the first Eucalyptus trees can be harvested, the company's only income is from the environmental services it can provide. This again brings into evidence the importance of well-designed state policies to support companies in the development of sustainable businesses. The work of Floresta is very much in line with the politics of the stat of Acre which tries to support a forest based economy and the multiple uses of forests because it is attempting to establish a silvicultural system with and complete value chains.

Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA) – forestry research – 19.08.2013

Río Branco, Acre, Brazil

As part of the trip the group visited the headquarters of the “*Empresa Brasileira de Pesquisa Agropecuária*” (EMBRAPA) in the city of Rio Branco, in the state of Acre. EMBRAPA is a public enterprise which belongs to the Ministry of Agriculture. It was founded in 1973



and it has offices in the majority of Brazilian states. EMBRAPA aims to promote research, innovation and sustainable development. The enterprise supports the development of local knowledge and innovations according to the local circumstances and needs. The visit to the EMBRAPA office in Acre aimed introducing to students innovative solutions for improving forest management at the Amazon rainforest as well as presenting some research developments. The visit was divided in three parts which included:

1. Lectures on innovative tools for forest planning;
2. Lecture on research project of bamboo;
3. Field visit to the research camp.

During the visit the students had the opportunity to discuss with researchers and local experts about sustainable forest management and other innovative projects of EMBRAPA. The first lecture was related to the Digital Model for Forest Exploration (MODEFLORA) and the technology of Light Detection and Ranging (LIDAR). Afterwards, a lecture concerning the many uses of bamboo was presented.

Brazil has a total area of 851 million hectares, 477.7 million of which are covered by natural forests. The state of Acre is located in the Amazon rainforest and it maintains more than 86% of its original forest cover. With the objective of improving forest monitoring the “*Modelo Digital de Exploração Florestal*” (MODEFLORA) was developed. It is a process of forest planning which uses geo-referencing. It is part of the latest innovations for forest management in the Amazon. The process uses GPS, GIS and Remote Sensing for mapping the forest area. The stages of MODEFLORA include: i) Preparing a digital forest inventory; ii) Producing a precise micro mapping; iii) Planning the exploration; iv) Developing dynamic maps; and v) Working in the selected areas for management of the forest.

The process MODEFLORA was tested in more than 11.800 hectares during two years engaging

five wood enterprises. The principal conclusion is that the model is very precise, has a high efficiency and supports the decision making process for wood use. The advantages of this model are the reduction of the costs for elaborating maps in at least 30%, as well as a lowering of the environmental impacts. This technology is improving forest management in Acre and the idea is that later it can be used in other states with of the Amazon rainforest in Brazil.

Light Detection and Ranging (LIDAR)

During the lecture another technology for forest management was presented. It is called "*Light Detention and Ranging*" (LIDAR) is a new optic technology of remote detection that works with three dimensions for improving the planning and monitoring of the forest inventory, as well as for measuring the carbon storage, the biomass and the ecological forest dynamic. This technology measures



3D image produced by LIDAR.

the properties of the reflected light to obtain the specific characteristics and the distance of a specific object. LIDAR is used for generating high resolution digital models of the forest.

Lecture on research project of Bamboo

The second lecture was related to the Bamboo research project lead by EMBRAPA. During the presentation it was highlighted that the bamboo is part of natural vegetation of the Amazon rainforest and that the Acre is the state with more species of native Bamboo in Brazil. The researcher mentioned the existence of around 1300 species. It has been used for millenniums for multiple uses. Currently EMBRAPA is leading multiple researches to explore the alternatives for promoting the use of bamboo for proposes such as: construction, furniture and floor material. These projects aim to contribute to the sustainable development of the local communities and sustainable management of the forest. The advantages of using bamboo include the high productivity which is similar to the Eucalyptus, the possibility to grow in a variety of climatic conditions and the big capacity to store carbon.

Field research by EMBRAPA

After the lectures the students had the possibility to visit the research camp which has a territory of 1200 hectares (900 are primary forest and the other 300 are dedicated to research proposes). In this research camp there are a nursery of native and exotic species, multiple experimental plantations which are monitored permanently and other agricultural and forestry projects. The results of the research are used for improving the rural development of the region.



Plantation site at EMBRAPA

EMBRAPA has developed multiple technologies and innovations which are used for the enterprises and the local communities. This enterprise is an example of public investment on research and innovation for improving local development.

