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WELCOME TO AFRICA

Scientific Cooperation Network on Climate Change Adaptation

STUDENTS EXCURSION

„Summer School on Climate Change Adaptation"

8 – 22 March 2014

Addis Ababa / Wondo Genet, Ethiopia

Technische Universität Dresden
Faculty of Environmental Sciences
Institute of International Forestry and Forest Products
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In the beginning of March a student group of the TU Dresden headed to Ethiopia together with Prof. Dr. Jürgen Pretzsch and staff members of the department of Tropical Forestry, in order to participate in a "scientific network on climate change adaption". The workshop incorporated many excursions as well as a lectures held by network participants from Ethiopia, Sudan, Tanzania, Uganda and Germany from 12th-13th of March 2014 promoting newest scientific insights aiming on climate change adaption.

Day 1 (Su, 9th March) Social and Cultural Program Addis Ababa

Tamara Karp, MSc student, Tropical Forestry

Our first day in Ethiopia started with breakfast when we made the acquaintance with the African participants from Sudan, Tanzania, Ethiopia and Uganda and also with the Ethiopian staple food Injera (a kind of large, flat, sour tasting, spongy pancake made of teff flour, which is used to grasp other dishes served with it). After everybody was sated, we left our hotel to explore the city of Addis Ababa. During the bus ride to Entoto Hill - our first stop - we got a first impression of Ethiopia's capital. Loads of mini-buses, people and animals on the streets made clear that life in Addis happens outdoors. Entoto Hill is covered with Eucalyptus trees,

the first of which was brought from Australia to Ethiopia by Emperor Menelik II. Reaching a height of 3200 m a.s.l., besides its historical importance, the hill nowadays also serves as training ground for the successful Ethiopian athletes. Our first attention was for the Emperor Menelik and Empress Taitu Memorial Museum, where numerous historical artifacts were exhibited. Among a lot of different clothes, royal crowns, books, music instruments, religious utensils, paintings, bank notes, hand-woven fabrics, and presents from other countries, we could also marvel at an Olympic gold medal which was won by 22-year old Ethiopian marathon runner Gezahegne Abera at the 2000 summer Olympics in Sidney. Another gem was a rifle, which the emperor used in the famous battle of Adwa, when Ethiopia defeated Italy and as the first African nation that defeated a colonial power, not only gained its independence but also became the focus of the world's attention. Subsequently we had a short look at the colorful Entoto Maryam church which was built by emperor Menelik II and his wife Taitu and where the emperor was crowned in 1889. As the church was surrounded by praying Ethiopians, we went on to the palace of Menelik II. Highlights of the palace were certainly the wall pegs made out of cow horns and a natural refrigerator which was - according to the guide - used to cool beer and the local honey wine 'tej'. On a small viewing platform we had a stunning vista on the city of Addis and the aromatic smell coming from numerous *Juniperus procera* trees (Juniper/Wacholder), motivated some of the participants to consider opening a 'Sauerkraut'-business in Addis. However, the idea was cast away later on, as Ethiopians turned out to be not very happy to try out new things as to food.

Our next stop was a local market, where we were able to prove our negotiating skills and stock up with traditional scarves, clothes, tasty fruits and the

stimulating plant Khat (although supposedly none of the participants was persistent enough in chewing to feel the stimulating effect). After the market, we finally made our first Ethiopian eating-experience. Loads of tibs (small pieces of sautéed or grilled meat with vegetables and chili), wats (stews of meat or vegetables) and injera (of course) were ordered and delightfully eaten with our hands.

In the afternoon the group split: one part decided to pay a visit to 'Lucy', a 3,2 million year old hominid skeleton exhibited in the Ethiopian National Museum, the other part went to the Red Terror Martyr's Memorial Museum, where we learned about the killing of up to 500.000 people, committed by the Derg, a military junta under leadership of Mengistu Haile Mariam between 1977 and 1978. In the late afternoon we finally walked back from Mesquel Square outside the museum to our hotel, where we finished the day with a tasting of different Ethiopian beer types.