Further information/ Links:

<http://www.embrapa.br/>

Fundação de Tecnologia do Estado do Acre (FUNTAC) – foundation – 20.08.2013

Rio Branco, Acre, Brazil

Having experienced different management approaches of forest concessions, FUNTAC, the Foundation of Technology of the State of Acre, is concerned with the sustainable management of state forest through technological advance. In the days to come FUNTAC would present us with the practical application of precision logging and road construction in the state forest of Antimary. Beforehand, however, we visited the headquarters and research facility in Rio Branco. Here, studies are being conducted on topics related to forestry, medicine, and engineering. In particular, we went through 5 research areas concerned with:



- Application fields for bamboo;
- The use of natural products in renewable energy systems (Biodiesel);
- The use of non-wood products in cosmetics, food, pharmacy and phytotherapy;
- Seed micro-propagation;
- Explorative research on orchids.
- Further topics include forest fire observations, geo-processing and pavements.

FUNTAC has analytical tools for performing physical and mechanical lab tests to determine the origin and characteristics of wood. In the first laboratory, researchers look for new species for better use in products. The current issue for the government is the abundance of bamboo in the state and how to use it efficiently. Since bamboo is fast-growing and varies in (levels of stability) throughout its growth process, it is rather difficult to make use of it as a construction material. Therefore, FUNTAC conducts experiments with bamboo in combination with milk boxes, saw dust, pressure and other species, e.g. Samaúma, to produce durable plywood. The government supplies money to support the structure and projects.



Heating furnace at FUNTAC's research facility.

In another research area, FUNTAC helps to develop renewable energy systems for remote and isolated groups of communities. Solar panels, biofuels and wood-efficient stoves are their three focuses for the promotion of a sustainable cycle. In a first proposal developed by FUNTAC, communities could extract the Murmuru (*Astrocaryum murumuru*) nut from their surrounding forest, separate oil from the nut, produce their own biodiesel for electric energy production. However, the price range of the nut which grows naturally is higher in cosmetics (R\$ 35/kg), which makes FUNTAC reconsider their proposal.

This cross-cutting issue is also addressed in another lab. In the lab for natural products, oily woods are used for non-timber products in cosmetics, food, pharmacy and phytotherapy, i.e. medicine with a close-to-nature extraction process to preserve the complex of active substances of herbal plants. What is innovative about this lab is its sense for application. Researchers work on phytotherapy to develop simple extraction techniques, which are then taught to and used by the forest communities themselves. This process is equally funded by the state.



Cosmetics products by FUNTAC.

The fourth laboratory focuses on seed micro-propagation. Its work also considers the needs of communities. Acre is a poor state with poor villages in which subsistence farming is dominant. Hence, FUNTAC helps farmers by offering them to sell their seeds and seedlings through their cooperatives or simply produce seedlings for them in the laboratory. All of this is a non-profit activity of the company for which it receives funds from the state to cover expenses. Furthermore, the lab works with species for medicinal use, food production and bamboo and researches on best growing conditions for species. In the days to come we would see this research to be applied hands-on.

Further information/ Links:

<http://www.funtac.ac.gov.br/>

FUNTAC – forest management – 21./22.08.2013

Antimary, Acre, Brazil

After breakfast, around 9 am the expedition team left the camp in order to participate in the opening of a permanent road into tropical rainforest. The ride in the truck was as bumpy and dusty as the days before. Some students welcomed the new and already hot morning with some Brazilian and international songs; some taste of gasoline filled the warm air. When we reached our destination in the middle of the forest, we could already hear the destructive sound of a giant machine.



Truck transfer to the logging area in Antimary

During a small presentation we were taught that the permanent infrastructure built into the forest enables vehicles to get into the forest and the wood to be extracted. The roads are built one year before they are actually used for transportation. Unfortunately, the summer in Antimary is not long enough, thus wood already needs to be transported along the new roads before the period of 1 year has passed. A main road is 6-8 meters wide; side roads reach 4-5 m. Piçarra is a special mud able to hold the weight of the vehicles. Before the tractor D-50 enters the forest and starts opening the road, a team of workers marks the tractors way attaching colourful strips to the trees alongside the future road.

Criteria for the location of a road:

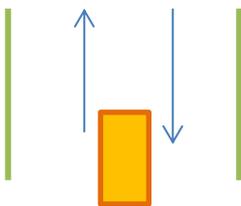
- Rivers are avoided. The tracks are planned without the need to cross a river (best case) in order to avoid additional infrastructure such as bridges
- The route with the least density is chosen in order to avoid the felling of big and valuable trees during the road opening

Most of the vegetation destroyed by the machine does not have commercial use and is left at the side of the road. Normally for each Forest in Brazil with a management plan, the land is divided into UPA's (Annual productive unity). Each UPA can only be logged once in 30 years. These are further divided into work units (UTs). Within the UT's 100% of the area is assessed

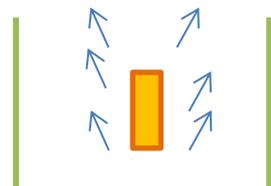
and all trees with a diameter bigger than 35 cm are recorded. The operational license (LO) for logging is given for the UPA each year from the IMAC (Institute of environmental control in Acre). The roads need maintenance every year while working in an area. When the harvesting in a certain area is finished, the roads will be covered by natural regeneration. After 30 years, when the next harvesting is allowed, the same roads will be opened once again in order to facilitate access and transportation. The IMAC checks the roads, log yards and the permanent conservation area. 3% of the Antimary forests are open for infrastructure construction.

Manner in which the machine cuts through vegetation:

1. Tractor pushing forth and back



2. Tractor pushing the vegetation aside



John Dillinger Truck for road construction



Newly created road.

The wood from the Antimary forest management is FSC certified. Two students had the opportunity to take a ride on the tractor and get a different perspective of the road construction process, sitting in the operator’s cab themselves. Corinna Bruder shared her experience after getting off the machine:

“It is incredible how the machine “eats” its way through the forest. The unstructured and non-insuperable wall of green in front of us disappeared in only a few seconds. In some moments I thought that, this time the machine wouldn’t make it through the dense vegetation, but I was wrong. The machine flattened everything, no matter whether it was a big tree or only some shrubs. An impressive experience.”

In Acre, everybody can buy forest if the forest is for sale. Nevertheless, an annual operation plan (POA) and management plan is obligatory in order to obtain a license which allows for the logging of 20% of the area. Since Antimary was granted a concession, forest cannot be bought by private persons. During a concluding round the students had the opportunity to clarify and ask questions. One student asked whether there were ways to improve this shocking way of forest destruction for infrastructure and also the logging process we had witnessed the day before. The answer was quite short and clear. The Amazon is a very diverse biome. It is difficult to use techniques such as logging from an airplane, which is used in other regions. The machines are rustic because the terrain is variable. Professor Robert also mentioned that this way of managing the forest is better than converting the forest into agricultural land or pasture. The forest has to have a value, in order to convince people to manage the forests with a long term perspective and not just to cut them down. The other alternatives are worse than this forest management.



Students on a woodpile in Antimary.

Full of new impressions we went back to our camp. As always people in the back of the truck were covered by red dust, which was churned up by the weight and speed of the cars on the unpaved roads. After lunch it started to rain. We were relieved from the heat and humidity, and thankfully breathed in the cool, fresh and

clean air. Another truck ride brought us back to the main road and our bus then brought us back into civilization, back to Rio Branco.

Madegran & Laminados Triunfos – wood processing industries – 23.08.2013

Rio Branco, Acre, Brazil

On the final day of our study trip we visited industries in the next steps of the timber value chain. At Madegran, a medium sized saw mill near the city of Rio Branco, we could observe how a big log was processed and how the blades of a large saw were sharpened. The company has the permission to harvest 18000 m³ of wood out of its annual production units and has a



Workers at the Madegran saw mill

daily production of 75 m³. The saw mill has one straight saw and one round saw and we were told that it is generally operating on a low degree of technology. Logs are cut year round but taken out of the forest only in the dry season. After wards they are stored in the open, which does not provide the optimal storing conditions considering the high humidity and abundance of fungi. The log that was being processed at the time of our visit was actually too big for the company's saw, so the operators were juggling around to get it through. The question arose, of why they even cut logs that are too big for their saw, but we did not receive a satisfactory answer. However, we were told, that the lack of well trained staff and better technology in the saw mills of Acre are important causes for the inefficient use of timber resources. Much more investment and education is needed to counteract this problem.

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The second visit of the day took us to Laminados Triunfo, a company producing wood products such as ply wood and logs. We could observe the whole cycle of ply wood production from the arrival of the logs to the gluing and pressing of the thin wood planks. It was very interesting to see how huge logs were peeled like a potato by big machines to produce the ply wood components. The company has forest concessions for 30000 ha and harvests around 4000 ha a year. It used to be FSC certified but the company director told us that due to the financial crisis in Europe and the decline in the market the demand in Europe had decreased so much that it was not economically viable anymore to pay for the FSC certification.