Day 2 (Mo, 10th March) **Forestry and related fields in Addis Ababa**

Alexander Pinkwart, BSc student, Forestry

Day 2 of our excursion to Africa dealt with a closer look to forestry and wood related projects. After a pleasant breakfast with strong Ethiopian coffee we went by bus through the city center of Addis Ababa to the Forestry Research Center of Ethiopia (FRC). This Center is a part of the Ethiopian Institute of Agricultural Research (EIAR) and is situated in a suburban area of Addis. The FRC has created 4 different research teams (1) Plantations & Agroforestry, 2) Natural Forests, 3) Non Timber Forest products, 4) Forest product utilization) which run different projects. Moreover FRC owns several greenhouses, run poplar breeding experiments, as well as a tree nursery with adjacent seed collection and progress (done by hand). 75% of Ethiopia's nowadays fuel and construction wood derives from unsustainable sources. Hence, there is a huge demand for plantation and afforestation projects. FRC provides these projects in Ethiopia with seedlings of suitable provenances. At a coffee ceremony, celebrated by the FRC, we further discussed the heard projects of FRC and could even talk with some of the researchers. Afterwards we continued with a visit at the International Livestock Research Institute (ILRI) that is located nearby FRC. The ILRI also cooperates with institutions like CIFOR or ICRAF and is mainly funded by the World Bank. Here we had also a nice lunch in the cafeteria with a subsequent coffee and a walk in the park.

In the afternoon we had a look at the African bamboo project, which aims on creating a fiberboard made of bamboo with homogenous characteristics. This can be utilized in construction sites in Ethiopia and is due to the 2 natural occurring Ethiopian bamboo species a way of

creating new construction material and a new cash income possibility for farmers. The fiberboards are cut and thermally modified in order to dissolve sugar and other residues from it. Glued together they get the board shape. This project is executed by a small sawmill in Addis Ababa who also sells furniture and other wood products. Our last stop for today was at a micro enterprise site, where small enterprises are supported by the state in order to develop a basic progress and market for their products. There we could watch other bamboo products, locally produced by one of the enterprises. Furthermore the enterprise collective had a shop where for instance coffee, fabric and small chairs (made of one piece of wood) could be purchased. With a small walk through the city or just a beer after dinner and good talks about the experiences we finished the day.

Day 3 (Tue, 11th March) Gums and resins in Nazareth

Robert Starke, MSc student, Wood Sciences

After an early, but good breakfast with omelette and tea or coffee, we left the Ras Hotel in Addis Ababa at 8 am. Our aim was to leave Addis Ababa to see the gums and resins facility in Adama (Nazreth). Although there was an enormous traffic jam we could luckily pass through without losing too much time. On the way we watched heavy haulage in direction to Addis Ababa. Lots of materials are needed for constructions in the fast growing city. Before passing the city Debre Zejt we saw volcanic mountains on the left side and the beautiful country side south of the capital. At around 11 am, we arrived at the gums and resins store house. We got a short introduction by the owner and went directly into the warehouse. There were lots of sacks full of frankincense (*Boswellia papyrifera*). The employees were dividing the resins into different quality classes. The best quality class has been known under class A. Pieces of this class had a yellow colour without any impurities. We tried some small pieces by chewing. It is antiseptic and healthy for the throat. Actually frankincense is used for religious purpose by burning the resins and emitting the smoke in the holy place. Everybody was interested in this non-timber product. In the second and third room we were introduced to the resins named Gum Arabic. There were the species *Acacia senegal* and *Acacia seyal*. It was hard to distinguish the species from each other. *Acacia seyal* looks whiter than *Acacia Senegal*, which has an orange colour. Both resins are used as an ingredient in soft drinks e.g. juices and Coca Cola. We left the place and visited a second facility in Adama, where resins were sorted. The weather was nice and the sun was shining. We enjoyed the lunch in a restaurant nearby. Our next destination was Langano – one of the Ethiopian rift valley lakes. It was a long journey from Adama via Mojo to Sabana Lodge. The rift valley is a flat area with surrounding volcanoes and a breathtaking view. As it was already late (around 5 pm) we decided to stay at the lake for a little while for having a presentation about the recent geological activities and go swimming. The lake Langano has high sodium content. For that reason there are no bilharzias and swimming is possible without jeopardizing health. After this pleasant stay we travelled with our bus to the final destination Wondo Genet College of Forestry and Natural Resources (WGCFNR). As it was already dark, everybody was happy to arrive without any complications.

Day 4 and 5 (Wed & Thu, 12-13th March) Workshop

Attendance of the Workshop with presentations and discussions on three research fields:

1) Climate Change Adaptation and Mitigation
2) Buffer Zone and Collaborative Land Management
3) Value Chains

Day 6 (Fri, 14th March) Fieldwork

Maximilian Klöcker, BSc student Geography

On our first day of field work with Dr. Fritz Haubold, the group of students went at first to the Arboretum. There, the group had a closer look at the volcanic rocks which are the basement of the soil building processes. Its red color is caused by iron inside of the basaltic rocks. The impact of eucalyptus on the underneath soil was clearly visible in this area, too. The leaves rot very slowly and this leads to high acidity of the soil. On the further way heading up the hill deeper into the forest there was an ongoing discussion about the vegetation. The group concluded that the local forest was not a mist influenced forest. This kind of forest occurs in the regions of Malawi and Uganda at an altitude of 2000 to 3000 meter and the density of vegetation is higher than in the college. In Wondo Genet there is only secondary vegetation with small tree coverage, big tree crowns and a lot of vegetation underneath the trees. Roots on the surface stabilize the trees and provide some additional nutrition from the upper parts of the soil. The forest area is highly vertically and horizontally structured. There is not much litter from the trees and the amount of solid material like rocks in the upper parts of the soil is really high. Due to the location on the mountain slide the soil is not very deep. After some hiking, the group reached a soil profile where Dr. Haubold explained the different layers in the soil: (from top to bottom)

II: different layer because of allochthon displacement from upslope

Layer	Properties
L	Litter layer, leafs and rotten organic material
Ah	Organic influenced upper layer of the soil, about 3-4% of organic material
AhBv	Changing layer from upper organic influenced layer to mineral soil layer, clay is dislocated from the upper soil layers down
BvCv II	Changing layer from mineral soil layer to rock dominated layer
Cv II	Rock dominated layer

Later on a viewpoint with a tower was reached where a presentation about the geology and evolution of the main Ethiopian rift valley was given. But due to a nearby thunderstorm the group decided to return as fast as possible back to the college. Dr. Haubold explained the evolution of the landscape, the caldera in which the whole Wondo Genet area is located and also the effect from the hot springs and location of the college to the near mountains which are important for the water system and hence for the vegetation in the college area.

After the fieldwork the students had some hours of free time which was mainly used for a short visit to the near town Washa. At 4 pm the whole group left by bus to the hot springs where everybody had the chance to take a relaxing bath. In the evening we had dinner in the restaurant located near to the hot springs and all returned to the college by bus afterwards.

Day 7 and 8 (Sat & Su, 15-16th March) **Bale Mountains excursion**

Manuel Göbel & Johannes Lindenberg, BSc students, Forestry

On the seventh day of our trip we started a two days excursion to visit the Adaba-Dodola forest priority area, which is located in the Bale Mountains region, about 400 km southeast of Addis Ababa. After the arrival in Dodola, we met several stakeholders and started to head towards the forest. During the quite long walk we could see the problems the region is facing: over-population, high cattle density, and unsustainable use and pollution are reasons for increasing pressure on natural resources and degradation of natural habitats. Dominating species in the area are Juniperus and Hagenia, the standing volume consists mainly of over-mature and over-sized trees. The forests are very fragmented due to scattered settlements and seriously affected by uncontrolled wood extraction and overgrazing.

The representatives of the local community and organizations presented their conservation approach, which consists of an integrated management system combining production, animal husbandry and eco-tourism. Exploitation of resources shall be stopped through regulating the access to the forest (by giving exclusive user rights to a maximum of 30 households for an area with 360 hectare), reducing the pressure on the forest (by promoting tree planting outside the forest) and promoting alternative non-wood income sources like tourism, trophy hunting, bamboo and selling of seeds. Many of the forest dwellers with user rights are organized in one union for counseling and coordination. Remarkable positive impacts of the approach are sustainable wood utilization, regulated grazing and improvement of the livelihood in the area by providing legal access to subsistence goods and goods to sell. Before we went to our hotel in the evening, we had the opportunity to visit the town Dodola with its big marketplace.

The second day of this trip started with a traditional Ful (beans) breakfast at a nice restaurant. On the way we could watch a wedding ceremony. Fellows of the groom were riding to the house of the bride on decorated horses. When we arrived at the eucalyptus plantation, a local manager answered our questions. Although there was some Juniperus and Cypressus regeneration underneath the eucalyptus, the plantation was not really in a good shape. Many twists in the management plans during the last decades could be a reason for this.

The manager told us that a lot of grazing took place within the plantation, what is forbidden by now. Their plan for the next years is to harvest the Eucalyptus and Cypressus species and use it only as fuel wood. Without the Eucalyptus cover and no cattle in the area they hope for natural regeneration of Juniperus and Podocarpus species.

Day 9 (Mo, 17th March) Campus Tour and Surroundings

Dennis Weiß, BSc student, Forestry

On Monday we were encouraged to take a campus tour on our own and explore the surroundings of the Wondo Genet College Campus.