Now the company mainly produces for the internal market and the US which have no high demand for FSC certified products. Even so the director said the FSC standards were still fulfilled. With the problems on the timber market the company has put a bigger focus on the production of energy from burning wood residues. It is building



Heavy duty truck carrying a Samaúma.

two power plants which will have the total capacity for producing 34 MW. They will sell 25- 27 MW to the local electricity company and use the rest to power their own machines. The energy sold will be sufficient to cover the demand of a city of around 300000 inhabitants. Around



Ply wood factory at Laminados Triunfo

60% of the fuel demanded by the power plants will be provided by the left overs of production and it is therefore smart to combine both processes. Especially now, that the growing economy of Brazil is demanding ever more energy it is nice that a renewable source for energy production is used. However, a very important question that has to be asked is if forest management might change to the worse if it becomes more valuable to burn wood than to use the timber. We worried about the possibility that a perverse situation may arise, where doing clear cuts for energy production gets more valuable than any other forest use. An alternative could be provided by energy wood plantations with native species.

After the final visit we returned to our camping site in Rio Branco and prepared for the final farewell party with churrasco, good music and new good friends.

Reflections on the study trip Brasil Norte-Sul

by Cristina Urrutia

For the last three weeks, I had the great opportunity to take part on a forestry study trip across Brazil. It was organized by the Federal University of Paraná which also provided the bus that became our substitute home for the time of the journey. 43 students from Brazil, Germany, the US, Colombia and Peru travelled and learned together about Brazilian forest use and conservation.

We started from the city of Curitiba which is located close to the Atlantic coast and finished in Rio Branco in the Amazonian state of Acre. During the journey we travelled through the Mata Atlantica, the Amazon rainforest, the Brazilian Cerrado, the Pantanal and the Peruvian cloud forest. In all honesty, it has to be said that the predominating view out of a bus window is the one of seemingly endless pasture lands and agricultural fields. Smoke and even fire are often visible and the forest is usually far away in the horizon. In Peru the depressing sight of gold mines is added to the picture.

Even so, this trip has left me with a sense of optimism, because I have seen some of the efforts the Brazilian state and people are doing to protect their forests and manage them sustainably. We visited a tree-nursery which produces seedlings of native species for the restoration of the Mata Atlantica, forest of which only seven per cent are left. At the Chapada dos Guimarães National Park we saw the Cerrado and met a team that is doing a great job to protect the park from fire and settlers. In the Pantanal we visited a private initiative for the conservation of this important Biome. We got an insight to the forest industry in Brazil that ranged from timber and fiber production in plantations to the low impact harvesting of native forests. We saw teak and eucalyptus plantations but we also visited a company that is researching the possibility to do plantations with native tree species. It was also interesting to visit processing industries such as saw mills, a company that produces ply wood and a condom factory which produces products out of native rubber.

Maybe the most interesting and inspiring visits took place in the state of Acre where we learned about the history of the rubber tappers of Acre and saw how the state government is implementing policies to foster the sustainable use of timber and non-timber forest products alike. As I learned from this trip, the new Brazilian forest code, which was harshly criticized by

conservationists, does in fact provide strict legislation for the conservation of riparian buffers, hilltops and steep slopes. Each land owner has to protect these areas in his properties and establish permanent conservation areas. Also, the Brazilian government and the state of Acre fund extensive research on forest use, management and the development of new technologies. I think that on the long term, this might make a difference in conserving the Amazon rainforest and it is therefore good that cooperation between Brazilian research institutions and Peru is taking place.

Of course there are still some problems and so for example the saw mills of the state of Acre only work with low technology and therefore waste a lot of wood. Law enforcement and the correct application of laws are a problem, sometimes just because there is a lack of knowledge regarding them. In other Brazilian states legislation is even less protective than in Acre and may thus be ill suited to protect forests and ensure a sustainable use. There is also still a big lack of knowledge regarding the variety of tree species and their ecology which is needed for better management and law enforcement. As I was told, the federal state is making too little investments to develop the forestry sector and the lack of a strong lobby that can advocate for forests is apparent. Also, the pressures of the population and the demands of growing economies remain.

However, I think that this study trip is one of the best examples of how we can start to deal with these challenges. It provided education and the opportunity for a critical exchange between different views and backgrounds. A Brazilian girl from Curitiba told me that Brazilians were the keepers of the forest. Now, it is in our hands to cooperate with them to find the right balance between forest use and conservation and develop solutions for the problems of the future.



The Brasil Norte-Sul Study Group 2013.