At first we visited the campus own nursery, which the college employees maintain by themselves. At this nursery they cultivated several local and foreign species, such as *Juniperus procera, Polycarpus lusitanica, Dovalis abyssinicus, Hibiscus, Euphorbia pulcherrima, Nerium oleander*. These plants are meant for the use on local research grounds and some are also sold to local people.

Afterwards we visited the Arboretum. Here we were able to see older plants, some of them also from the college's own nursery. Some species such as *Acacia abyssinica, Euphobia abyssinica, Podocarpus gracilior, Maes lanceolata, Eucalyptus microcarpa, Cordia africana, Eucalyptus mitens, Juniperus procera, Spathodea nilotica* and many more.

Allocated over the campus we found "Cashin", a local plant which is used for natural fences and has an interesting taste. Also spread throughout campus we found a plant introduced to us as "Shito". It has a lemon like scent and is, according to a local, somehow used as deodorant. Around the campus, we also found several forms of land use. There is of course housing space, agricultural area used for sugarcane and other local plants, but also forestry and agroforestry areas in private use as well as for research. We also found a lot of animal bones and remainings which showed the activity of predators like hyenas.

Back on the main campus we found a replica of a traditional house with its own little farm. Here we could take a look inside the house and were able to get a hazy notion of what life in a house with no doors between the few separated rooms would be like. In the yard we could see indigenous agroforestry systems consisting of banana plants combined with coffee plants

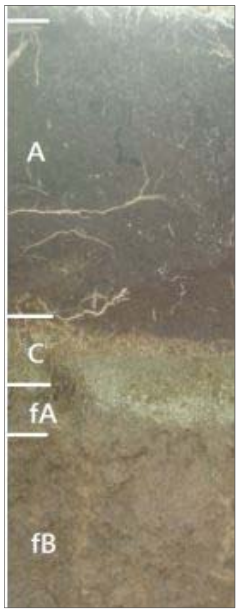
for bilateral benefits as well as rosemary, avocado, jackfruit and tenadam, a local healing plant. Also cultivated were mangos, ensete and potatoes in a shifting cultivation manner. (Ensete, also known as false banana, is a root crop and traditional staple food in South Ethiopia.
Afterwards we came across a football field where we made a break and watched some students playing football. Later we were able to visit the local sawmill and saw some types of irrigation systems.
All along the way we were accompanied by a local nursery employee and a huge variety of birds, insects and monkeys which made the campus tour a nice relaxing diversion from the full packed days that lay behind us.

Day 10 (Tue, 18th March) Fieldwork – Soil types and erosion processes

Christian Trepte, BSc student, Forestry

Together with Dr. Haubold (TUD) and a lecturer from the College we walked along the mountain chain and later into the agricultural land around Wondo Genet, in order to understand how the soils of the region were formed, how the landscape is underlying erosion and what the local farmers are doing in order to withstand the degradation processes.
An indicator, how the landscape of Wondo Genet was formed, are the so called "sloping layers" of the basaltic material. The layers that were initially arranged in a horizontal manner experienced a force from underground that caused them to tilt the angle of orientation, which can be observed on the site, as shown in the photograph (right). The slopes are composed of tuffite, a basaltic material composed of ash and lava with slight crystallisation. The dark colors come from manganese or iron. The soil on top is a syroseme. The iron in the tuffite oxidates forms hematite that gives the rock a red color.

On the second site several layers of ash and lava formed a trap series. Due to changing conditions, most dominantly by the chemical composition of the lava, the amorphous obsidian (the black material) was formed. These trap series can reach dimensions up to 2000 meters.



The third site revealed an andosole (A, C) that buried a luvisol (fA, fB). The andosole typically occurs on fresh volcanic material, in this case the volcanic ash (C). The buried luvisole is characterized by a depth increasing clay content. In the cultivated areas the horizons of the andosole are mixed.
On the remaining sites, located on the crops different stages of erosion could be seen. In the first stage the surface run-off forms annual gullies, which accumulate into a gully of 1st order. Several gullies, which are similar to temporary river beds that reach until the rock, form a gully system. The more gullies are involved the greater the amount of water carried. In the rainy season the gullies sometimes overflow and

cause severe crop damage. Another type of gully is the road side gully, which occurs due to compression of the soil.

Fanjachu

Fanjachini

If further erosion is to be prevented then actions need to be done in the gullies of 1st order by check dams or much earlier, in form of soil bands or vegetation cover, in order to slow down surface run-off. The farmers apply several techniques of which the "fanjachu" was more practiced. It catches the water and the carried sediments which afterwards are displaced up the hill. Thereby the soil is kept up the hill. The "fanjachini" works down the slope. Another technique was the plantation of parallel grass bands that slow down the water flow and catch a portion of the sediments.

The farmers around Wondo Genet are highly dependent on the fertile soil. They have developed crop rotation in order to sustain the fertility. They plant potato, teff, maize and wheat, produce honey and keep livestock. The digging of fanjachus seems to be the most effective way to prevent further erosion.

Day 11 (Wed, 19th March) Gum Arabic Collection at Yabelo

Jakob Frysch, BSc student, Forestry

After a long bus ride through the astonishing Ethiopian nature in the south of the country towards the Kenyan border we visited a nomadic community in a Kebele nearby the town Yabelo to gain an impression about the production and the regional trade of gum.

The collection is done by the female members of the community, who collect approximately daily 4-5 kg of exudate from *A. Senegal* and *Commiphora spec.* For this, they have to walk for 3-4 hours (5-6 km). This activity is often combined with pastoralism. The first instance of trade is managed by the female head of the community. She buys the collected exudate of each household and sells it to either private companies for 18-20 Birr/kg (1 Euro = ca. 25 Birr) or to the Natural Gum Processing and Marketing Enterprise (NGPME) branch of Yabelo for 17 Birr/kg (fixed).

Private actors are more interested in a high quality than the national enterprise. Furthermore the NGPME has strict guidelines for buying gums from the communities. Never the less the collection of this Non-Timber-Forest-Product (NTFP) generates a cash income of approximately 80 Birr per day for the community (Interview 19.03.2014, Kebele).

Day 13 (Thu, 20th March) Agroforestry Practice in Sidama

Wiebke Grassl, BSc student Geography

We stayed in Yabelo for one night, to depart very early at 6 o'clock in the morning by bus. After two hours of travelling north, we reached Gorodugda, a small town on our way up to Gedeo/Sidama. There we had breakfast with eggs, juice, coffee or tea. A special offer of the restaurant was a selection of cake in different shapes. All of the participants enjoyed the sweet part of this day's breakfast. In the meantime a flat tire of the bus was repaired and we were able to continue our journey. The sun was shining and the mood of the group was bright, too. About noon it was so hot outside and the street was so steep, that the brakes of the bus became too hot. So an unplanned stop at the roadside was necessary to cool them down.

After some hours of driving we reached Gedeo/Sidama to see the traditional agroforestry system. In the gardens the locals are growing coffee plants, ensete, beans (in the rainy season), avocado trees and sugar cane. There is no fruit rotation because the agroforestry system is a continuous system. Coffee plants are regenerating naturally, but ensete is replaced after four to five years. Tree species growing in the gardens are for example melissea and eucalyptus. They provide shade for the coffee plants and are used for multiple purposes, for example as fuel or construction material. The farmers have a good income due to their products, but there is no possibility for money accumulation. This makes new investments difficult. The agroforestry system is working only in this area as a result of its long tradition here. Mostly women and children are working in the gardens. Coffee, sugar cane and avocado are the major income. The inheritance is given to all family members, so the property stays in the community, which makes the system sustainable. The property stays in the families and it is not allowed to sell the land. This system is working so well due to the strong social system and its tradition.
In the evening we reached Wondo Genet College and had dinner together.

Day 14 (Fri, 21st March) Environmental activities around lake Ziway

Erik Aschenbrand, PhD candidate, Tropical Forestry

On our last day we left Wondo Genet in the morning leaving behind four of our students that stayed longer to conduct fieldwork for their Bachelors theses. We also had to say goodbye to Dr. Tsegaye Bekele and all the other staff from Wondo Genet College that were always very much concerned to make our stay in Ethiopia as fruitful and as comfortable as possible. On our way to Addis heading north through the Ethiopian rift valley, we stopped in the town of Ziway to visit a branch office of the local environmental NGO „Horn of Africa Regional Environment Centre and Network". With a very interesting presentation the head of this branch office, Mr. Amare Haile, gave us an overview about current regional environmental concerns. We learned that in the area of Lake Ziway, competition for land and water resources results in environmental degradation and that European companies have also joined in this competition for scarce water resources.
Back in Addis we celebrated the last evening of a very interesting journey together by joining a cultural dance show in a traditional restaurant before taking the flight back to Germany.

Students on a fieldwork trip

Students and African researchers in the WGC

The excursion group of the Summer School 2014: Researchers from the African network partners and German students and staff members from TU Dresden in the Wondo Genet College of Forestry and Natural Resources in Ethiopia.

Edited by: Alexander Pinkwart, BSc Student and workshop participant
Maxi Domke, project coordinator